© 2007 Abigail Schwab Batia
To my loving husband Mark David Batia.
ACKNOWLEDGMENTS

“Trust in the Lord with all your heart; do not depend on your own understanding. Seek his will in all you do, and he will direct your paths.” (Proverbs 3:5-6). During the past few years, this quote has always proven true. Without my faith and the prayers and support of family and friends, I would not have been able to complete this amazing endeavor.

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Because most Americans are sedentary, and obesity is of growing interest as a health concern in the United States, intervention methods for increasing exercise behavior are needed. Studies in the field of health promotion and exercise psychology have recently focused on determining psychological variables that influence exercise behavior. Little research has been devoted to the psychological mechanisms by which personality traits affect health-related behaviors. One possible mechanism is motivation. By adopting a self-determination theory perspective it may be possible to elucidate the motivational processes by which personality traits influence engagement in health-related behaviors such as exercise. The focus of my study was to examine the relationship between personality and the extent to which exercise behavior is regulated in a self-determined fashion.

The findings of my study suggest that personality is associated with self-determination and that there are gender and race differences on personality and exercise behavior. Additionally in this study population, self-determination fully explains the mechanism through which the openness and conscientiousness domains affect exercise behavior and partially explains the mechanism through which extraversion affects exercise behavior. The implications are
numerous for health educators, practitioners, and researchers some of which include rigorous personality and motivation education for future practitioners, proper choice and implementation of exercise programs for each specific personality domain, and continued research with other health behaviors. These results can guide the development of more personalized programs and interventions to facilitate adoption of exercise behavior in non-exercisers while increasing adherence in current exercisers.
Considerable research has been devoted to the analysis of psychosocial factors associated with the development of a variety of health behaviors over the past decade (Bermudez, 1999; Courneya, Bobick, & Schinke, 1999). In the wake of this research, one important point has become clear: the main cause of mortality can be prevented by making certain lifestyle and behavior changes (Craig, Russell, Cameron, & Beaulieu, 1999). Less attention, however, has been paid to the reasons and mechanisms that explain why individuals keep engaging or disengaging in behaviors that they know are beneficial to their health. Furthermore, why do individuals fail to develop habits that could increase their quality of life and well-being?

The association between sedentary lifestyle and all-cause mortality and morbidity is well documented (Craig, Russell, Cameron, & Beaulieu, 1999) and represents one of the most prevalent behavioral health risks in industrialized countries (US Department of Health & Human Services, 1996). The physical benefits of exercise have also been well documented and include a reduced risk of diabetes, heart disease, high blood pressure, bone density loss, premature death, as well as improvement in weight management and overall fitness (Bouchard, Shephard, & Stephens, 1994; Warburton, Nicol & Bredin, 2006). Research suggests that the benefits of regular exercise extend beyond the primary prevention of chronic physical diseases, as regular exercise has been demonstrated to improve mental well-being and quality of life (Courneya, Mackey, & Jones, 2000).

Despite the health threats posed by inactivity, research indicates that 60% of the population remains insufficiently active to receive health benefits from physical activity and 25% of the population is considered sedentary (Stephens & Caspersen, 1994; US Department of Health & Human Services, 1996). Furthermore, the attrition rates from structured exercise programs
remain high. About 50% of exercise participants terminate their involvement within the first six months of enrollment (Craig, Russell, Cameron, & Beaulieu, 1999). Thus, understanding the individual factors that influence adherence to an exercise regimen will aid in implementing effective intervention strategies.

**Research Problem**

Studies in the field of health promotion and exercise psychology have recently focused on determining psychological variables that influence exercise behavior. Little research, however, has been devoted to the psychological mechanisms by which personality traits affect health-related behaviors (Bermudez, 1999; Hoyle, 2000). One possible mechanism is motivation. Researchers have examined the association between personality traits and exercise participation motives, but it is hard to discern a consistent pattern in the findings. The study of such surface motives does not in itself reveal much about the underlying motivational processes. By adopting a self-determination theory perspective it may be possible to elucidate the motivational processes by which personality traits influence engagement in health-related behaviors such as exercise. Therefore, the focus of this study is to examine the relationship between personality and the extent to which exercise behavior is regulated in a self-determined fashion.

**Rationale**

Current research (Li, 1999; Wilson, Rodgers, & Fraser, 2002) and commentary (Vallerand & Perreault, 1999) has highlighted the importance of understanding the motivational processes that regulates exercise initiation and persistence. One theoretical approach that holds appeal for understanding exercise motivation is called self-determination theory (SDT) (Deci & Ryan, 1985; Ryan & Deci, 2000). SDT proposes that persistence behavior and psychological well-being are regulated via mechanisms reflecting the quality of motivation toward a particular activity (Ryan & Deci, 2000). SDT is founded on the premise that there are innate psychological
needs for autonomy, competence, and relatedness and it also recognizes a distinction between intrinsic and extrinsic motivation. Rather than simply contrasting intrinsic and extrinsic motivation, SDT posits a differentiated view of extrinsic motivation. The theory proposes that there are different ways in which a person’s behavior can be regulated and that these different forms of behavioral regulations form a continuum of self-determination. The continuum includes amotivation, external regulation, introjected regulation, identified regulation, integrated regulation, and intrinsic regulation. Behavioral regulation within the exercise domain is assessed by the Behavioral Regulation in Exercise Questionnaire – 2 (BREQ-2; Markland & Tobin, 2004). In addition to the BREQ-2, a Relative Autonomy Index (RAI; Ryan & Connell, 1989) is computed to represent overall self-determination of participants.

Research aimed at identifying reasons for exercise also occurs in the context of associated personality traits. Personality characteristics are individual differences that predispose, or facilitate, the development and preservation of certain patterns of behavior (Bermudez, 1999). In addition, the identification of such variables and the analysis of their association with different kinds of behavior permit researchers to assess an individual’s vulnerability and facilitate the identification of variables on which to focus to improve their health. It is valuable to include personality traits when researching exercise motivation because those traits can provide the framework within which motivation occurs (Eysenck & Eysenck, 1985).

The Five-Factor Model (FFM) of personality is a version of trait theory that views humans as people with consistent and enduring individual differences (McCrae & John, 1992). The five personality dimensions of the FFM are Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. One major advantage of the FFM is that it provides a comprehensive yet parsimonious taxonomy of personality traits. Still, it is not believed that the
five-factor factors exhaust personality but rather represent personality at the highest hierarchical level of trait description (McCrae & John, 1992). The FFM is assessed using the NEO-Five-Factor Inventory (NEO-FFI) developed by Costa and McCrae (1992).

To date, few research designs have combined the three variables – personality, self-determination and exercise. This study aims to discern whether an individual’s personality type influences their self-determination relative to their exercise behavior (i.e., does one personality type show higher or lower levels of self-determination than the other four types?). If personality is linked to other known determinants of exercise such as motivation, participants can be matched to exercise programs that meet their needs. Additionally, interventions to maximize exercise adherence could be developed based on personality profiles. Lack of such research and the plausible relationship between these variables establishes a need and provides the rationale for conducting this study.

**Research Questions**

1. Is there an association between personality and self-determination?

2. Are there gender and/or race/ethnicity differences on personality, self-determination and exercise behavior?

3. Using self-determination theory as a framework, do participants’ self-determination scores mediate the relationships between aspects of personality (neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness) and exercise behavior?

4. Do elements of the Five-Factor Model of personality moderate relationships between participants’ self-determination scores and exercise behavior?

**Delimitations**

- This study utilized a cross-sectional, paper-pencil, survey research design.
- Participants aged 18 and older, were university students enrolled in classes at a large, public university in north central Florida.
- Data was collected in calendar year of 2007.
- Participants were able to read and understand the directions, the questions, and their respective response options necessary to complete the questionnaire.
• The NEO-Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992) was used to assess the personality type of participants.
• The Behavioral Regulation in Exercise Questionnaire – 2 (BREQ-2; Markland & Tobin, 2004) was used to measure self-determination of participants.
• In addition to the BREQ-2, a Relative Autonomy Index (RAI) was computed to represent overall self-determination of participants.
• The Leisure Time Exercise Questionnaire (LTEQ; Godin, Jobin, & Bouillon, 1986) was used to assess weekly frequency of mild, moderate, and strenuous exercise.
• A Demographic Questionnaire was used to obtain demographic information about participants.

Limitations

• The use of self-report surveys may lead participants to provide responses that they believe are socially desirable.
• Data collected from a cross-sectional survey design reflects responses from participants at a specific point in time and therefore cannot establish causation.
• Findings in this study cannot be generalized to other populations of college students.
• Volunteers who participated in the study may not represent all college students at a large, public university in north central Florida.
• Data collected during calendar year 2007 may differ from data collected during other time periods.
• Demographic information obtained by the demographic questionnaire may not capture all pertinent information about participants.

Assumptions

• Volunteers who agreed to participate in the study are considered adequate to represent college students at a large, public university in north central Florida.
• Data collected during the calendar year 2007 is considered adequate for the purpose of the study.
• The NEO-Five-Factor Inventory is considered adequate to address personality type among participants.
• The Behavioral Regulation in Exercise Questionnaire – 2 is considered adequate to determine the self determination of participants as exercisers.
• Demographic information obtained by the Demographic Questionnaire is considered adequate to describe study participants.
• The research design is considered appropriate for the purpose of the study.

List of Terms

Agreeableness: A personality type under the Five-Factor Model characterized by trust, straightforwardness, altruism, compliance, and tender-mindedness (McCrae & John, 1992).
Amotivation: Not acting at all or acting without intent resulting from not valuing the activity, not feeling competent, or not expecting it to yield a desired outcome (Ryan & Deci, 2000).

Autonomy: A basic psychological need in which the feeling of volition that can accompany any act, whether independent or dependent, collectivist or individual (Frederick & Ryan, 1993).

Competence: A basic psychological need which concerns people’s inherent desire to be effective in dealing with the environment (White, 1959).

Conscientiousness: A personality type under the Five-Factor Model characterized by order, dutifulness, achievement-striving and self-discipline (McCrae & John, 1992).

Exercise: Planned, structured, and repetitive physical activity that is done with the purpose of maintaining or improving physical fitness or health (Sallis & Owen, 1999).

External Regulation: The most controlling form of external motivation outlined within the Self-Determination Theory, involving participation in a behavior to satisfy an externally imposed demand or to obtain an instrumental reward (Deci & Ryan, 1985).

Extrinsic Motivation: The performance of an activity because of pressure from significant others or the desire to avoid the negative (Ryan & Deci, 2000).

Extraversion: A personality type under the Five-Factor Model characterized by a keen interest in other people and external events, positive affect, activity, assertiveness, and excitement-seeking (McCrae & John, 1992).

Identified Regulation: Occurs when a behavior is valued and deemed important or useful by the individual and is perceived as being chosen by oneself (Deci & Ryan, 1990).

In-active: Not performing any physical activity or activity during work or leisure time that does not exceed half an hour per week, such as those in clerical jobs (Al-Asfoor, Al-Lawati & Mohammed, 1999).

Integrated Regulation: The most autonomous form of extrinsic motivation that occurs when identified regulations are fully assimilated to the self, meaning they have been evaluated and brought into congruence with one’s other values (Ryan & Deci, 2000).

Intrinsic Motivation: The performance of an activity for the inherent satisfaction of the activity itself (Ryan & Deci, 2000).
Introjected Regulation: The second type of external motivation that is characterized by taking in a regulation but not fully accepting it as one’s own (Ryan & Deci, 2000).

Leisure-Time: Freedom provided by the cessation of activities; especially time free from work or duties (Merriam-Webster, 2006).

Neuroticism: A personality type under the Five-Factor Model characterized by anxiety, depression, self-consciousness, and vulnerability (McCrae & John, 1992).

Openness to Experience: A personality type under the Five-Factor Model characterized by openness to fantasy, feelings, ideas, values, aesthetics, and action (McCrae & John, 1992).

Personality: Stable sources of individual differences that predispose, or facilitate, the development and preservation of certain patterns of behavior (Bermudez, 1999).

Physical Activity: Any movement that results in the use of energy and usually involves the use of large muscle groups (Sallis & Owen, 1999).

Relatedness: A basic psychological need in which one feels they have satisfying and supportive social relationships (Frederick & Ryan, 1993).

Sedentary: Undertaking little to no leisure time physical activity (Youssef, Abou-Khatwa, & Fouad, 2003).

Self-Determination: A relatively enduring aspect of a person’s personality which reflects being more aware of their feelings and their sense of self, and feeling a sense of choice with respect to their behavior (Thrash & Elliot, 2002).
CHAPTER 2
REVIEW OF THE LITERATURE

Exercise

Increasing physical activity is a major goal of Healthy People 2010, the U.S. national health promotion and disease prevention objectives (U.S. Department of Health & Human Services, 2000). The Report of the Surgeon General (U.S. Department of Health & Human Services) indicated that more than 60% of U.S. adults are not regularly physically active and that 25% of U.S. adults do not participate in any physical activity. The Behavioral Risk Factor Surveillance System, completed by the Centers for Disease Control and Prevention in 2001 to measure leisure time, transportation, and household physical activity, found that nearly 55% of U.S. adults were not active enough to meet the exercise recommendation of 30 minutes of moderate-intensity activity on most days of the week (Centers for Disease Control and Prevention, 2003).

A number of expert groups, such as the American College of Sports Medicine, the National Institutes of Health and the Centers for Disease Control and Prevention, have introduced exercise recommendations. There is a debate over whether these guidelines should be for maximal fitness level, which would result in the greatest health benefits, or for an activity level realistically attainable by the general public that is still of high enough for intensity, frequency, and duration to lead to some health benefits. Most researchers in the field (e.g., Sallis & Owen, 1999) have agreed upon the definitions of the following terms used in the guidelines: Physical activity is any movement that results in the use of energy and usually involves the use of large muscle groups, whereas exercise is planned, structured, and repetitive physical activity that is done with the purpose of maintaining or improving physical fitness or health. Exercise and physical activity are often measured in terms of metabolic equivalents, called METs.
Resting required the energy equivalent of one MET (Sallis & Owen). Moderate activity has been defined as activity that requires three to six times as much energy as rest (3-6 METS), which for most people is equivalent to brisk walking. Vigorous activity has been defined as activity that requires at least seven times as much energy as rest (≥ 7 METs), which for most people is the equivalent of jogging (Blair, Kohl, Gordon, & Paffenbarger, 1992).

In 1990, the Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) recommended aerobic training 3 to 5 times a week for 20 to 60 minutes at an intensity of 60 to 90% of maximal heart rate (i.e., moderate to high intensity) plus twice-weekly resistance training (American College of Sports Medicine, 1990). These guidelines are among the “traditional” recommendations to achieve ideal aerobic fitness. Despite these recommendations, evidence accumulated that indicated that many Americans were still sedentary. In addition, research suggests that, although greater levels of activity led to the lowest risk of dying, the greatest increase in health benefits resulted when the least active and fit became moderately active and fit (Blair et al., 1992). Even a modest level of physical activity at moderate intensities can be healthy (Sallis & Owen, 1999).

The prevalence of physical inactivity is higher in women than in men, but it is highest among minority women. However, it has been shown that women are less active than men in all racial or ethnic groups (Valerie, 2000). Differences in race/ethnicity show that minorities suffer disproportionately from chronic diseases that are more commonly observed among persons who are physically inactive (Crespo, 2000). While information about biological and genetic predispositions could explain some of these health disparities, it is the interaction between societal and other environmental factors that can provide better clues on how to reduce the levels of physical inactivity observed in minority populations (Kjelsås & Augestad, 2004).
Crespo, (2000) found the highest prevalence of physical inactivity among non-Hispanic blacks and Mexican Americans. The prevalence of physical inactivity among both Mexican American men and women of any age group is greater than the prevalence of physical inactivity observed among non-Hispanic whites ages 70 to 79 years. Physical inactivity increases as people get older, but for Mexican Americans, participation in physical inactivity during leisure time is very high very early in their adult lives.

Of the adults who start an exercise program, 60% will drop out during the first six months (Morgan & Dishman, 2001). Thus, sedentary behavior is a major health problem in the United States. As a result, researchers have examined the determinants of adults’ exercise behavior in an attempt to understand how to increase adherence to physical activity or exercise (Dishman, Sallis, & Orenstein, 1985; Oman & King, 1998). In fact, there are more than 300 studies examining exercise determinants (Sallis & Owen, 1999; Trost, Owen, Bauman, Sallis, & Brown, 2002). Understanding the individual factors, such as personality and motivation, that may influence adherence to an exercise regimen will aid in implementing effective intervention strategies.

**Personality**

Personality is defined as “the underlying, relatively stable, psychological structures and processes that organize human experience and shape a person’s actions and reactions to the environment” (Lazarus & Monat, 1979, p. 1). Personality is the sum total of all the behavioral and mental characteristics that make an individual unique (WordReference.com, 2006). Thus, personality includes social (e.g., extraversion and impulsiveness), perceptual (e.g., openness), and cognitive (e.g., neuroticism) characteristics (Gill, 2000).

Several years ago, researchers suggested that there may actually be a healthy personality (Marshall, Wortman, Vickers, Kusulas, & Hervig, 1994). Thus, personality may play a role in
health maintenance and promotion. Marshall and colleagues suggested that the broad personality domains of neuroticism, extraversion, openness, agreeableness, and conscientiousness can “provide an adequate and valuable initial organizing framework for research aimed at understanding linkages between personality and health” (p. 282). In other words, do people who engage in healthy behaviors share common personality characteristics that unhealthy people do not display? In particular, exercise is one of the healthy behaviors that is being investigated to determine if individuals with specific personality characteristics are more likely to exercise than others (Courneya, Bobick, & Schinke, 1999).

Past research in the relationship of personality and exercise has focused on either specific personality traits including self-esteem, self-motivation, and locus of control (e.g., Dishman, 1983; Dishman & Steinhardt, 1990; Sullum, Clark, & King, 2000) or more global personality dimensions through the use of measures such as Eysenck’s Personality Inventory (Eysenck & Eysenck, 1985) and Cattell’s Sixteen Personality Questionnaire (Cattell & Eber, 1964). The main problem faced by this kind of research is the use of a large diversity of personality constructs, frequently redundant and measured with different instruments (Smith & Williams, 1992).

In recent years, a significant consensus has been reached about the use of the Five Factor Model (FFM; Costa & McCrae, 1992) as a framework for research on the relationships between personality and health, including exercise behavior (Bermudez, 1999; Smith & Williams, 1992). The resulting research has demonstrated how the FFM incorporates most of the research results generated from other theoretical models and associated with the dimensions of Extraversion, Neuroticism, and Openness to Experience. Likewise, this research has shown that the dimensions of Agreeableness and Conscientiousness are relevant for the development of healthy
behavior and the achievement of higher levels of physical welfare (Costa & McCrae, 1980; McCrae & Costa, 1990).

**Five-Factor Model of Personality**

The current dominant framework for studying personality is the Five Factor Model (Costa & McCrae, 1992), which contains the following five domains that explain personality the most: neuroticism, openness to experience, conscientiousness, extraversion, and agreeableness (McAdams, 1994; Marshall et al., 1994; Paunonen & Ashton, 2001; Wiggins & Trapnell, 1997). These five broad domains provide a parsimonious yet reasonably comprehensive representation of personality (Costa & McCrae, 1992). Neuroticism is the tendency to experience negative affect and emotional distress. Extraversion is the disposition toward positive emotions, sociability and excitement. Openness to experience is characterized by a willingness to entertain new ideas and unconventional values. Agreeableness is the inclination to be agreeable and altruistic. Finally, conscientiousness is the temperament of a strong-willed, determined and organized individual.

Currently, the dominant measure used to assess personality is the 240-item NEO-PI-R, which is based on the FFM and assesses the five personality domains (neuroticism, openness, conscientiousness, extraversion, and agreeableness). Additionally, the NEO-PI-R assesses six facets within each of the five domains (Costa & McCrae, 1992). These facets explain and provide insight into the composition of each domain. That is, the neuroticism domain contains the following six facets: anxiety, angry hostility, depression, self-consciousness, impulsiveness, and vulnerability; while the extraversion facets are warmth, gregariousness, assertiveness, activity, excitement-seeking, and positive emotions. The openness to experience facets are fantasy, aesthetics, feelings, actions, ideas, and values. The agreeableness domain facets are trust, straightforwardness, altruism, compliance, modesty, and tender-mindedness. Finally, the
conscientiousness domain facets are competence, order, dutifulness, achievement striving, self-discipline, and deliberation (see Table 2-1 for a brief description of each of the FFM facets).

Within the trait or variable-centered approach, the FFM is currently the most influential and there is growing evidence for the cross-cultural universality of these dimensions (McCrae & Allik, 2002). Studies of indigenous trait lexicons also provide support for FFM dimensions in a variety of languages and cultures (Saucier, Hampson, & Goldberg, 2000). For example, in the Philippines there is support for the FFM in both lexical studies (Church, Katigbak, & Reyes, 1998) and in studies that have applied indigenous and imported inventories (Katigbak, Church, Guanzon-Lapen˜a, Carlota, & del Pilar, 2002).

There is now considerable evidence that the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992) provides reliable and valid measures of personality traits in a wide variety of cultures, from Zimbabwe to the Russian Arctic (Draguns, Krylova, Oryol, Rukavishnikov, & Martin, 2000; Piedmont, Bain, McCrae, & Costa, 2002). Using translations prepared by psychologists from around the world, the American factor structure has been replicated in a wide range of cultures (Rolland, 2002). Gender differences (Costa, Terracciano, & McCrae, 2001) and maturational trends (McCrae et al., 1999) on FFM scales have also been widely replicated. In general, these studies suggest that the NEO functions much the same in all cultures. However, there are also some cross-cultural differences: Standard deviations of NEO-PI-R scales are consistently smaller in Asian countries than in the West (McCrae, 2002), and gender differences are less marked among Asians and Black Africans than among Americans and Europeans (Costa et al., 2001).

To reduce participant burden, a 60-item version of the NEO-PI-R called the NEO-Five-Factor Inventory (NEO-FFI) was developed (Costa & McCrae, 1992). The NEO-FFI assesses the
five broad personality domains by using one question from each facet from the NEO-PI-R. As with many questionnaires with a short and long form, the long form allows for greater insight into each personality domain and is more reliable than the short form (Costa & McCrae).

**Personality and Exercise**

In a recent review of exercise and personality literature \((N = 44\) studies), Hagan (2004) found that personality was rarely defined in studies, and there were a variety of assessment instruments used to measure both personality and exercise. The variety of questionnaires used demonstrates an inconsistency in the definition and conceptualization of personality.

For example, eight different personality assessments were used (i.e., Eysenck Personality Questionnaire, NEO, Adjective Checklist, Symptom Checklist, Multiple Affect Adjective Checklist, Cattell’s Sixteen PF, Type A Personality, and the MMPI), with the Eysenck Personality Questionnaire being the most commonly used. The questionnaires developed to assess personality differ in length and type of assessment. For example, some measures have 60 items while other have 500 items (Costa & McCrae, 1992; Hathaway & McKinley, 1943). Additionally, the array of scales/dimension assessed include personality facet ranges from three (Eysenck Personality Questionnaire; Eysenck & Eysenck, 1964) to 25 (Adjective Checklist; Gough, 1952). The wide array of personality questionnaires makes it difficult to compare results across studies.

In terms of the exercise measures, six physical activity measurements appeared equally in the literature. Most of these measures were author-developed. One problem identified was a lack of uniformity in the definition of regular exercise. That is, regular exercise has been defined by governing bodies of physical activity and medicine but these definitions are rarely used in personality and exercise research. For example, a few studies have used the number of bouts an individual exercises during the week without reference to a time interval or the number of
sessions in a month while some studies did not define regular exercise (Brunner, 1969; Francis & Carter, 1982; Iannos & Tiggemann, 1997). Also, a standardized measure of exercise has not consistently been employed (Arai & Hisamichi, 1998; Bamber, Cockerill, & Carroll, 2000; Chapman & DeCastro, 1990; Goldberg & Sheppard, 1982; Iannos & Tiggemann, 1997; Schnurr, Vaillant, & Vaillant, 1990; Yates, Shisslak, Allender, Crago, & Leehey, 1992). The difficulty is that the instruments may not be reliable and valid, making comparisons across studies questionable.

About 50% of the studies examined whether differences in personality occurred between active and non-active individuals, a classification based mostly on author-developed questionnaires. Additionally 83% of the studies reviewed found that active people reported higher levels of extraversion than inactive people, and that inactive people reported higher levels of neuroticism than active people. Some of this literature will be reviewed in more detail below.

For example, Arai and Hisamichi (1998) examined the relationship between exercise and personality. Participants (N = 22,448) completed the Japanese short form of the Eysenck Personality Questionnaire-Revised (Eysenck & Eysenck, 1985) and a self-report author-developed exercise questionnaire assessing frequency of exercise per week. Bivariate correlations were used to examine the data and an analysis of covariance was conducted to control for possible confounding factors of age, marital status, and education. They found that high levels of extraversion were positively related to exercise, and high levels of neuroticism were positively correlated to not exercising. A limitation of this study, however, was its lack of a standardized exercise measure.

In a study using all standardized measures, Mathers and Walker (1999) examined the relationship between extraversion and exercise behavior among 36 university students. The
students completed the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1964), the Commitment to Physical Exercise Scale (Corbin, Nielsen, Bordsdorf, & Laurie, 1987) and the Negative Addiction Scale (Hailey & Bailey, 1982). Based on the students’ responses to the physical activity measures, they divided the sample into exercisers and non-exercisers. Group differences were analyzed with planned orthogonal comparisons within analysis of variance. They found that the exercise group scored higher on extraversion than the non-exercise group. This study, however, is limited by its small sample size, which limits the generalizability of the results. Additionally, a measure of exercise behavior was not used, but rather an attitude about exercise.

To date, few studies have investigated the relationship of exercise behavior to the Five-Factor Model (Courneya, Bobick, & Schinke, 1999; Courneya & Hellsten, 1998; Giacobbi, Hausenblas, Frye, 2005; Rhodes & Courneya, 2003; Rhodes, Courneya, & Hayduk, 2002; Watson & Pennebaker, 1989). The model is derived from trait theory and perceives humans in the context of consistent and enduring individual differences. Although it does not provide an exhaustive description of personality, theorists of the model believe that the five factors provide representation of personality at the highest level of trait description (Costa & McCrae, 1992). Therefore, it seems that the FFM may contribute something to the knowledge about the relationship between personality and exercise behavior beyond the global measures and specific traits comprising the majority of past research.

Using a standardized measure of exercise behavior, Courneya, Bobick, and Schinke (1999) conducted two studies assessing personality and exercise. In the first study, female undergraduate students \( N = 300 \) completed the Leisure-Time Exercise Questionnaire (Godin, Jobin, & Bouillon, 1986) and the NEO-FFI to assess the FFM of personality (60 items; Costa &
Hierarchical regression analysis was used to examine both sets of data. Positive correlations emerged for extraversion and conscientiousness, and a negative correlation for neuroticism, with exercise. In the second study (\(N = 67\)), women participated in an 11-week exercise program, and their attendance was monitored. Based on their responses to the NEO-FFI and their class attendance, a significant positive association between exercise and extraversion and conscientiousness was found.

In another study with similar measures, Courneya and Hellsten (1998) examined exercise behavior and personality using the FFM with 264 undergraduate students. The NEO-FFI, Leisure-Time Exercise Questionnaire, and author-developed exercise preference questionnaire were used to assess personality, exercise, and exercise preferences, respectively. Pearson correlations were computed along with multivariate analysis of variance and Tukey post hoc tests. A negative correlation with exercise was found for neuroticism, and positive correlations were found for extraversion and conscientiousness. However, regression analysis revealed that none of the five domains were statistically significant predictors of exercise behavior.

For exercise preferences, Courneya and Hellsten (1998) found that all the NEO domains were related to some aspect of preferences. More specifically, individuals who scored high on extraversion preferred to exercise in a group rather than alone and they also enjoyed supervised sessions more than the self-directed sessions preferred by individuals who scored lower on extraversion. Additionally, individuals scoring high on openness preferred to exercise outdoors more than indoors compared to those scoring low on openness, while those scoring high on agreeableness favored aerobics more than weight-training compared to those who scored low on agreeableness. Those who preferred high-intensity exercise scored lower on neuroticism and higher on conscientiousness than those who preferred moderate intensity, and individuals who

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preferred scheduled exercise scored lower on openness and higher on conscientiousness than those who preferred spontaneous exercise. A limitation of this study was using the short version of the NEO versus the longer version and an author-developed measure of exercise preferences that was not tested for reliability and validity.

Rhodes, Courneya, and Hayduk (2002) examined the moderating influence of the five-factor model of personality on the theory of planned behavior (TPB) in the exercise domain. Researchers assessed personality in undergraduate students (N = 300) who completed measures of the NEO-FFI, TPB instruments, and a two-week follow up of exercise behavior. Researchers created two-group structural equation models of the theory of planned behavior using a median split for each personality trait. Neuroticism was found to moderate the effect of subjective norm on intention and Extraversion was found to moderate the effect of subjective norm on intention as well as intention on behavior. Researchers also found that conscientiousness moderated the effect on the intention and behavior relationship. Openness to Experience and Agreeableness, however, were not found to moderate the TPB in the exercise domain. From a practical perspective, this suggests that interventions based on normative beliefs may only benefit individuals with high Neuroticism or low Extraversion, as these people appear to be more motivated by social pressure. In addition, Low Conscientiousness individuals may need special attention to get them to implement their intentions to actual behavior (Gollwitzer, 1999).

In another study, Rhodes and Courneya (2003) assessed the Five-Factor Model of personality and the theory of planned behavior (TPB) constructs with regard to exercise. The purpose of their study was to investigate the theory of planned behavior’s mediating hypothesis between the five-factor model and exercise behavior. They used an extended TPB model, including concepts of affective and instrumental attitude, injunctive and descriptive norm,
controllability, and self-efficacy. To test the replicability of the findings, the research questions were examined with undergraduate students (N = 303) prospectively and with breast, prostate, colon, and lung cancer survivors (N = 802), using a cross-sectional design. Personality was assessed using the NEO-FFI, exercise behavior was assessed using the Leisure-Time Exercise Questionnaire, and TPB was assessed with various measures. Using structural equation modeling, the results indicated that Neuroticism, Openness to Experience, Conscientiousness, and Agreeableness did not have significant effects for either undergraduate students or cancer survivors. Further research is needed in order to ascertain that these personality domains would not, in fact, have a significant direct effect upon exercise behavior while controlling for the TPB. The results did, however, indicate that Extraversion had a significant effect for both the undergraduate students and cancer survivors. This study suggests the importance of Extraversion’s activity facet on exercise behavior, even when controlling for a TPB model with additional social-cognitive concepts and disparate population samples.

Giacobbi, Hausenblas, and Frye (2005) assessed the within-subjects association between daily life events, positive and negative mood states, and exercise, as well as the moderating role of personality for the exercise/mood relationship. Participants were recruited from undergraduate classes (N = 106). They completed various instruments including the NEO-FFI to assess personality and the Leisure-Time Exercise Questionnaire to assess exercise behavior. Hierarchical linear modeling and the HLM/2L computer program were used to analyze the data. Results confirmed the hypothesis that levels of exercise would result in significant increases in positive mood states and reduction in negative mood states. The analysis of the possible moderating role of personality on the relationship between exercise and mood revealed that, with the exception of Openness to Experience and Conscientiousness, personality variables had little
effect on this association. These results could be due to sampling issues or the limited variability on personality scores because researchers used the 60-item NEO Five-Factor Inventory instead of the 240-item NEO Personality Inventory Revised (Costa & McCrae, 1992).

In summary, exercise and personality research has mostly examined the personality factors of extraversion and neuroticism, despite the fact that researchers have acknowledged the utility of the FFM as operationalized by the NEO for explaining and predicting health behaviors (Digman, 1994; McAdams, 1994). Thus, research that applies the NEO is needed. In particular, research utilizing the 60-item NEO-FFI is necessary because of the tool’s strong psychometric properties and its assessment of each domain to examine the relationship between personality and exercise. Finally, most of the research has used unstandardized exercise measures when examining the relationship between personality and exercise (e.g., Arai, & Hisamichi, 1998; Bamber et al., 2000) despite the need to use standardized measure of exercise (US Department of Health & Human Services, 2000).

**Self-Determination Theory**

An important objective of human sciences is concerned with the development of conceptual models that predict and explain human behavior. Such models have demonstrated substantial predictive value and have helped practitioners identify the groups of individuals that are likely to engage in socially desirable behaviors. One approach that social and health psychologists have adopted to understand health-related behavior and well-being is self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000). Applications of this theory have led to identification of the most essential motivational constructs that underlie psychological well-being as well as motivation to engage in health-related behaviors. SDT is a macro-theory of human motivation concerned with the development and functioning of personality within social contexts. The theory focuses on the degree to which human behaviors...
are volitional or self-determined (Ryan & Deci, 2000). SDT focuses on the degree to which human behaviors are volitional or self-determined, that is, the degree to which people endorse their actions at the highest level of reflection and engage in those actions with a full sense of choice (Ryan, Kuhl, & Deci, 1997).

SDT assumes that human motivation and well-being are associated with the satisfaction of three psychological needs: competence, relatedness and autonomy (Deci & Ryan, 2000). At a theoretical level, the concept of psychological needs is important because it helps researchers and practitioners to identify the motivational constructs that are necessary for motivation, well-being and integrity (Ryan, 1995). According to SDT, a strong sense of competence, relatedness and autonomy constitutes the essential input that nurtures motivation and well-being.

The need for competence concerns people’s inherent desire to be effective in dealing with the environment (White, 1959). Throughout life, people engage their world in an attempt to master it and to feel a sense of effectiveness when they do. The need for relatedness concerns the universal propensity to interact with, be connected to, and experience caring for other people (Baumeister & Leary, 1995). Many of life’s activities involve others and are directed at experiencing the feeling of belongingness. Finally, the need for autonomy concerns people’s universal urge to be causal agents, to experience volition, to act in accord with their integrated sense of self, and to endorse their actions at the highest level of reflective capacity (deCharmes, 1968). To be autonomous does not mean to be independent of others, but to feel a sense of willingness and choice when acting.

Because these needs are essential, people tend to orient toward those situations that allow satisfaction of the needs and away from those that thwart the needs (Deci & Vansteenkiste, 2004). However, in many cases, people’s behavior is not specifically intended to satisfy their
basic needs. Rather, they do what they find interesting and personally important, and they experience need satisfaction in doing so.

The concept of motivation has been studied from several perspectives (e.g., Freud, 1923/1962; Hull, 1943; Skinner, 1953). One perspective that has proven useful over the past 20 years suggests that behavior can be seen as intrinsically or extrinsically motivated (de Charms, 1968; Deci & Ryan, 1985; Ryan, 1995). Intrinsically motivated behaviors are those that are engaged for personal benefit, in other words, for the pleasure and satisfaction derived from performing a specific behavior. They are activities that people voluntarily perform in the absence of material rewards or constraints (Deci & Ryan, 1985). Playing tennis for the sheer pleasure of improving one’s skill is an example of intrinsic motivation.

On the other hand, extrinsic motivation pertains to a wide variety of behaviors where the goals of action extend beyond those inherent in the activity itself. People engage in such behaviors as a means to an end, not for their own sake (Deci & Ryan, 2000). Originally, it was thought that extrinsic motivation referred to behaviors performed in the absence of self-determination, which thus could be prompted only by external contingencies. However, Deci, Ryan, and their colleagues (Deci & Ryan, 1985, 2000; Ryan & Connell, 1989; Ryan, Connell, & Deci, 1985) proposed that different types of extrinsic motivation exist, some of which are self-determined and may be performed through self-regulation. According to these researchers, there are four types of extrinsic motivation which can be ordered along a self-determination continuum. From lower to higher levels of self-determination, they are external (non-self-determined), introjected (limited self-determination), identified (moderate self-determination), and integrated regulation (complete self-determination) (Mullan & Markland, 1997).
Behavior that is externally regulated is typically undertaken because of pressure from significant others (e.g., family, friends, or doctor), or the desire to avoid the negative consequences of inaction (e.g., disapproval of others). For example, some individuals may exercise to improve their health conditions because a health professional advised it. In this case, an activity that can or should be fun is performed in order to avoid negative consequences (e.g., cardiovascular disease onset). The motivation is extrinsic because the reason for participation lies outside the activity itself. Furthermore, the behavior is not chosen or self-determined.

External regulation may also be fueled by a desire for rewards. In this case the motivation is still extrinsic and non-self-determined, but the instigating factor is the desired reward rather than a constraint. Regardless of whether the goal of a behavior is to obtain rewards or to avoid sanctions, the individual experiences an obligation to behave in a specific way and feels controlled by the reward or the constraint (Deci & Ryan, 1985).

With introjected regulation, individuals begin to internalize the reasons for their actions. Thus, the source of control is inside the individual. However, this form of internalization is not truly self-determined since it is limited to the internalization of external contingencies. Rewards or constraints are now imposed by the individual and not by others. Thus, an individual might say, "I’ll feel guilty if I don’t work out today." Beliefs and controls are now internalized, although these are not self-determined and are experienced as pressure and tension toward specific aims.

In contrast, identified regulation occurs when a behavior is valued and deemed important or useful by the individual and is perceived as being chosen by oneself (Deci & Ryan, 1990). Behavior is internally regulated in a self-determined way. An example would be an individual who exercises because they value its benefits. The motivation is extrinsic because the activity is
not performed for itself but as a means to an end (e.g., to improve one’s cardiovascular health). However, the behavior is nevertheless self-determined: Rather than being guilted into working out, the individual chooses to do it because they feel it will benefit them.

The last type of extrinsic motivation is integrated regulation. At this level, a person does the behavior willingly and self-regulation is consistent with an individual's self-concept. The focus is on how the chosen extrinsically motivated behavior fits in with the rest of the individual's life activities and valued goals. To the extent that there is harmony between the behavior and the individual's other facets of his or her self, there is integration. For instance, someone exercising for integrated reasons would do so because exercising is part of what he/she is and, therefore, maintenance of fitness is of utmost importance to that person. When there is conflict, however, the behavior is not integrated. It should be noted that it is at this stage of integration that the individual experiences the greatest level of self-determination for extrinsically motivated behaviors.

Apart from intrinsic and extrinsic motivation, Deci and Ryan (1985) claim that a third construct – amotivation – must be considered to fully understand human behavior. Individuals are amotivated when they perceive a lack of contingency between their behavior and outcomes. There is an experience of incompetence and lack of control. Amotivated behaviors are neither intrinsically nor extrinsically motivated: They are non-motivated. There are no rewards (intrinsic or extrinsic) and participation in the activity will eventually cease. Amotivated behaviors are the least self-determined because there is no sense of purpose and no expectation of reward or of the possibility of changing the course of events.

In summary, there are five types of regulation with varying degrees of self-determination: external regulation, introjected regulation, identified regulation, integrated regulation and
intrinsic regulation. Intrinsically motivated behaviors are the most self-determined, whereas amotivated behaviors are the least self-determined. External regulation, introjected regulation, and identified regulation are three different forms of extrinsic motivation, external regulation being the least self-determined of these types. With introjected regulation, the individual begins to internalize the external regulatory process but does not identify with it and, thus, does not experience self-determination. Finally, with identified regulation, the regulatory process is integrated with one’s self and behavior becomes self-determined.

The self-determination continuum conceptualization allows for a more meaningful understanding of how one can simultaneously be extrinsically motivated (e.g., exercising to improve appearance, maintain fitness, or lose weight) yet feel quite self-determined in the regulation of behavior. Research has shown the relevance of the continuum approach in a diverse range of settings; academic contexts (e.g., Ryan & Connell, 1989; Vallerand & Bissonnette, 1992), couple happiness (Blais, Sabourin, Boucher, & Vallerand, 1990), among the elderly (Vallerand & O’Connell, 1989) and exercise and sport (Biddle, Soos, & Chatzisarantis, 1999; Chatzisarantis & Biddle, 1998; Chatzisarantis & Hagger, 2005; Chatzisarantis et al., 2002; Mullan & Markland, 1997; Pelletier et al., 1995; Thompson & Wankel, 1980).

Numerous studies have revealed that motivation leads to a host of important outcomes (Vallerand, 1997). Because the different types of regulation are hypothesized to be on a continuum from high to low self-determination, and because self-determination is associated with enhanced psychological functioning (Deci, 1980; Deci & Ryan, 1985), self-determination theory predicts a corresponding pattern of consequences. That is, the self-determined forms of regulation (intrinsic motivation and identified regulation) are postulated to bring about positive consequences, whereas the least self-determined types of regulation (external regulation and
amotivation) are predicted to lead to negative outcomes. Much field research over the past two
decades has shown this to be the case (Vallerand, 1997). More specifically, studies in different
life domains (e.g., health and physical activity) have found that the more self-determined forms
of motivation lead to greater interest, greater effort, better performance, higher self-esteem,
greater satisfaction, and enhanced health. At the same time, the less self-determined types of
regulation are negatively related to these outcomes (Kasser & Ryan, 1996; Pelletier et al., 1995;
Vallerand & Losier, 1999; Vallerand & Perreault, 1999; Williams, Grow, Freedman, Ryan, &
Deci, 1996).

**Self-Determination Theory and Exercise**

Self-determination theory has recently been used by researchers to study motivation in
exercise contexts. The results have been similar to those found in other life contexts in that self-
determined motivation to exercise has been associated with more positive behavioral, cognitive
and affective outcomes, compared with controlling motivational regulations or amotivation.
These studies are valuable to the exercise behavior literature. Thompson and Wankel (1980)
tested the proposition that perceived choice is positively correlated to intrinsic motivation. They
examined the perceived choice of activities in relation to participation persistence in an adult
women’s fitness program (N = 36). Registrants in a commercial fitness program were randomly
assigned to either an experimental or control condition. Subjects in the control (no-choice)
condition were led to believe that a program of exercise had been assigned to them without
considering their preferences. Subjects in the experimental (choice) group were told that their
exercise program had been designed based on their preferences. In actuality, both exercise
programs were designed with an equal degree of activity preferences. Therefore, only their
perception of choice actually differed. Attendance records over the next six-week period showed
significantly higher attendance among the perceived choice group. These findings support the proposition that self-determination is basic to persistence in physical activities.

In terms of self-reported behavior, Ingledew, Markland and Medley (1998) examined the relationship between different exercise motives and the stages of behavioral change proposed by the transtheoretical model (Prochaska & DiClemente, 1984) (N=425). In the context of exercise adoption, the transtheoretical model argues that individuals move through five stages of behavioral change, starting from being physically inactive and ending up as regular exercisers. Discriminate analysis was used to examine the data. Ingledew et al. (1998) found that extrinsic, especially body-related, motives were more important in the early stages of behavioral change, whereas enjoyment (an intrinsic motive) was important for progression to regular exercise patterns. However, Ingledew et al. (1998) used a descriptive questionnaire that measures motives for exercise (some of which can be high or low in self-determination depending on how they are operationalized), but not the underlying motivational regulations that underpin exercise behavior.

In contrast, Mullan and Markland (1997) assessed the variations in four motivational regulations (intrinsic motivation, identified, introjected and external regulation) across the different stages of change. Discriminate function analysis was used to examine the data. It was found that those individuals (N=314) who reported that they exercised infrequently (preparation stage) had significantly lower scores on intrinsic motivation and identified regulation to exercise than individuals who indicated that they exercised regularly but for less than six months (action stage), and those who exercised regularly for six or more months (maintenance stage). No stages of change differences were found in introjected regulation and external regulation. This is surprising given that controlling behavioral regulations are more likely to be associated with maladaptive behavioral outcomes (Ryan & Deci, 2000). Unfortunately, Mullan and Markland
(1997) did not assess amotivation. More research is needed to examine whether there are significant variations in self-determination among the different stages of change. Such research is important to understanding why (e.g., the underlying motivational mechanisms) individuals participate or refrain from exercising.

One of the greatest challenges facing researchers and clinicians is how to prevent relapse for those individuals who have recently started exercising. However, research studying relapse in exercise settings has been mainly atheoretical (e.g., Sallis et al., 1990) and SDT can provide a potentially useful theoretical framework. For example, Mullan and Markland (1997) suggested that controlling exercise regulations may lead to a greater number of relapses from exercise compared with more self-determined types of exercise regulation. This is probably because those who are self-determined engage in exercise because they find it fun or because they consider it personally important. Therefore, they are less likely to experience motivational setbacks than individuals who exercise out of feelings of guilt or other extrinsic reasons. In line with this argument, Ryan, Frederick, Lepes, Rubio and Sheldon (1997) showed that adherence to an exercise program was associated with enjoyment and competence motives (intrinsic motives) as opposed to body appearance motives (extrinsic motives). However, this study did not assess the motivational regulations that underpin exercise behavior. More studies are needed to examine whether different types of exercise regulation with varying degrees of self-determination can predict relapse from exercise. This is important in view of the high relapse rates of exercisers (Sallis et al., 1990).

Intention to continue exercise is an important outcome variable when studying exercise behavior. Currently, there is some support for the positive role of self-determined motivation in predicting intentions of children to be physically active (e.g., Ntoumanis, 2001; Standage, Duda,
& Ntoumanis, 2003). In a recent meta-analysis of a small number of studies ($N=21$), Chatzisarantis, Hagger, Biddle, Smith and Wang (2003) found that intentions to be physically active were negatively correlated with amotivation and external regulation, and positively associated with introjected regulation, identified regulation and intrinsic motivation. In addition, path analysis of corrected effect sizes supported the mediating effects of perceived locus of causality on the relationship between perceived competence and intentions. However, all studies in this meta-analysis were carried out with children or with sport participants. More research is needed to examine whether the findings from this meta-analysis will apply to adult exercisers. This is particularly important in view of the high drop-out rates from exercise programs (Berger et al., 2002).

The physical self plays an important role in daily functioning and well-being. This is reflected in the consistently high correlations between aspects of the physical self, such as body image, with global self-esteem (Fox, 1997). SDT discusses the relationship between global self-esteem and motivated behavior and suggests that true self-esteem (a type of self-esteem that is stable and secure) may be developed through engaging in behaviors that are autonomously regulated and engender feelings of competence and relatedness (Deci & Ryan, 1995). The only study that has examined the association between exercise regulations and physical self-esteem was carried out by Wilson and Rodgers (2002) with female exercisers ($N=114$). Bivariate correlations indicated that exercise motives displayed a graded pattern of relationships. It was also shown that autonomously regulated exercise motivations (intrinsic motivation and identified regulation) discriminated between those with high and low physical self-esteem, whereas controlling exercise regulations (introjected and external regulation) did not. Discriminate function analysis revealed that more autonomous exercise motives correctly classified 83.3% of
the high PSE group and 88.9% of the low PSE group. However, this study was conducted with young female exercisers. How the findings apply to more general populations has yet to be tested. More research is needed to examine the extent to which different types of exercise motivation may be differentially related to the physical self.

Collectively, applications of SDT show that participation in exercise and physical activity can be explained on the basis of psychological needs and, more specifically, on the basis of behavioral regulation.

**Personality, Self-Determination, and Exercise**

To date there is only one study that has explored the relationships existing among personality, self-determination, and exercise behavior. Ingledew, Markland, and Sheppard (2004) assessed attendees of a sports center (N = 214) using personality scales (the NEO-FFI supplemented with the Eysenck Personality Questionnaire Psychoticism scale), exercise self-determination scales (Behavioral Regulation in Exercise Questionnaire which measures extrinsic, introjected, identified and intrinsic forms of regulation), and a five-item Stages of Change questionnaire. Analyses were restricted to 182 individuals in the maintenance stage of exercise participation. Partial correlation analysis was used to examine relationships between each personality scale and the self-determination scales, controlling for other personality scales, gender and age. Neuroticism was associated with more introjected regulation, extraversion with more identified and intrinsic regulation, openness with less external regulation, conscientiousness with less external regulation and more intrinsic regulation, and psychoticism with more external regulation. Limitations to this study include the use of BREQ, which does not contain a measure of the amotivation variable, and the use of the Eysenck Personality Questionnaire along with the NEO-FFI (Costa & McCrae, 1992; Eysenck, 1992). Further testing
of these ideas will require studies about how personality relates to individuals’ progression over time along the continuum of behavioral regulation.

To date, there have been no studies conducted on the mediational and moderational relationships among personality, self-determination, and exercise behavior. Because of this, the portion of this research study examining these relationships is by necessity exploratory.

**Conclusion**

Research examining personality and exercise is continuing to become more prevalent. Research has shown the FFM to be the dominant framework to explain personality. Additionally, the NEO is the most popular FFM personality assessment (Saucier & Goldberg, 1998). The limited research examining the relationship between exercise and FFM of personality has shown that some personality characteristics, specifically extraversion, are positively related to exercise. Conversely, neuroticism is negatively correlated to exercise. However, standardized measures need to be used to assess exercise behavior and the FFM ought to be used to evaluate personality, specifically the NEO-FFI.

SDT is founded on the premise that there are innate psychological needs for autonomy, competence, and relatedness. It also recognizes a distinction between intrinsic and extrinsic motivation. SDT proposes that there are different ways in which a person’s behavior can be regulated, and that these different forms of behavioral regulations form a continuum of self-determination. The continuum includes external regulation, introjected regulation, identified regulation, integrated regulation and intrinsic regulation. Research on behavioral regulation and exercise concludes that adherence is positively related to more intrinsic regulation (self-determined) and negatively related to more extrinsic regulation (non-self-determined). Also, it was found that intentions to exercise were negatively correlated with amotivation and external
regulation, and positively associated with introjected regulation, identified regulation and intrinsic motivation.

There is extensive evidence that personality traits are associated with health-related behaviors, but less evidence regarding the underlying mechanisms. Studies have been conducted on the descriptive motives of personality and exercise but they do not reveal much about the underlying motivational processes. By adopting a SDT perspective it may be possible to elucidate the motivational processes by which personality traits moderate engagement in health-related behaviors such as exercise. It may also be possible to determine if SDT mediates the relationship between personality and exercise behavior.
<table>
<thead>
<tr>
<th>NEO Facets</th>
<th>Definitions</th>
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<tbody>
<tr>
<td><strong>Neuroticism</strong></td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>Rapid tempo, vigorous movement, and sense of energy</td>
</tr>
<tr>
<td>Angry Hostility</td>
<td>Tendency to experience anger and related states such as frustration and</td>
</tr>
<tr>
<td></td>
<td>bitterness</td>
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<tr>
<td>Depression</td>
<td>Tendency to experience depressive affect</td>
</tr>
<tr>
<td>Self-Consciousness</td>
<td>Amount of shyness and social anxiety</td>
</tr>
<tr>
<td>Impulsiveness</td>
<td>Inability to control cravings and urges</td>
</tr>
<tr>
<td>Vulnerability</td>
<td>Vulnerability to stress; coping with stress and difficult situations</td>
</tr>
<tr>
<td><strong>Extraversion</strong></td>
<td></td>
</tr>
<tr>
<td>Warmth</td>
<td>Interpersonal intimacy; cordiality and heartiness</td>
</tr>
<tr>
<td>Gregariousness</td>
<td>Preference for other people’s company</td>
</tr>
<tr>
<td>Assertiveness</td>
<td>Positive or confident in a persistent way</td>
</tr>
<tr>
<td>Activity</td>
<td>Tempo/pace of life and activities</td>
</tr>
<tr>
<td>Excitement-Seeking</td>
<td>Level of sensation seeking</td>
</tr>
<tr>
<td>Positive Emotions</td>
<td>Tendency to experience positive emotions such as joy, happiness, and love</td>
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<tr>
<td><strong>Openness</strong></td>
<td></td>
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<tr>
<td>Fantasy</td>
<td>Imaginative and fantasizing</td>
</tr>
<tr>
<td>Aesthetics</td>
<td>Appreciation for art and beauty</td>
</tr>
<tr>
<td>Feelings</td>
<td>Receptivity to inner feelings and emotions</td>
</tr>
<tr>
<td>Actions</td>
<td>Willingness to try new activities and go new places</td>
</tr>
<tr>
<td>Ideas</td>
<td>Intellectual curiosity and an openness to entertain new ideas</td>
</tr>
<tr>
<td>Values</td>
<td>Readiness to reexamine social, political, and religious values</td>
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<tr>
<td>Agreeableness</td>
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<tr>
<td>--------------------------------------------------</td>
<td></td>
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<tr>
<td><strong>Trust</strong></td>
<td></td>
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<tr>
<td>The disposition to believe that others are either honest and well-intentioned or cynical and skeptical</td>
<td></td>
</tr>
<tr>
<td><strong>Straightforwardness</strong></td>
<td></td>
</tr>
<tr>
<td>The tendency to be frank and sincere versus using flattery and deception</td>
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<tr>
<td><strong>Altruism</strong></td>
<td></td>
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<tr>
<td>Active concern for others’ welfare</td>
<td></td>
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<tr>
<td><strong>Compliance</strong></td>
<td></td>
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<tr>
<td>Characteristic reactions to interpersonal conflict</td>
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<tr>
<td><strong>Modesty</strong></td>
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<tr>
<td>Humble and self-effacing versus believing one is superior to others</td>
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<tr>
<td><strong>Tender-Mindedness</strong></td>
<td></td>
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<tr>
<td>Attitudes of sympathy and concern for others</td>
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<thead>
<tr>
<th>Conscientiousness</th>
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<tbody>
<tr>
<td><strong>Competence</strong></td>
</tr>
<tr>
<td>Capable, sensible, prudent, and effective</td>
</tr>
<tr>
<td><strong>Order</strong></td>
</tr>
<tr>
<td>Neat and tidy versus unmethodical and disorganized</td>
</tr>
<tr>
<td><strong>Dutifulness</strong></td>
</tr>
<tr>
<td>Governed by conscience</td>
</tr>
<tr>
<td><strong>Achievement</strong></td>
</tr>
<tr>
<td>High aspirations versus lackadaisical</td>
</tr>
<tr>
<td><strong>Self-Discipline</strong></td>
</tr>
<tr>
<td>The ability to begin tasks and carry them through to completion</td>
</tr>
<tr>
<td><strong>Deliberation</strong></td>
</tr>
<tr>
<td>The tendency to think carefully before acting</td>
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CHAPTER 3  
METHODS  

Research Design  

According to Creswell (2005), research designs “are the specific procedures involved in the last three steps of the research process: data collection, data analysis, and report writing” (p. 51). Specifically, research designs allow us to answer our research question(s) (Cottrell & McKenzie, 2005). A study’s design is therefore important in determining whether one’s findings are scientifically sound.  

This study employed correlational research design using specific survey measures for data collection. Cottrell and McKenzie (2005) describe correlational research as “non-experimental research that examines relationships between or among variables” (p. 7). In utilizing a correlational design, the researcher must be careful to refrain from concluding a cause and effect relationship between factors. Causal relationships can only be established by using experimental design (Cottrell & McKenzie, 2005).  

A correlational study assumes that the researcher can first describe (by measuring or observing) each of the variables she is trying to relate (Trochim, 2001). The most widely used method to collect descriptive and behavioral data in health education is the survey research design. According to Alreck and Settle (2004), a survey is “a research technique where information requirements are specified, a population is identified, a sample is selected and systematically questioned, and the results analyzed, generalized to the population, and reported to meet the information needs” (p. 449). A survey’s value depends on both the amount of resources devoted to it and the care and expertise that goes into the work. Surveys frequently take the form of questionnaires (e.g., paper-and-pencil, electronic) or interviews (e.g., one-on-one, focus group, telephone) (Alreck & Settle, 2004).
The myriad strengths of survey research explain why this method is so popular among social scientists. As cited earlier, surveys can be administered through several media and can be tailored to measure a wide range of characteristics from a sample. In addition, surveys employ a standardized method of data collection and can be designed to collect a large amount of information in a relatively short period of time (McDermott & Sarvela, 1999).

Despite the usefulness of this type of research, survey methods have several disadvantages. One limitation of surveys is the potential for a low response rate, as only those respondents who are accessible and motivated to complete the survey can become sources of data. This is especially true for self-administered surveys, where the investigator is not present to motivate the respondent or clarify any sources of confusion (McDermott & Sarvela, 1999). Surveys are also limited in that they depend on direct responses from the study sample. If sensitive items are included in a survey, respondents may skip these items because they feel embarrassed or threatened by them or may tend to over- or under-report behaviors (Alreck & Settle, 2004). Other disadvantages of survey research include lack of a comparison group and absence of a pre-test for assessing change scores (Aday, 1993).

This study utilized a cross-sectional, paper-pencil, survey research design. Due to the cross-sectional nature of the research design, survey data was collected on a single occasion (Creswell, 2005).

**Research Variables**

This study investigated multiple relationships among variables, including five variables related to personality (Neuroticism, Extraversion, Conscientiousness, Openness to Experience, and Agreeableness); one variable related to self-determination established by the Relative Autonomy Index (RAI); and one variable related to total exercise index (LTEQ). Variables were used as independent or dependent variables, depending on the individual research questions.
Specifically, self-determination represented different types of variables depending on the corresponding research questions.

For all four research questions, personality represented independent variables. Personality was measured using the NEO-Five-Factor Inventory (NEO-FFI). For the first and second research questions, self-determination represented a dependent variable and for the third and fourth research questions, self-determination represented an independent variable. Self-determination was measured using a composite score (RAI) of the items within the Behavioral Regulation in Exercise Questionnaire – 2 (BREQ-2). For the second, third and fourth research questions exercise behavior represented the dependent variable, which was measured using a composite score of the items within the Leisure Time Exercise Questionnaire (LTEQ).

The demographic variables included age, gender, race/ethnicity, and academic class. Age was measured as a self-reported number. Gender was measured as either male or female. Race/ethnicity was measured as White, Black/African American, Asian/Pacific Islander, Hispanic/Latino, or Other. Academic class is defined as the scholastic status that participants currently hold at the university. This variable was measured by asking participants to indicate whether they are a freshman, sophomore, junior, or senior.

**Study Population**

Undergraduate students were the population for this study. The target population was a convenient sample of undergraduate students enrolled at a large southeastern university during the spring semester of 2007. The undergraduate students were awarded with extra credit as an incentive for participation in the study. Each subject was given a one-page document with instructions and an informed consent form to sign (see Appendix F). Instructions were available to the participants throughout the questionnaire for reference.
**Instrumentation**

Data was collected on the variables of personality, self-determination, and exercise frequency using existing instruments that have demonstrated psychometric adequacy. The psychometrics of the scales are illustrated by internal reliability, which “reflects the extent to which items measure various aspects of the same characteristic and nothing else summed” (Portney & Watkins, 2000, p. 71), convergent validity, which occurs when “two measures believed to reflect the same underlying phenomenon…yield similar results or…correlate highly” (Portney & Watkins, 2000, p. 90), and discriminate validity, which is present when “different results, or low correlations, [result] from measures that are believed to assess different characteristics” (Portney & Watkins, 2000, p. 90).

Instruments for the study were selected by conducting an extensive literature review of instruments previously used by researchers to examine personality, self-determination, and other functions and aspects of physical activity. The protocol for this study included three main instruments and sample population demographics: (1) NEO-Five-Factor Inventory (Steffen et al., 2002), (2) Behavioral Regulation in Exercise Questionnaire - 2 (Markland & Tobin, 2004), (3) Leisure-Time Exercise Questionnaire (Godin, Jobin, & Bouillon, 1986), and (4) Demographic Questionnaire.

**NEO-Five-Factor Inventory (NEO-FFI).** The NEO-FFI (Costa & McCrae, 1992) contains 60 statements (12 questions per domain) representing the following five personality domains: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness (see Appendix A). Each of these five domains has six facets. The facets for each of the domains are neuroticism (N; anxiety, angry hostility, depression, self-consciousness, impulsiveness, and vulnerability), extraversion (E; warmth, gregariousness, assertiveness, activity, excitement-seeking, and positive emotions), openness to experience (O; fantasy,
aesthetics, feelings, actions, ideas, and values), agreeableness (A; trust, straightforwardness, altruism, compliance, modesty, and tender-mindedness), and conscientiousness (C, competence, order, dutifulness, achievement striving, self-discipline, and deliberation). The participants respond to each item on a 5-point scale anchored with strongly disagree (0) and strongly agree (4). The 12 items for each domain are added together to provide a total score for that personality domain. Higher scores represent more characteristics of that domain. The NEO has adequate reliability and validity (Costa & McCrae, 1992). The NEO-FFI domain scores show good concurrent validity with the NEO-PI-R, correlating .92, .90, .91, .77, and .87 (N, E, O, A, C respectively; Costa & McCrae, 1992). The NEO-FFI scales show correlations of .75 to .89 with the NEO-PI validimax factors. Internal consistency values range from .74 to .89 (Costa & McCrae, 1992).

**Behavioral Regulation in Exercise Questionnaire – 2 (BREQ-2).** The BREQ-2 is a 19-item self-report measure developed to assess exercise regulations consistent with Self-Determination Theory (Markland & Tobin, 2004). The BREQ-2 is an extension of the behavioral regulation in exercise questionnaire (BREQ; Mullen, Markland, & Ingledew, 1997). The BREQ contains four subscales that measure external, introjected, identified, and intrinsic regulation of exercise behavior, and the BREQ-2 includes an additional subscale that assesses amotivation (see Appendix B). Sample items characterizing each BREQ-2 subscale are as follows: “I don’t see the point in exercising” (amotivation; four items); “I exercise because other people say I should” (external regulation; four items); “I feel guilty when I don’t exercise” (introjected regulation; three items); “I value the benefits of exercise” (identified regulation; four items); “I enjoy my exercise sessions” (intrinsic regulation; four items). Following the stem, “Why do you exercise?”, participants respond to each item on a five-point scale anchored by (0)
'Not true for me' and (4) ‘Very true for me’. Previous research has supported the BREQ’s multidimensional four-factor structure (Wilson, Rodgers, & Fraser, 2002), invariance across gender (Mullen, Markland, & Ingledew, 1997), and the ability of BREQ scores to discriminate between physically active and non-active groups (Mullen & Markland, 1997). BREQ-2 subscale scores were calculated by averaging the relevant BREQ-2 items. In addition, following common practice (Ryan & Connell, 1989), a Relative Autonomy Index (RAI) was computed to represent overall self-determination, such that a more positive score represented greater self-determination:

\[ \text{RAI} = [(3 \times \text{Intrinsic Motivation}) + (2 \times \text{Identified Regulation}) - (\text{Introjected Regulation}) - (2 \times \text{Extrinsic Regulation}) - (3 \times \text{Amotivation})] \]

Previous research has supported the BREQ-2’s multidimensional four-factor structure (Wilson, Rodgers, & Fraser, 2002), invariance across gender (Mullen et al., 1997), and the ability of BREQ-2 scores to discriminate between physically active and non-active groups (Mullen & Markland, 1997). Wilson & Rodgers (2002), found the fit of the oblique five-factor measurement model implied by the BREQ-2 was deemed reasonable given the observed global fit indices (\( \chi^2 = 333.49; \text{df} = 142, p < 0.01; \text{CFI} = 0.92; \text{IFI} = 0.92; \text{RMSEA} = 0.07 (90\% \text{CI} = 0.06 \text{ to } 0.08) \)) and the pattern of moderate-to-strong standardized item loadings on the intended latent factors (\( \lambda = 0.75; \lambda^\prime \text{s ranged from } 0.63 \text{ to } 0.91 \)). Cronbach’s \( \alpha \) for all BREQ-2 subscales exceeded 0.75.

**Leisure-Time Exercise Questionnaire (LTEQ).** The LTEQ (Godin, Jobin, & Bouillon, 1986) is a self-report measure that assesses the frequency of strenuous, moderate, and mild leisure-time exercise done for at least 20 minutes during a typical week (see Appendix C). To determine the metabolic equivalents (METS) also known as total exercise, the frequency of exercise is multiplied by the activity intensity. Each intensity level is appointed a number that is
then multiplied by the frequency \[ (\text{mild} \times 3) + (\text{moderate} \times 5) + (\text{strenuous} \times 9) \]. The values for mild, moderate, and strenuous exercise are added to determine the total exercise index. A high score represents a greater level of activity. The LTEQ is a reliable and valid measure of exercise behavior (Godin et al.; Jacobs, Ainsworth, Hartman, & Leon, 1993). It has demonstrated a one-month test-retest reliability of .62 and concurrent validity coefficients of .32 with an objective activity indicator (CALTRAC accelerometer), .56 with \( VO_{2\text{max}} \) (as measured by expired gases), and -.43 with percentage body fat (as measured by hydrostatic weighing). These levels of reliability and validity compared very favorably to nine other self-report measures of exercise that were examined (Jacobs et al., 1993).

**Demographic Questionnaire.** The demographic questionnaire contained questions pertaining to age, gender, academic class, and race/ethnicity (see Appendix D).

**Data Collection**

An application was submitted to the University of Florida Institutional Review Board (UFIRB) prior to beginning any portion of this study. Approval from the UFIRB indicated that the study was deemed ethical in its proposed treatment of participants and that it was acceptable to begin data collection.

A pilot test to determine whether the format of the instruments was user-friendly was conducted due to the fact that the instruments had not been used together before. The pilot test also helped to determine the length of time it took the participants to complete all four questionnaires. A convenience sample of twenty undergraduate students was selected to participate in the pilot test. Instructions were given to the pilot test sample explaining the purpose of the pilot test and inviting them to participate. Those students that agree to participate signed an informed consent that was returned to the researcher. Feedback was also given by the pilot study participants on the user-friendliness of the survey and their overall thoughts. After
completing the survey, responses to the pilot test questions were reviewed and used to determine if any changes were to be made to improve the survey prior to disseminating it to the study sample (Creswell, 2005).

The study used a convenience sample taken from general education classes during the Spring 2007 semester. The undergraduate students were awarded extra credit as an incentive for participation in the study. A proposed sample of 400 participants was necessary in order to allow for a sufficient response rate.

A cover letter was given to the sample participants to explain the purpose of the study, describe what was being asked of them, and invite them to participate. If they choose to participate they were asked to sign the informed consent that was found on the cover letter. Instructions were also available to the participants throughout the questionnaire for reference. Completion of the 86-question survey required approximately 20 minutes.

**Data Analysis**

SPSS, version 15.0, was used to analyze the data by generating both descriptive and inferential statistics. Descriptive statistics served to summarize the sample’s demographic characteristics (i.e., gender, age, race/ethnicity, academic class). The demographic variables were considered nominal, thereby allowing for the calculation of means, standard deviations, frequencies, and percentages. Inferential statistics were used to answer the research questions.

Research question one was answered using bivariate correlations, a method chosen because it is designed to identify the relationship between two variables by determining to what extent one variable is associated with another (Portney & Watkins, 2000). For the first research question, bivariate correlations were calculated to determine if there is an association between personality and self-determination. In terms of the second research question, two separate Multivariate Analysis of Variance (MANOVA) were calculated to determine whether differences
existed between gender and/or race/ethnicity on personality, self-determination, and LTEQ scores.

Because there were significant relationships between gender and race/ethnicity among the personality domains and LTEQ scores research questions three and four were analyzed controlling for gender and race/ethnicity. This relationship needs to be controlled so that the regressions calculated will reflect the true unique relationship between personality and LTEQ and not an artifact of collinear relationships between gender/race and LTEQ.

Research question three was answered using multiple regression, which was chosen because it is designed to determine if the independent variables can predict the dependent variable (Portney & Watkins, 2000). As far as the third research question is concerned, multiple regression was used to examine whether or not self-determination mediates the relationship between personality and exercise behavior. The method for assessing mediation was guided by Baron and Kenny’s (1986) mediational model. In order to test for mediation, a series of regression equations must be estimated and tested.

To establish mediation, the following conditions must hold: First, the independent variable must affect the mediator in the first equation; second, the independent variable must be shown to affect the dependent variable in the second equation; and third, the mediator must affect the dependent variable in the third equation. If these conditions all hold in the predicted direction, then the effect of the independent variable on the dependent variable must be less in the third equation than in the second. (Baron & Kenny, 1986, p. 1177)

For this question, the five personality domains served as the independent variable, exercise behavior served as the dependent variable, and self-determination was being tested as the mediator. Thus, the research hypotheses related to research question three were as follows:

1) Personality domains are related to self-determination; 2) Personality domains are related to exercise behavior; 3) Self-determination will mediate the relationship between personality and exercise behavior.
The first step was to test whether there were statistical significant direct effects between the personality domains and the mediating variable of self-determination (Hypothesis 1). If the direct effects were statistically significant in the first step, then the first condition of mediation was met. The second step was to test whether there were statistically significant direct effects among the personality domains and the dependent variable of exercise behavior (Hypothesis 2). If the direct effects were statistically significant in the second step, then the second condition of mediation was met. The third step was to test whether there were statistically significant direct effects between the dependent variable (exercise behavior) and the mediator (self-determination) as well as between the dependent variable (exercise behavior) and the independent variable (personality) (Hypothesis 3). If the direct effects tested in step two were no longer statistically significant after including the mediating variable in step three, then the final condition of mediation was met.

Concerning the fourth research question, multiple regression was used to examine whether personality moderates the relationship between self-determination and exercise behavior. Based on this research question, the independent variables were personality (neuroticism, extraversion, openness, agreeableness, and conscientiousness) and self-determination, while the dependent variable was exercise behavior. Personality was the variable being tested for moderation.

**Summary**

Chapter 3 describes the methods that were used to examine associations between different personality types, self-determination, and exercise behavior. The chapter includes a description of the research design, the research variables, the population, the instrumentation, data collection procedures, and the data analyses procedures. Data was collected from participants during the Spring of 2007. A total of 400 participants was desirable.
Descriptive statistics were calculated to determine baseline frequency rates in each personality type, self-determination scores, and frequency rates for gender, age, race/ethnicity, and academic class. Bivariate analysis was used to analyze research questions one and MANOVA was used to analyze research question two. Multiple regression was used to examine whether self-determination mediates the relationship between personality and exercise behavior and if personality moderates the relationship between self-determination and exercise behavior (i.e. research questions three and four). Analyses for all research questions were tested at a .05 significance level for $\alpha$. 
Participants Characteristics

Study participants included undergraduate students 18 years of age or older. All participants were undergraduates enrolled at a large southeastern university during the spring semester of 2007. Data collection procedures produced 369 usable surveys. Of the 392 surveys completed by participants, 23 were discarded because of excessive missing data.

**Age, Gender, Race and Class:** Table 4-1 provides a summary of participants by age, gender, race/ethnicity, and academic class. A large percentage of the participants were aged 20-21 (n=181, 46.2%) and 18-19 (n=152, 38.8%) with only a small percentage aged 22-23 (n=47, 12%), 24-25 (n=1, .3%) and over 25 (n=7, 1.8%).

The final sample had a greater number of female participants (n=315, 81%), than male participants (n=72, 19%). Most participants were White (68.6%) and a small percentage sampled were Black/African American (10.2%), Asian (8.7%), Hispanic (7.9%), and Other (3.1%). This is not a representation of ethnicities in the United States but it is similar to undergraduate enrollment during 2007. In this sample, males and Hispanics are underrepresented based on university demographics for undergraduates, but the other groups are similar to enrollment in 2007 (female = 54%; male 46%; Whites = 66%; Hispanic = 13%; Black/African American = 9.6%; Asian 7.26%).

The study sample consisted of students in various academic classes. The largest academic class represented in the sample was sophomores (n=144, 36.7%) followed by juniors (n=102, 26%), seniors (n=77, 19.6%) and freshmen (n=62, 15.8%).
Personality, Self-Determination, and Exercise Behavior

First, to ensure reliable measurement instruments, internal consistency estimates were computed for each personality domain. Internal consistency estimates (i.e., Cronbach’s alpha) ranged between .68 and .84 for the NEO domains (see Table 4-2). Because the alpha value is higher as the number of items increases, there is no set interpretation as to what is an acceptable value (George & Mallery, 2001). The general rule of thumb for reliability interpretations, displayed in Table 4-3, was used to interpret the alpha levels of the study measures. Thus, although the general rule of thumb would indicate questionable to good reliability, the reliability values obtained in this study are comparable to those in the NEO manual (Costa & McCrae, 1992).

To ensure the reliability of the self-determination in the exercise domain measure, internal consistency estimates were computed for the Behavioral Regulation in Exercise Questionnaire - 2. The internal consistency of the BREQ-2 was .78. The reliability values obtained in this study are comparable to those found by Wilson & Rodgers (2002) (α = .75). Self-determination was calculated from a Relative Autonomy Index (RAI). RAI was computed to represent overall self-determination, such that a more positive score represented greater self-determination. The mean RAI score was 9.00 (SD=5.58). RAI scores ranged from -12.75 for the lowest score to 19.25 for the highest score.

The LTEQ was used to assess exercise behavior. To determine the metabolic equivalents (METS) also known as total exercise, the frequency of exercise is multiplied by the activity intensity. The values for mild, moderate, and strenuous exercise are added to determine the total exercise index. A high score represents a greater level of activity. Means, standard deviations, skewness, and kurtosis scores for the LTEQ are presented in Table 4-4. Examination of the skewness scores revealed the data were normally distributed.
Research Questions

Research Question One

Is there an association between personality and self-determination? A bivariate correlation was calculated to determine if there was an association between personality and self-determination in a sample of undergraduate students. The bivariate correlation results presented in Table 4-5 indicate that, among the sample, extraversion, conscientiousness, openness, and agreeableness are positively associated with self-determination and neuroticism is negatively associated with self-determination. According to Portney and Watkins (2000), the following criteria can be used as a general guideline for measuring the strength of association between two variables: “Correlations ranging from 0.00 to .25 indicate little or no relationship; those from .25 to .50 suggest a fair degree of relationship; values of .50 to .75 are moderate to good; and values above .75 are considered good to excellent” (p. 494). Based on these general guidelines, the association between the five personality variables and self-determination can be considered fair to moderate.

Research Question Two

Are there gender and/or race/ethnicity differences on personality, self-determination and exercise behavior? Two separate multivariate analysis of variance (MANOVA) were conducted with personality, self-determination, and exercise behavior (LTEQ) factors as the dependent variables and gender as the fixed factor in the first and race/ethnicity as the fixed factors in the second. In the first MANOVA, the Box’s $M$ test for the homogeneity of variance-covariance matrices across design cells was found to be significant ($p = .019$) and Levene’s test of the assumption of homogeneity of variance was significant for openness, conscientiousness, and LTEQ and not significant for all other dependent variables. In the second MANOVA, the Box’s $M$ test for the homogeneity of variance-covariance matrices across design cells was found to be
significant \((p = .028)\) and Levene’s test of the assumption of homogeneity of variance was found to be not significant for all dependent variables.

For the first MANOVA, gender differences were found on all five personality domains. Females scored significantly higher on neuroticism, extraversion, agreeableness, and conscientiousness whereas males scored significantly higher on openness. Differences between males and females were also found for LTEQ scores but there were no gender differences found on self-determination scores (RAI). Males scored significantly higher on LTEQ scores than females. Data for the first MANOVA are presented in Table 4-6 and Table 4-7. Because significant gender differences were found among the sample for personality and exercise behavior, all of the analyses were run again with a female only sample and a male only sample. No differences in the findings were found for the female only sample on any of the four research questions and the sample size for the male only sample was found to be too small to make any significant inferences. Thus this study used the original sample of 369 participants to analyze all four research questions.

The second omnibus MANOVA test found significant differences for race/ethnicity among extraversion, agreeableness, and LTEQ scores (see Table 4-6). After controlling for alpha inflation using a Bonferroni correction, post-hoc follow-up analyses were conducted to localize the effects of race/ethnicity on extraversion, agreeableness, and LTEQ. Asians were significantly less extraverted than Whites \((p = .004)\). Whites were found to be significantly more physically active than Black/African Americans \((p = .000)\). No differences were found among race/ethnicity and agreeableness.

Because there were significant relationships between gender and race/ethnicity among the personality domains and LTEQ scores all of the following research questions were analyzed
controlling for gender and race/ethnicity. This relationship needs to be controlled for in research questions three and four so that the regressions reflect the true unique relationship between personality and LTEQ and not an artifact of collinear relationships between gender/race and LTEQ.

Research Question Three

Using self-determination theory as a framework, do participants’ self-determination scores mediate the relationships between aspects of personality (neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness) and exercise behavior? The method for assessing mediation was guided by Baron and Kenny’s (1986) mediational model. In order to test for mediation, a series of regression equations must be estimated and tested. In this study, the five personality domains served as the independent variable, exercise behavior served as the dependent variable, and self-determination was being tested as the mediator. The order of variables can be viewed in Figure 4-1. The following hypotheses were constructed to test for mediation and guide this research question.

Hypothesis 1: Personality domains are related to self-determination. Hypothesis 1 was tested using regression analysis. To test the first condition of mediation using all five personality domains, multiple regression was conducted to examine the degree of association among neuroticism, extraversion, openness, agreeableness, and conscientiousness and the mediating variable.

When testing a mediational model, the first step for testing condition one is to determine whether there are statistically significant direct effects among the personality domains and self-determination. For this hypothesis, the mediator (self-determination) was regressed on the personality domains. Multiple regression coefficients permit the researcher to tease out statistically the effects of the other personality domains. The contribution of each effect was
evaluated by testing its statistical significance with \( t \) tests. In this regression, the \( R^2 \) of .218 was statistically significant, \( F(8,353) =12.18, p = .000 \). The results indicated there were four statistically significant relationships: neuroticism (\( \beta = -.215, t(353) = -3.97, p = .000 \)); extraversion (\( \beta = .191, t(353) = 3.43, p = .001 \)); openness (\( \beta = .088, t(353) = 1.80, p = .072 \)); and conscientiousness (\( \beta = .147, t(353) = 2.80, p = .005 \)). Because the association among neuroticism, extraversion, openness, and conscientiousness and self-determination were statistically significant in hypothesis 1, the first condition of mediation was met. The estimated model parameters are shown in Table 4-8.

Hypothesis 2: Personality domains are related to exercise behavior. Hypothesis 2 was tested using regression analysis. To test the second condition of mediation using all five personality domains, a multiple regression was conducted to examine the degree of association among personality and the dependent variable.

When testing a mediational model, the second step for testing condition two is to determine whether there are statistically significant direct effects among the personality domains and exercise behavior for this hypothesis, the dependent variable (exercise behavior) was regressed on the personality domains. The contribution of each effect was evaluated by testing its statistical significance with \( F \) statistical tests. In this regression, the \( R^2 \) of .217 was statistically significant, \( F(9,353) =10.56, p = .000 \). The results indicated there were three statistically significant relationships: extraversion (\( \beta = .190, t(353) = 3.27, p = .001 \)); openness (\( \beta = .092, t(353) = 1.80, p = .072 \)) and conscientiousness (\( \beta = .120, t(353) = 2.18, p = .030 \)). Because the association among extraversion, openness and conscientiousness and self-determination was statistically significant in hypothesis 2, the second condition of mediation was
met for these three personality domain only. The estimated model parameters are shown in Table 4-9.

Hypothesis 3: Self-determination will mediate the relationship between personality and exercise behavior. Hypothesis 3 was tested using regression analysis. To test the third condition of mediation using the personality domains, a multiple regression was conducted to examine the relationships among personality (extraversion, openness and conscientiousness), self-determination and the exercise behavior. To test this hypothesis, the dependent variable (exercise behavior) was regressed on the significant personality domains found in step two and on the mediator variable (self-determination).

The contribution of each effect was evaluated by testing its statistical significance with F statistical tests. The results indicated, after controlling for the effects of the other personality domains, there was one statistically significant relationship: extraversion ($\beta = .134$, $p = .019$). To establish full mediation, the effect of personality (extraversion, openness and conscientiousness) on exercise behavior should be zero in the third step. Partial mediation occurs when this effect is reduced, but remains statistically significant. After comparing the direct effects significance from step two to the significance found in step three, it can be concluded that self-determination does not fully mediate extraversion and exercise behavior. Because the direct effect of openness and conscientiousness tested in step two are no longer statistically significant after including the mediating variable in step three, it can be concluded that the final condition of mediation was met. A Sobel test was conducted as a follow up to ensure that the change in significance found from step two to step three in regards to openness and conscientiousness were truly significant ($p = .0; p = .01$ respectively). The data for step three are shown in Table 4-10 and as shown self-determination fully mediates openness and
conscientiousness and exercise behavior and partially mediates extraversion and exercise behavior.

**Research Question Four**

Do elements of the Five-Factor Model of personality moderate relationships between participants’ self-determination scores and exercise behavior? Research question four was tested using regression analysis. The method for assessing moderation was guided by Baron and Kenny’s (1986) moderation model. Based on this research question, the independent variables were personality (neuroticism, extraversion, openness, agreeableness, and conscientiousness) and self-determination, while the dependent variable was exercise behavior. Personality was the variable being tested for moderation. Multiple regression was used to test whether the independent variables (personality and self-determination) were significant predictors of the dependent variable (exercise behavior). The order of variables can be viewed in Figure 4-2.

A regression was computed in which three distinct steps were stipulated. The main effect of self-determination is entered first, the main effect of personality is entered second, and the interaction term is entered third. The results of this calculation found that, when controlling for gender and race/ethnicity, the interaction term did not significantly add new variance in the third step. Thus moderation cannot be interpreted from the results. None of the FFI personality domains moderate relationships between self-determination and exercise behavior. Table 4-11 provides a summary of these results.

**Summary**

This chapter reports findings from examining responses from undergraduate student participants by personality, self-determination, exercise behavior, gender, age, race/ethnicity, or academic class. A sample profile was illustrated; most participants were white females, aged 18-21. Findings suggest that an individual’s score of extraversion, conscientiousness, openness, and
agreeableness are positively associated with self-determination and that scores of neuroticism are negatively associated with self-determination. A MANOVA indicated that gender differences were found for all five personality domains and LTEQ scores but no differences were found on self-determination scores. The second omnibus MANOVA test found significant differences for race/ethnicity among extraversion, agreeableness, and LTEQ scores. Multiple regression indicated that self-determination fully mediates openness and conscientiousness and exercise behavior and partially mediates extraversion and exercise behavior when controlling for gender and race/ethnicity. Finally, multiple regression suggests that none of the FFI personality domains moderate relationships between self-determination and exercise behavior when controlling for gender and race/ethnicity. Chapter 5 presents a summary, discussion, and recommendations from the study.
Table 4-1 Demographic distribution by age, gender, and race/ethnicity, and class.

<table>
<thead>
<tr>
<th>Demographical Variables</th>
<th>N</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-19</td>
<td>152</td>
<td>39.2</td>
</tr>
<tr>
<td>20-21</td>
<td>181</td>
<td>46.6</td>
</tr>
<tr>
<td>22-23</td>
<td>47</td>
<td>12.1</td>
</tr>
<tr>
<td>24-25</td>
<td>1</td>
<td>.3</td>
</tr>
<tr>
<td>Over 25</td>
<td>7</td>
<td>1.8</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>72</td>
<td>18.4</td>
</tr>
<tr>
<td>Female</td>
<td>315</td>
<td>80.4</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
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<tr>
<td>White</td>
<td>269</td>
<td>68.6</td>
</tr>
<tr>
<td>Black/African American</td>
<td>40</td>
<td>10.2</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>31</td>
<td>7.9</td>
</tr>
<tr>
<td>Asian</td>
<td>34</td>
<td>8.7</td>
</tr>
<tr>
<td>Other</td>
<td>12</td>
<td>3.2</td>
</tr>
<tr>
<td>Academic Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td>62</td>
<td>15.8</td>
</tr>
<tr>
<td>Sophomore</td>
<td>144</td>
<td>36.7</td>
</tr>
<tr>
<td>Junior</td>
<td>102</td>
<td>26.0</td>
</tr>
<tr>
<td>Senior</td>
<td>77</td>
<td>19.6</td>
</tr>
</tbody>
</table>

Table 4-2 Mean (M), Standard Deviation (SD) Scores, Alpha Levels, Skewness, and Kurtosis for the NEO Personality Domains

<table>
<thead>
<tr>
<th>Domain</th>
<th>M</th>
<th>SD</th>
<th>Alpha</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuroticism</td>
<td>31.92</td>
<td>6.61</td>
<td>.76</td>
<td>.103</td>
<td>-.202</td>
</tr>
<tr>
<td>Extraversion</td>
<td>43.47</td>
<td>6.02</td>
<td>.79</td>
<td>-.491</td>
<td>.539</td>
</tr>
<tr>
<td>Openness</td>
<td>38.92</td>
<td>5.69</td>
<td>.68</td>
<td>.018</td>
<td>-.206</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>42.85</td>
<td>5.77</td>
<td>.76</td>
<td>-.409</td>
<td>.389</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>41.72</td>
<td>5.87</td>
<td>.84</td>
<td>-.204</td>
<td>-.254</td>
</tr>
</tbody>
</table>
### Table 4-3 Rule of Thumb for Reliability of Measurement Interpretation

<table>
<thead>
<tr>
<th>Alpha Value</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; .9</td>
<td>Excellent</td>
</tr>
<tr>
<td>&gt; .8</td>
<td>Good</td>
</tr>
<tr>
<td>&gt; .7</td>
<td>Acceptable</td>
</tr>
<tr>
<td>&gt; .6</td>
<td>Questionable</td>
</tr>
<tr>
<td>&gt; .5</td>
<td>Poor</td>
</tr>
<tr>
<td>&lt; .5</td>
<td>Unacceptable</td>
</tr>
</tbody>
</table>

### Table 4-4 Mean ($M$), Standard Deviation ($SD$) Scores, Skewness, and Kurtosis for the LTEQ

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strenuous Exercise</td>
<td>1.79</td>
<td>2.02</td>
<td>1.15</td>
<td>4.40</td>
</tr>
<tr>
<td>Moderate Exercise</td>
<td>2.64</td>
<td>2.20</td>
<td>.86</td>
<td>2.35</td>
</tr>
<tr>
<td>Mild Exercise</td>
<td>3.88</td>
<td>2.63</td>
<td>.45</td>
<td>1.16</td>
</tr>
<tr>
<td>LTEQ Total (METS)</td>
<td>51.56</td>
<td>26.63</td>
<td>.91</td>
<td>2.60</td>
</tr>
</tbody>
</table>

### Table 4-5 Correlations Between the NEO Domains and Self-Determination (RAI)

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. RAI</td>
<td>-</td>
<td>-.34**</td>
<td>.36**</td>
<td>.13*</td>
<td>.23**</td>
<td>.28**</td>
</tr>
<tr>
<td>2. Neuroticism</td>
<td>-.31**</td>
<td>-</td>
<td>-.03</td>
<td>-.20**</td>
<td>-.30**</td>
<td></td>
</tr>
<tr>
<td>3. Extraversion</td>
<td></td>
<td>.12*</td>
<td>.39**</td>
<td>-.32**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Openness</td>
<td></td>
<td></td>
<td>.03</td>
<td>-.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Agreeableness</td>
<td></td>
<td></td>
<td></td>
<td>.23**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Conscientiousness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

*Note.* *p < .05; **p < .01
Table 4-6 MANOVA follow-ups for Gender and Race/Ethnicity Differences on Personality, Self-Determination, and LTEQ Scores

<table>
<thead>
<tr>
<th>Source</th>
<th>Dependent Variable</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Neuroticism</td>
<td>1</td>
<td>477.58</td>
<td>11.25</td>
<td>.001*</td>
</tr>
<tr>
<td></td>
<td>Extraversion</td>
<td>1</td>
<td>187.28</td>
<td>5.42</td>
<td>.020*</td>
</tr>
<tr>
<td></td>
<td>Openness</td>
<td>1</td>
<td>205.57</td>
<td>6.65</td>
<td>.010*</td>
</tr>
<tr>
<td></td>
<td>Agreeableness</td>
<td>1</td>
<td>516.06</td>
<td>15.88</td>
<td>.000*</td>
</tr>
<tr>
<td></td>
<td>Conscientiousness</td>
<td>1</td>
<td>282.80</td>
<td>7.14</td>
<td>.008*</td>
</tr>
<tr>
<td></td>
<td>RAI</td>
<td>1</td>
<td>31.10</td>
<td>1.01</td>
<td>.315</td>
</tr>
<tr>
<td></td>
<td>LTEQ</td>
<td>1</td>
<td>3516.89</td>
<td>5.04</td>
<td>.025*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Neuroticism</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Extraversion</td>
<td>4</td>
<td>32.81</td>
<td>.747</td>
<td>.560</td>
</tr>
<tr>
<td></td>
<td>Openness</td>
<td>4</td>
<td>147.32</td>
<td>4.36</td>
<td>.002*</td>
</tr>
<tr>
<td></td>
<td>Agreeableness</td>
<td>4</td>
<td>46.90</td>
<td>1.50</td>
<td>.202</td>
</tr>
<tr>
<td></td>
<td>Conscientiousness</td>
<td>4</td>
<td>96.69</td>
<td>2.91</td>
<td>.022*</td>
</tr>
<tr>
<td></td>
<td>RAI</td>
<td>4</td>
<td>27.56</td>
<td>.680</td>
<td>.606</td>
</tr>
<tr>
<td></td>
<td>LTEQ</td>
<td>4</td>
<td>4428.68</td>
<td>6.66</td>
<td>.000*</td>
</tr>
</tbody>
</table>

Note: * p < .05

Table 4-7 Means and Standard Deviations for Personality and LTEQ Scores

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Gender</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuroticism</td>
<td>Male</td>
<td>30.39</td>
<td>7.11</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>33.45</td>
<td>6.38</td>
</tr>
<tr>
<td>Extraversion</td>
<td>Male</td>
<td>42.07</td>
<td>6.60</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>43.98</td>
<td>5.71</td>
</tr>
<tr>
<td>Openness</td>
<td>Male</td>
<td>40.66</td>
<td>6.38</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>38.66</td>
<td>5.37</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>Male</td>
<td>42.34</td>
<td>5.43</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>45.52</td>
<td>5.76</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>Male</td>
<td>43.97</td>
<td>7.13</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>46.32</td>
<td>6.10</td>
</tr>
<tr>
<td>LTEQ</td>
<td>Male</td>
<td>58.48</td>
<td>31.25</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>50.19</td>
<td>25.28</td>
</tr>
</tbody>
</table>
Table 4-8 Unstandardized Regression Coefficients, Standardized Regression Coefficients and t-test Statistics for Hypothesis 1

<table>
<thead>
<tr>
<th>Variables</th>
<th>$B$</th>
<th>Std Error</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuroticism</td>
<td>-.179</td>
<td>.045</td>
<td>-.215</td>
<td>-3.97</td>
<td>.000*</td>
</tr>
<tr>
<td>Extraversion</td>
<td>.179</td>
<td>.052</td>
<td>.191</td>
<td>3.44</td>
<td>.001*</td>
</tr>
<tr>
<td>Openness</td>
<td>.086</td>
<td>.048</td>
<td>.088</td>
<td>1.80</td>
<td>(.072)</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>.075</td>
<td>.051</td>
<td>.079</td>
<td>1.48</td>
<td>.139</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>.128</td>
<td>.046</td>
<td>.147</td>
<td>2.80</td>
<td>.005*</td>
</tr>
</tbody>
</table>

Note: * $p < .05$

Table 4-9 Unstandardized Regression Coefficients, Standardized Regression Coefficients and t-test Statistics for Hypothesis 2

<table>
<thead>
<tr>
<th>Variables</th>
<th>$B$</th>
<th>Std Error</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuroticism</td>
<td>-.247</td>
<td>.228</td>
<td>-.061</td>
<td>-1.08</td>
<td>.279</td>
</tr>
<tr>
<td>Extraversion</td>
<td>.856</td>
<td>.261</td>
<td>.190</td>
<td>3.27</td>
<td>.001*</td>
</tr>
<tr>
<td>Openness</td>
<td>.437</td>
<td>.242</td>
<td>.920</td>
<td>1.80</td>
<td>(.072)</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>-.446</td>
<td>.254</td>
<td>-.098</td>
<td>-1.75</td>
<td>.080</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>.503</td>
<td>.231</td>
<td>.120</td>
<td>2.18</td>
<td>.030*</td>
</tr>
</tbody>
</table>

Note: * $p < .05$

Table 4-10 Unstandardized Regression Coefficients, Standardized Regression Coefficients and t-test Statistics for Hypothesis 3 compared to Hypothesis 2

<table>
<thead>
<tr>
<th>Variables</th>
<th>$B$</th>
<th>Std Error</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
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<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extraversion</td>
<td>.856</td>
<td>.261</td>
<td>.190</td>
<td>3.27</td>
<td>.001*</td>
</tr>
<tr>
<td>Openness</td>
<td>.437</td>
<td>.242</td>
<td>.920</td>
<td>1.80</td>
<td>(.072)</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>.503</td>
<td>.231</td>
<td>.120</td>
<td>2.18</td>
<td>.030*</td>
</tr>
</tbody>
</table>

**Step 3**

<table>
<thead>
<tr>
<th>Variables</th>
<th>$B$</th>
<th>Std Error</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extraversion</td>
<td>.603</td>
<td>.257</td>
<td>.134</td>
<td>2.35</td>
<td>.019*</td>
</tr>
<tr>
<td>Openness</td>
<td>.307</td>
<td>.235</td>
<td>.065</td>
<td>1.31</td>
<td>.192</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>.337</td>
<td>.225</td>
<td>.080</td>
<td>1.50</td>
<td>.136</td>
</tr>
</tbody>
</table>

Note: * $p < .05$; **Change in Significance**
Table 4-11 Unstandardized Regression Coefficients, Standardized Regression Coefficients and t-test Statistics for the Moderation of Personality

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1 (constant)</td>
<td>38.19</td>
<td>2.54</td>
<td>14.24</td>
<td>.000</td>
</tr>
<tr>
<td>RAI</td>
<td>1.72</td>
<td>.239</td>
<td>.357</td>
<td>7.17</td>
</tr>
<tr>
<td>2 (constant)</td>
<td>1.92</td>
<td>20.12</td>
<td>.095</td>
<td>.924</td>
</tr>
<tr>
<td>RAI</td>
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a. Dependent Variable: LTEQ

Figure 4-1 Self-determination mediating personality and exercise behavior
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<td>2) Self-Determination</td>
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Figure 4-2 Moderation of personality
CHAPTER 5
SUMMARY, DISCUSSION, AND RECOMMENDATIONS

Summary

The purpose of this study was to examine the relationship between personality and the extent to which exercise behavior is regulated in a self-determined fashion. Studies in the field of health promotion and exercise psychology have recently focused on determining psychological variables that influence exercise behavior. Limited research, however, has been devoted to the psychological mechanisms by which personality traits affect health-related behaviors (Bermudez, 1999; Hoyle, 2000). Researchers have examined the association between personality traits and exercise participation motives, but it is hard to discern a consistent pattern in the findings. The study of such surface motives does not in itself reveal much about the underlying motivational processes. By adopting a self-determination theory perspective, findings from this study may elucidate the motivational processes by which personality traits influence engagement in health-related behaviors such as exercise.

To date, few research designs have combined the three variables – personality, self-determination, and exercise. Furthermore, this study was the first to explore the mediation and moderation of self-determination on the relationships between the Five Factor Model (FFM) of personality and exercise behavior. Findings from this study indicate that an individual’s personality type does influence their self-determination relative to their exercise behavior. Since personality was shown to be linked to other known determinants of exercise such as motivation, participants can be matched to exercise programs that meet their needs and/or interventions to maximize exercise adherence. Interventions could include designing physical activity programs based upon an individual’s unique personality profile, such as group exercise for those that score
high on extraversion, novel activities for those scoring high on openness, and highly intense activities for those scoring high on conscientiousness.

The research questions addressed in this study were:

1. Is there an association between personality and self-determination?
2. Are there gender and/or race/ethnicity differences on personality, self-determination and exercise behavior scores?
3. Using self-determination theory as a framework, do participants’ self-determination scores mediate the relationships between aspects of personality (neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness) and exercise behavior?
4. Do elements of the Five-Factor Model of personality moderate relationships between participants’ self-determination scores and exercise behavior?

This study took place in two stages including a pilot test of the procedures and instruments and the administration of the approved survey. The pilot test was employed to assess the survey completion process. A convenience sample (n = 20) was invited to take the NEO, BREQ-2, LTEQ, and demographic questionnaire and comment on its understandability and user-friendliness. Responses to the pilot test questions were reviewed and used to determine the changes that were made to improve the survey prior to disseminating it to the study sample (Creswell, 2005).

The study utilized a convenience sample taken from classes at a large Southeastern university during the spring semester of 2007. The undergraduate students were provided extra credit as an incentive for participation in the study.

The research questions directed the data analysis. For the first research question, bivariate correlations were calculated to determine if there was an association between personality and self-determination. For the second research question, two separate Multivariate Analysis of Variance were calculated to determine whether gender differences existed, as well as the
presence of race/ethnicity differences on personality, self-determination, and exercise behavior scores.

Research questions three and four were answered using multiple regression. For research question three, multiple regression was used to examine whether or not self-determination mediates the relationship between personality and exercise behavior. The five personality domains (neuroticism, extraversion, openness, agreeableness, and conscientiousness) served as the independent variables, exercise behavior served as the dependent variable, and self-determination was being tested as the mediator.

For the forth research question, multiple regression was used to examine whether or not personality moderates the relationship between self-determination and exercise behavior. Based on this research question, the independent variables were the five personality domains and self-determination, while the dependent variable was exercise behavior. Personality was the variable being tested for moderation.

Discussion

The health benefits of regular moderate physical activity have been well-established (Warburton, Nicol & Bredin, 2006), yet participation rates across the population are generally too low to accrue these benefits (US Department of Health & Human Services, 1996). Thus, promotion of physical activity is a public health priority. Understanding the antecedent correlates of participation in physical activity is considered a useful first-stage endeavor to focus on intervention efforts. Research has provided evidence that physical activity participation is related to many factors spanning personal, social, and environmental categories (Trost et al., 2002). The personal factors that have received continued, albeit modest, attention in exercise and health psychology are personality and motivation. Therefore, understanding the individual factors that influence exercise behavior will aid in implementing effective intervention strategies. In
response to this need, this study provides a deeper knowledge of the demographic, personality, and self-determination variables associated with exercise behavior and offers insight into the underlying motivational mechanisms that influence personality and ultimately the exercise behaviors of individuals. The following sections provide a discussion of these findings.

Demographics

This sample consists primarily of white female undergraduate students. This is not a representation of ethnicities in the United States but it is similar to that of undergraduates enrolled at this university during 2007. In this sample, males and Hispanics are underrepresented based upon university demographics for undergraduates, but the remaining groups are similar to university enrollment in 2007. The majority of the participants were aged 20-21 with a sophomore academic class standing. This is consistent with the enrollment of the courses that were surveyed. Because of the exploratory theoretical nature of this study the representation found within this convenience sample was considered adequate. The measures used in this study were found to be valid instruments. Both the NEO-FFI and BREQ-2 indicated questionable to good reliability.

Research Question One

Research question one states “Is there an association between personality and self-determination?” A bivariate correlation was calculated to determine if there was an association between personality and self-determination in a sample of undergraduate students. Among the sample, extraversion, conscientiousness, openness, and agreeableness are positively associated with self-determination. This demonstrates that as an individual’s score on extraversion, conscientiousness, openness, or agreeableness increases, their self-determination does as well. It was also found that neuroticism was negatively associated with self-determination. As an individual’s neuroticism score increases, their self-determination decreases. Thus, highly
extraverted, conscientious, open, and agreeable individuals are more likely to be motivated in a self-determined fashion towards exercise than a highly neurotic individual. These findings are supported by previous research (Ingledew, Markland & Sheppard, 2004).

The findings that neuroticism, extraversion, and conscientiousness are related to self-determination of exercise behavior are consistent with previous evidence that these particular personality domains are related to exercise participation per se. Courneya, Bobick & Schinke (1999) found that high levels of extraversion and conscientiousness were positively related to exercise, whereas high levels of neuroticism were positively correlated to a lack of exercise. The findings for extraversion and conscientiousness have an explanation in self-determination theory (Deci & Ryan, 2000). It is hypothesized that extraverted individuals are able to feel self-determined because exercise satisfies their need for relatedness; conscientiousness individuals are able to feel self-determined because exercise satisfies their need for competence. The finding for neuroticism may simply reflect the general tendency of neurotic individuals to experience negative affects (Watson & Pennebaker, 1989).

Because of the significance found in research question one, personality domains can be linked to self-determination. Knowing that highly extraverted, conscientious, open, and agreeable individuals are more likely to be self-determined (i.e., more intrinsically motivated) towards exercise than a highly neurotic individual, programs can be established to target their motivation or lack thereof. Individuals, especially neurotics, can be screened and matched to exercise programs that meet their personal and unique needs. Interventions could also be developed to maximize exercise adherence based upon these findings.

These interpretations cannot be more than speculative, given that this study used a convenience sample and research has only just begun to examine the relationships between
personality domains and self-determination. Further testing of these ideas will require studies of how personality relates to individuals’ progression over time along the continuum of self-determination. More research is also needed to examine whether there are significant variations in self-determination among the different stages of change. Such research is important to understand why (i.e., the underlying motivational mechanisms) individuals participate or refrain from exercising. Likewise, studies examining whether different types of exercise regulation with varying personality domains can predict relapse from exercise are needed. This is important in view of the high relapse rates of exercisers (Sallis et al., 1990).

**Research Question Two**

Research question two states “Are there gender and/or race/ethnicity differences on personality, self-determination and exercise behavior?” Two separate multivariate analysis of variance (MANOVA) were conducted with personality, self-determination, and exercise behavior (LTEQ) factors as the dependent variables and gender as the fixed factor in the first analyses and race/ethnicity as the fixed factors in the second. In the first MANOVA, gender differences were found on all five personality domains. Females scored significantly higher on neuroticism, extraversion, agreeableness, and conscientiousness whereas males scored significantly higher on openness. Differences between males and females were also found for LTEQ scores but there were no gender differences found on self-determination scores (RAI). Males scored notably higher on exercise behavior scores than females showing that males were engaged in higher amounts of exercise than females.

The second omnibus MANOVA test found significant differences for race/ethnicity among extraversion, agreeableness, and LTEQ scores. Bonferroni correction post-hoc follow-up analyses were conducted to localize the effects of race/ethnicity on extraversion, agreeableness, and LTEQ. Asians were significantly less extraverted than Whites ($p = .004$) and Whites were
found to be significantly more physically active than Black/African Americans \((p < .000)\). No differences were found among race/ethnicity and agreeableness.

Gender as well as race/ethnicity differences for the five-factor model of personality are supported by previous research (Costa & McCrae, 1992; Draguns, Krylova, Oryol, Rukavishnikov, & Martin, 2000; Piedmont, Bain, McCrae, & Costa, 2002). Within the trait or variable-centered approach, the FFM, is currently the most influential and there is growing evidence for the cross-cultural universality of these dimensions (McCrae & Allik, 2002). Studies of indigenous trait lexicons also provide support for FFM dimensions in a variety of languages and cultures (Saucier, Hampson, & Goldberg, 2000). Gender differences (Costa, Terracciano, & McCrae, 2001) and maturational trends (McCrae et al., 1999) on FFM scales have also been widely replicated. It is important to be aware of these differences when planning interventions that are based upon FFM personality domains. Gender and race/ethnicity differences can help to pinpoint variables such as personality that can determine ways to increase adherence to physical activity for both females and Black/African Americans.

The differences found among males and females as well as race/ethnicity on exercise behavior are also supported by previous research findings (Crespo, 2000; Kjelsås & Augestad, 2004; Valerie, 2000). Differences in race/ethnicity show that minorities suffer disproportionately from health disparities that are the result of physical inactivity (Crespo, 2000). Research question two has determined that gender and race/ethnicity differences are variables that identify elements (i.e., personality and exercise behavior) that are influential to beginning and maintaining physical activity.

Research Question Three

Research question three states “Using self-determination theory as a framework, do participants’ self-determination scores mediate the relationships between aspects of personality
(neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness) and exercise behavior?” Because significant relationships between gender and race/ethnicity among the personality domains and LTEQ scores were found, research questions three and four were analyzed controlling for gender and race/ethnicity. This relationship needs to be controlled for in these research questions so that the regressions reflect the true unique relationship between personality and LTEQ and not an artifact of collinear relationships between gender/race and personality and LTEQ.

In order to test for mediation while controlling for gender and race/ethnicity, a series of regression equations were estimated and tested. Self-determination was being tested as the mediator. The following hypotheses were constructed to test for mediation and guide the research: (1) Personality domains are related to self-determination; (2) personality domains are related to exercise behavior; and (3) self-determination will mediate the relationship between personality and exercise behavior. Because the association among neuroticism, extraversion, openness, and conscientiousness and self-determination were statistically significant in the first hypothesis, the first condition of mediation was met.

The results for the second hypothesis indicated the association among extraversion, conscientiousness, and openness and self-determination was statistically significant, thus the second condition of mediation was met. The results of the third hypothesis indicated, after controlling for the effects of the other personality domains, there were three statistically significant relationships: extraversion, openness, and conscientiousness. It can be concluded that the relationship of openness and conscientiousness to exercise behavior was fully mediated by self-determination and the relationship of extraversion to exercise behavior was partially mediated by self-determination.
The mediation findings for extraversion, conscientiousness, and openness have an explanation in self-determination theory (Deci & Ryan, 2000). Self-determination theory (SDT) assumes that human motivation and well-being are associated with the satisfaction of three psychological needs; the need for relatedness, competence, and autonomy (Deci & Ryan, 2000). It is speculated that extraverted individuals are able to feel self-determined because exercise can satisfy the need for relatedness, whereas conscientious individuals are able to feel self-determined because exercise can satisfy the need for competence. In the same way, the finding for openness may reflect need for autonomy. At a theoretical level, the concept of psychological needs is important because it helps researchers and practitioners identify the motivational constructs that are necessary for motivation and well-being (Ryan, 1995). In the case of this study, SDT completely explains the mechanism through which the openness and conscientiousness domains affect exercise behavior and partially explains the mechanism through which extraversion affects exercise behavior.

**Extraversion**

Self-determination was found to partially mediate extraversion and exercise behavior. The extraversion personality domain describes one's comfort level with relationships. Extraverts tend to spend much of their time maintaining and enjoying a large number of relationships. Extraverts are inclined to lead, talk, and exert themselves physically more often than other people. They also tend to be friendlier and more outgoing, thus the association between extraversion and the SDT psychological need of relatedness. The need for relatedness concerns the universal propensity to interact with, be connected to, and experience caring for other people (Baumeister & Leary, 1995).
Because the need for relatedness is essential, individuals tend to orient toward those situations that allow satisfaction of the need and away from those that thwart the need (Deci & Vansteenkiste, 2004). However, in many cases, an individual’s behavior is not specifically intended to satisfy their basic needs. Rather, they do what they find interesting and personally important and they experience need satisfaction in so doing.

Various researchers have suggested that exercise may be linked with dispositional characteristics of the individual, such as personality. Courneya and Hellsten (1998) reported that exercise behavior was positively linked with extraversion. Personality factors were related to the different types of exercise behaviors that participants adopted. Extraverts preferred to exercise with others rather than alone thus fulfilling their need for relatedness or satisfying an inherent desire to maintain and enjoy their relationships.

However, extraversion was not fully mediated thus it needs to be addressed that other factors play a role in explaining the mechanism through which personality affects exercise behavior. It should be noted that extraversion was found to play a direct role in predicting exercise behavior and it had a direct effect on self-determination. Considering these direct and indirect effects, it seems prudent for exercise interventions to focus on increasing feelings of relatedness within participants so that there is an increased probability for self-determined motivation and exercise behavior outcomes. Examples of interventions for extraverted individuals are discussed in the implication section below.

**Openness**

Self-determination was found to fully mediate openness and exercise behavior. The openness personality domain addresses one's range of interests. Openness to experience describes a dimension of personality that distinguishes imaginative, creative people from down-
to-earth, conventional people. Open individuals are intellectually curious, appreciative of art, and sensitive to beauty. This explanation of openness helps to clarify the association between openness and the SDT psychological need of autonomy. The need for autonomy concerns people’s universal urge to be causal agents, to experience volition, to act in accord with their integrated sense of self, and to endorse their actions at the highest level of reflective capacity (deCharmes, 1968). It also reflects a desire to engage in activities of one’s choosing and to be the origin of one’s own behavior. To be autonomous does not mean to be independent of others, but to feel a sense of willingness and choice when acting.

Motivation is one of the many correlates of openness. Although the word openness may suggest a kind of passive tolerance of new experiences, in fact open individuals are characterized by an active pursuit of novelty. Autonomy is embedded with freewill and choice and thus an open individual’s ability to adapt to a new situation is fundamental. This is a positive attribute when it comes to exercise and adherence. Open individuals are more likely to try new activities and are thus more likely to find one that they enjoy. They are also not afraid of pursuing new situations and have more flexible attitudes. Exercise interventions for individuals scoring high on openness should focus on these aspects of the need for autonomy.

**Conscientiousness**

Self-determination was also found to fully mediate the conscientiousness domain and exercise behavior. Conscientiousness is the trait of being painstaking and careful, or the quality of acting according to the dictates of one's conscience. It includes such elements as self-discipline, carefulness, thoroughness, organization, deliberation (the tendency to think carefully before acting), and need for achievement. Conscientiousness concerns the way in which individuals control, regulate, and direct their impulses. The benefits of high conscientiousness
are obvious. Conscientious individuals avoid trouble and achieve high levels of success through purposeful planning and persistence. They are also positively regarded by others as intelligent and reliable. This description of conscientiousness helps to explain the association between conscientiousness and the SDT psychological need of competence.

The need for competence concerns people’s inherent desire to be effective in dealing with the environment (White, 1959). Throughout life, people engage their world in an attempt to master it and to feel the sense of effectiveness when they do. It also implies that individuals have a desire to experience a sense of competence in producing desired outcomes and to prevent undesired events (Deci & Ryan, 1985). In the area of physical activity this might include feeling confident enough to engage in an activity or to pursue an exercise goal. For a conscientious individual this may also include trying to prevent an undesired health condition (i.e. heart disease or becoming overweight) through being physically active. Thus, conscientious individuals are able to feel motivated in a self-determined fashion because exercise can satisfy the need for competence. Interventions for conscientious individuals need to concentrate on the facets of the need for competence to be as effective as possible.

**Research Question Four**

Research question four states “Do elements of the Five-Factor Model of personality moderate relationships between participants’ self-determination scores and exercise behavior?” In this question, moderation refers to the examination of the statistical interaction between personality and self-determination in predicting exercise behavior. This suggests that the relationship between personality and exercise behavior may differ at different levels of self-determination. In other words, personality may adversely affect exercise behavior more under conditions of low self-determination compared to conditions of high self-determination. Most research has examined the main effect view of self-determination, namely, that the more self-
determined one is, the more they are likely to participate in exercise. To date, the literature on these three variables has neglected to consider the role of self-determination as a moderator of the personality to exercise behavior relationship. Thus this portion of the analysis is by necessity exploratory.

Research question four was tested using regression analysis. Personality was the variable being tested for moderation. Multiple regression was used to test whether personality and self-determination were significant predictors of exercise behavior. The results of this calculation for sample controlling for gender and race found that the interaction term (personality x self-determination) did not significantly add new variance. Thus moderation cannot be interpreted from the results. None of the FFI personality domains moderate relationships between self-determination and exercise behavior.

**Implications**

The endorsement of physical activity is a public health priority (Trost et al., 2002). Understanding the associations between personality and motivation in the exercise domain is considered a useful approach in targeting both active and inactive individuals. Researchers have the responsibility to continue exploring antecedent variables and strategies to ensure that individuals receive assistance in overcoming barriers and identifying tendencies that limit or broaden their ability to adhere to exercise. Previous researchers suggest that past efforts have been nominal in advancing the field of study; however, continual efforts and focusing on underlying psychological mechanisms are imperative for future progress (Bermudez, 1999; Courneya & Hellsten, 1998; Hoyle, 2000). This study informs the numerous ways future health education, practice, and research can collaborate to identify individual differences that affect the quality of an exercise experience ultimately leading to life-long adherence. Recommendations and implications for the roles of educators; practitioners; and future research follow.
Implications for the Role of Health Educators

This study’s findings provide important implications for health education professionals. Research indicates that a significant percentage of the population needs support related to exercise, due to inadequate participation rates (US Department of Health & Human Services, 1996). Health educators have a critical role in educating practitioners and those serving in the field of physical activity education. Health educators are in a unique position to respond to the issues of physical inactivity and have the expertise and the resources to provide adequate preparation and support to future practitioners and educators. In spite of the limitations of this study (discussed later in this chapter) the specific findings related to the association between personality and self-determination theory can be helpful in individualizing strategies for providing education instruction to practitioners.

Health educators are also in the position to provide the necessary resources for personality evaluation. Health educators can train health promoters to properly implement the NEO personality screening tool with exercise participants as standard procedure. This will provide practitioners with information about an individual’s personality to help guide interventions and program choice. This insight will allow practitioners and educators to align their training process to more effectively meet the needs of individual exercise participants. Educating practitioners on the scoring and interpretation of the NEO as well as providing easy access to the necessary tools for reproduction is essential for practical implementation.

Practitioners should also be well informed on issues that they will face in the physical activity setting. This study found there to be gender and race/ethnicity differences on exercise participation. This is vital information for a practitioner when developing exercise programs for new and current participants. Females and Black/African Americans are more likely to be inactive than males and Whites. Knowing this, practitioners can target individuals that are more
likely to be non-exercisers or non-adherers to a program and design programs that anticipate these obstacles. Health educators should also instruct future practitioners and educators on detailed ways that they can target all exercise participants. This instruction should include information on strategies for conveying and disseminating the information obtained through the use of the NEO, specific activities that correspond with each unique personality domain (i.e. team sports for extraversion; outdoor activities for openness; marathons for conscientiousness), and physical activity resources for both the practitioner and participant (i.e. recreation parks; fitness clubs; websites). For health educators specializing in physical activity, it is a professional responsibility to equip both practitioners and participants with the tools necessary to assess factors associated with exercise participation and adherence.

Furthermore, school based health educators should integrate the personality and motivation mechanisms of exercise into the physical education and health education curriculums. This would provide for both the educators and students to be informed proactive participants in physical and health education in compliance with the National Standards for Physical Education and the National Standards for School Health Education (Joint Committee on National Health Education Standards, 1995; National Association for Sport and Physical Education, 2004). Providing educators with insight to their students’ personality type by integrating the NEO into the educational curriculum increases the likelihood of providing meaningful physical activity for every student. Providing individuals with positive physical activity experiences early in life prevents the negative impression of exercise later in life thus leading to a lifetime of enjoyable activity.
Undoubtedly, these recommendations will require resources and efforts to identify and respond to each unique individual’s needs. Costs, particularly in time and effort are unavoidable, and are far outweighed by the cost of outcomes associated with inadequate physical activity.

**Implications for the Role of Practitioners**

In becoming more aware of individuals’ personality and motivation differences and the affects of each on exercise, physical activity practitioners can take many steps in encouraging participation and adherence. First, practitioners should become fully competent in their understanding of the relationships between personality, motivation and exercise behavior. This would include an awareness of all unique personality domains and the motivational needs associated with each. Practitioners should also have knowledge of the target audience and an understanding of demographic factors affecting the personality, self-determination, exercise behavior relationship. Second, health and fitness practitioners should become proficient in administering NEO personality assessment and be able to accurately interpret the results. Practitioners can utilize the NEO-FFI to quickly and easily identify an individual’s personality type and then provide them with effective strategies to increase their exercise participation based upon their personality. In the physical activity setting, all new and existing participants should have their personality evaluated so that all can receive the benefits. Third, practitioners can increase participation and adherence by appropriately providing necessary assistance and interventions for each unique personality type. This study found that practitioners should focus on increasing feelings of relatedness, autonomy, and competence for extraverted, open, and conscientious individuals respectively so that their self-determined motivation, positive exercise behavior, and exercise adherence for a lifetime are improved.

Practitioners can utilize many simple techniques to increase participants’ activity levels and promote exercise adherence and enjoyment. Extraverted individuals that are lacking in
physical activity need to be motivated based on their unique personality characteristics. In doing so the psychological need of relatedness would naturally be fulfilled in participation. Extraversion concerns the differences in preference for social interaction and lively activity. The seeking of dynamic physical activity behaviors seems a logical extension for people scoring high in this trait, whereas the disinterest in physical activity seems likely for those scoring low in extraversion. Research has found that individuals who scored high on extraversion prefer to exercise in a group rather than alone, and they also enjoy supervised sessions more than self-directed sessions, relating directly with the need for relatedness (Courneya & Hellsten, 1998). Knowing this, health and fitness practitioners can encourage extraverts to participate in activities that are inclusive of social interaction and energetic activity. These might include group fitness classes, exercising with a partner/trainer, team/social interaction sports such as basketball, tennis, or golf, and high intensity activities such as adventure racing and kick boxing. Social activity settings such as a comprehensive fitness center or a corporate fitness facility would serve both the physical and social needs of an extravert. These settings also provide personal training resources and various group activities that are appealing to an extravert.

Open individuals that are not achieving adequate physical activity also need to be supported based on their personality’s uniqueness thus fulfilling the need of autonomy through exercise. Open individuals are characterized by an active pursuit of novelty. This is a positive attribute when it comes to exercise and adherence. Open individuals are willing to try new behaviors and are not troubled by new situations. They are also prone to participate in activities that they freely choose because they take pleasure in them not because they feel obligated to participate. Knowing these characteristics, practitioners can encourage those who score high on openness to participate in activities that are unusual or original to the individual. These novel
forms of exercise might include rock climbing, martial arts, group fitness classes or any activity that one has not fully experienced. Research has found that individuals scoring high on openness preferred to exercise outdoors more than indoors compared to those scoring low on openness (Courneya & Hellsten, 1998). This is likely due to the fact that outdoor environments are ever changing and indoor environments are unvarying. However, autonomy is rooted with freewill and choice and thus an open individual would be drawn to an exercise setting that offered a variety of choices. Comprehensive fitness centers offer a wide variety of activities at varying times and would be a good resource for a highly open individual. Practitioners should use these findings to help guide their exercise prescription for each unique open individual. Ultimately, health and fitness practitioners should focus on increasing feelings of autonomy within open participants so that the possibility of self-determined motivation and positive behavioral outcomes are increased.

Conscientious individuals that are not achieving adequate physical activity also need to be motivated to increase their activity based upon their personality characteristics. In doing so the psychological need of competence would be satisfied by participating in exercise. Conscientious individuals are characterized as self-disciplined, organized, and deliberate. When it comes to physical activity and adherence, these are positive characteristics. Individuals who score high on conscientiousness are likely to participate in activities that they are knowledgeable in and that are easy to schedule and plan into their day. Health and fitness practitioners should focus on strategies that include educating the participant on the various aspects of physical activity and providing information on the different forms of exercise available to them. Having an exercise calendar or workout schedule available for conscientious participants would help to motivate and encourage them to plan out their activity in advance. Because of their tendency towards
commitment, it is easier to keep conscientiousness individuals engaged in a meaningful activity with adherence becoming inherent. Deliberation is also a positive characteristic of conscientiousness because careful forethought goes into all their actions such as exercising for health related reasons. Practitioners can assist in goal setting and individual program planning to help boost the feelings of commitment and deliberation in those scoring high on conscientiousness.

Research on exercise preference (Courneya & Hellsten, 1998) found that those who preferred high-intensity exercise scored higher on conscientiousness than those who preferred moderate intensity, and individuals who preferred scheduled exercise scored higher on conscientiousness than those who preferred spontaneous exercise. Knowing this, practitioners can encourage those high on conscientiousness to participate in activities that are intense in nature and that are easily planned into their schedule. Activities that would appeal to a conscientious individual might include intense cardio such as running, mountain biking, or swimming, playing a team sport, triathlon/marathon training, or power lifting. Practitioners should focus on increasing feelings of competence within conscientiousness participants so that the possibility of self-determined motivation and positive exercise outcomes are increased. Competency is based on a sense of capacity in producing desired outcomes and through specific exercise and training accomplishments a conscientious individual can satisfy this need.

Ultimately, health and fitness practitioners will have to find innovative ways to respond to the needs of an individual’s personality. This commitment to providing an individualized approach to physical activity will promote participation, increased adherence, better long term health outcomes, and provide more satisfaction for individuals when engaging in exercise. To advance the health of the general population as proposed by the objectives of Healthy People
2010, health and fitness practitioners alike will have to respond and adapt to the unique personality needs of individuals and be willing to support all participants in increasing their physical activity levels (U.S. Department of Health and Human Services, 2000).

Implications for Future Research

Based on the findings of this study, health behavior researchers should delve further into the personality and motivation research to assess the relationships between the Five Factor Model of personality, self-determination, and other health and risk behaviors. Previous research has found personality to be associated in a health-promoting direction with a wide range of health-related behaviors such as smoking (Friedman et al., 1995; Vollrath, Knoch, & Cassano, 1999), drinking (Friedman et al., 1995; Stewart, Loughlin, & Rhyno, 2001; Vollrath, Knoch & Cassano, 1999), sexual behavior (Hoyle, Fejfar, & Miller, 2000; Vollrath Knoch & Cassano, 1999), mammography adoption (Siegler, Feaganes, & Rimer, 1995), and protection against sun exposure (Castle, Skinner, & Hampson, 1999). Health-related behaviors have also been associated with the self-determination theory. These behaviors include smoking (Levesque et al., 2006; Williams et al., 2006; Williams, Quill, Deci., & Ryan, 1991), alcohol use (Ryan, Plant, & O'Malley, 1995), and dieting (Levesque et al., 2006; Pellitier et al., 2004). Researchers should examine these behaviors to see if links exist between the FFM personality domains and being motivated in a self-determined fashion. Findings could help to explain the variables that are affecting the adoption or letting go of such health and risk behaviors. Additionally, if these findings hold true for other behaviors, research could help to guide planning for the customization of future programs and interventions.

Future research should also examine whether different types of exercise regulation with varying degrees of self-determination are associated with personality and exercise behavior. Findings from these studies can help predict relapse from exercise. This is important in view of
the high relapse rates of exercisers (Sallis et al., 1990). Also further research examining the relationship between personality, motivation, exercise behavior and exercise preferences may aid in developing exercise programs that are individualized and based on people’s exercise preferences. Research should also examine if these types of exercise programs result in an increase in exercise adherence.

Longitudinal studies that are based on the implication of this study would help to solidify current and future findings. These studies would be critical in ascertaining personality, self-determination development, and physical activity, as well as the symmetry and asymmetry of personality, motivation, and physical activity-related decline with ageing. For example, extraversion tends to decline with age and whether this matches declines in physical activity has yet to be investigated (McCrae et al., 1999). Similarly, conscientiousness has been able to predict longevity and health behavior from childhood (Friedman, Tucker & Tomlinson-Keasey, 1995). Its association with physical activity across this life span and mediation via physical activity would add to this interesting finding.

Future research could also look at personality, self-determination, and exercise behavior and how it varies across different populations. A cross-sectional study should be conducted to explore the comparisons of the variable in this study and various other populations including adolescents, young adults, middle-aged adults, and the elderly. Future studies could also control for other factors, such as Socioeconomic Status, that were not assessed in this study. As far as moderation is concerned, other variables besides personality could be looked at as having a moderating effect on self-determination and exercise behavior. Two possible moderating variables are gender and race/ethnicity.
Limitations and Future Directions

Limitations of this study include self-report data, a college-aged convenience sample, and instrumentation. The use of self-report data has limitations due to self-report bias (Krosnick, 1999). That is, individuals may report information due to how they think they should report data rather than how they actually felt. This could alter their true responses, therefore resulting in inaccurate data. Rather than using only a self-report personality questionnaire, future researchers may consider using an objective third party appraisal of each participant (Costa & McCrae, 1992). Similarly, an objective measure of exercise should be used such as pedometers and accelerometers rather than a self-report questionnaire.

Although personality is relatively stable throughout early to mid-adulthood, a college-aged population does not necessarily permit these results to be generalized to all populations (McCrae & Costa, 2003). Undergraduate students in this study represent a homogeneous, convenient sample of participants. College students also have unique characteristics that distinguish them from the greater population including more free time to be able to engage in activities. Greater generalizability of these results would benefit from replication using more diverse population samples. Any differences among populations are likely to have direct and meaningful implications for orchestrating the most effective intervention programs. Also, because the sample was not randomized, potentially confounding variables may have introduced error into measurement that is not accounted for in the analysis. Thus, inferences should be made with caution. Self-reports on the LTEQ and the participant demographics also pose a limitation to inferences made from study findings. This sample, however, was deemed appropriate because this study will be used to inform and guide the direction of future research in the areas of personality, motivation, and exercise behavior research.
To reduce participant burden, a 60-item version of the NEO-PI-R called the NEO-FFI (Costa & McCrae, 1992) was used in this study. The NEO-FFI assesses the five broad personality domains by using one question from each facet from the NEO-PI-R. As with many questionnaires with a short and long form, the long form allows for greater insight into each personality domain and it is more reliable and valid than the short form (Costa & McCrae, 1992). Future research might continue examining the relationship between exercise behavior and personality by using the NEO-PI-R. Furthermore, research using the FFM to examine the relationships between personality and exercise behavior should include both the personality domains and facets, thus providing valuable information for understanding the determinants and preferences for exercise behavior. This knowledge may aid in the creation of individualized exercise programs that increase adherence to exercise behavior.

**Study Strengths**

There are also strengths of this study that must be mentioned. First, a large sample was used with a very high response rate, especially considering the length of the instruments that were used to assess personality, self-determination, exercise behavior and demographics. Second, the use of validated measures of exercise, personality, and self-determination contribute to the strength of this study. Many of the studies in the past have failed to use validated and consistent measures to examine all the components (e.g., personality, self-determination and exercise behavior; Costa & McCrae, 1992; Courneya & Hellsten, 1998; Hagan, 2003; Markland & Tobin, 2004).

**Conclusion**

In conclusion, this study was conducted to examine the relationships between personality, self-determination, and exercise behavior. The findings suggest that personality is associated with self-determination and that there are gender and race differences on personality and exercise...
behavior. Additionally in this study population, self-determination fully explains the mechanism through which the openness and conscientiousness domains affect exercise behavior and partially explains the mechanism through which extraversion affects exercise behavior. The implications are numerous for health educators, practitioners, and researchers some of which include rigorous personality and motivation education for future practitioners, proper choice and implementation of exercise programs for each specific personality domain, and continued research with other health behaviors. Because most Americans are sedentary, and obesity is of growing interest as a health concern in the United States, intervention methods for increasing exercise behavior are needed (Center for Disease Control, 2002; United States Department of Health and Human Services, 2000). Therefore, results from this study can guide the development of more personalized programs and interventions to facilitate adoption of exercise behavior in non-exercisers while increasing adherence in current exercisers.
Instructions:

Carefully read all of the instructions before beginning. This questionnaire contains 60 statements. Read each statement carefully. For each statement choose the response that best represents your opinion. Make sure your answer is in the correct place on the scantron.

Fill in ₁ if you strongly disagree or the statement is definitely false.

Fill in ₂ if you disagree or the statement is mostly false.

Fill in ₃ if you are neutral on the statement, if you cannot decide, or if the statement is about equally true or false.

Fill in ₄ if you agree or the statement is definitely true.

Fill in ₅ if you strongly agree or the statement is definitely true.

Fill in only one response for each statement. Respond to all the statements, making sure that you fill in the correct response.
For each of the following statements choose the response that best represents your opinion. Fill in only one response for each statement. The scale is:


1. I am not a worrier.
2. I like to have a lot of people around me.
3. I don’t like to waste my time daydreaming.
4. I try to be courteous to everyone I meet.
5. I keep my belongings neat and clean.

6. I often feel inferior to others.
7. I laugh easily.
8. Once I find the right way to do something, I stick to it.
9. I often get into arguments with my family and co-workers.
10. I’m pretty good about pacing myself so as to get things done on time.

11. When I am under a great deal of stress, sometimes I feel like I’m going to pieces.
12. I don’t consider myself especially “light-hearted”.
13. I am intrigued by the patterns I find in art and nature.
14. Some people think I’m selfish and egotistical.
15. I’m not a very methodical person.

16. I rarely feel lonely or blue.
17. I really enjoy talking to people.
18. I believe letting students hear controversial speakers can only confuse and mislead them.
19. I would rather cooperate with others than compete with them.
20. I try to perform all the tasks assigned to me conscientiously.

21. I often feel tense and jittery.
22. I like to be where the action is.
23. Poetry has little or no effect on me.
24. I tend to be cynical and skeptical of others’ intentions.
25. I have a clear set of goals and work toward them in an orderly fashion.

26. Sometimes I feel completely worthless.
27. I usually prefer to do things alone.
28. I often try new and foreign foods.
29. I believe that most people will take advantage of you if you let them.
30. I waste a lot of time before settling down to work.
31. I rarely feel fearful or anxious.
32. I often feel as if I’m bursting with energy.
33. I seldom notice the moods or feelings that different environments produce.
34. Most people I know like me.
35. I work hard to accomplish my goals.

36. I often get angry at the way people treat me.
37. I am cheerful, high-spirited person.
38. I believe we should look to our religious authorities for decisions on moral issues.
39. Some people think of me as cold and calculating.
40. When I make a commitment, I can always be counted on to follow through.

41. Too often, when things go wrong, I get discouraged and feel like giving up.
42. I am not a cheerful person.
43. Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement.
44. I’m hard-headed and tough-minded in my attitudes.
45. Sometimes I’m not as dependable or reliable as I should be.

46. I am seldom sad or depressed.
47. My life is fast-paced.
48. I have little interest in speculating on the nature of the universe or the human condition.
49. I generally try to be thoughtful and considerate.
50. I am a productive person who always gets the job done.

51. I often feel hopeless and want someone else to solve my problems.
52. I am a very active person.
53. I have a lot of intellectual curiosity.
54. If I don’t like people, I let them know it.
55. I never seem to be able to get organized.

56. At times I have been so ashamed I just want to hide.
57. I would rather go my own way than be a leader to others.
58. I often enjoy playing with theories or abstract ideas.
59. If necessary, I am willing to manipulate people to get what I want.
60. I strive for excellence in everything I do.
APPENDIX B
BEHAVIORAL REGULATION IN EXERCISE QUESTIONNAIRE-2

EXERCISE REGULATIONS QUESTIONNAIRE (BREQ-2)

WHY DO YOU ENGAGE IN EXERCISE?

We are interested in the reasons underlying peoples’ decisions to engage, or not engage in physical exercise. Using the scale below, please indicate to what extent each of the following items is true for you. Please note that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise. Your responses will be held in confidence and only used for our research purposes.

<table>
<thead>
<tr>
<th>Item</th>
<th>Not true for me</th>
<th>Sometimes true for me</th>
<th>Very true for me</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I exercise because other people say I should</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2. I feel guilty when I don’t exercise</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3. I value the benefits of exercise</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>4. I exercise because it’s fun</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>5. I don’t see why I should have to exercise</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>6. I take part in exercise because my friends/family/partner say I should</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7. I feel ashamed when I miss an exercise session</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>8. It’s important to me to exercise regularly</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>9. I can’t see why I should bother exercising</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not true for me</td>
<td>Sometimes true for me</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>----------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>10. I enjoy my exercise sessions</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>11. I exercise because others will not be pleased with me if I don’t</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>12. I don’t see the point in exercising</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>13. I feel like a failure when I haven’t exercised in a while</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>14. I think it is important to make the effort to exercise regularly</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>15. I find exercise a pleasurable activity</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>16. I feel under pressure from my friends/family to exercise</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>17. I get restless if I don’t exercise regularly</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>18. I get pleasure and satisfaction from participating in exercise</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>19. I think exercising is a waste of time</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
APPENDIX C
LEISURE TIME EXERCISE QUESTIONNAIRE

Godin Leisure-Time Exercise Questionnaire

1. 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).

<table>
<thead>
<tr>
<th>Times Per Week</th>
</tr>
</thead>
</table>

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)

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, easy walking)
Please continue using the *Scantron* to answer questions 83 through 86.

1. What is your age in years?
   1. 18-19
   2. 20-21
   3. 22-23
   4. 24-25
   5. Over 25

2. What is your gender?
   1. Male
   2. Female

3. Which one of these groups would you say best represents your race?
   1. White
   2. Black/African American
   3. Hispanic/Latino
   4. Asian/Pacific Islander
   5. Other

4. What is your current academic class?
   1. Freshman
   2. Sophomore
   3. Junior
   4. Senior
   5. Graduate
APPENDIX E
UNIVERSITY OF FLORIDA INSTITUTIONAL REVIEW BOARD APPLICATION

1. TITLE OF PROTOCOL:
THE RELATIONSHIP BETWEEN PERSONALITY, SELF-DETERMINATION AND EXERCISE BEHAVIOR

2. PRINCIPAL INVESTIGATOR(s):
Abigail S. Batia, MESS
Doctoral Candidate
Health Education and Behavior
071 Florida Gym
PO Box 118210
Gainesville, FL 32611-8210
(352) 392-0583 x 1283
aschwab@hhp.ufl.edu

3. SUPERVISOR (IF PI IS STUDENT):
Jill W. Varnes, Ed.D.
Professor Health Education & Behavior
College of Health & Human Performance
PO Box 118210
16 Florida Gym
Gainesville, FL 32611-8210
(352)-392-0583 x 1230
jvarnes@hhp.ufl.edu

4. DATES OF PROPOSED PROTOCOL: From: January 1, 2007 To: January 1, 2008

5. SOURCE OF FUNDING FOR THE PROTOCOL:
(A copy of your grant proposal must be included with this protocol if DHHS funding is involved.)
Not Applicable

6. SCIENTIFIC PURPOSE OF THE INVESTIGATION
Over the past decade, much research (Bermudez, 1999; Courneya, Bobick, & Schinke, 1999) has been devoted to the analysis of psychosocial factors associated with the development of a variety of health behaviors. In the wake of this research, one important point has become clear: the main cause of mortality can be prevented by making certain lifestyle and behavior changes (Blair & Morrow, 1998; Craig, Russell, Cameron, & Beaulieu, 1999). Less attention, however, has been paid to the reasons and mechanisms that explain why individuals keep engaging or disengaging in behaviors that they know to be beneficial to their health.
Furthermore, why do individuals fail to develop habits that could increase their quality of life and well-being?

The association between sedentary lifestyle and all-cause mortality and morbidity is well documented (Craig, Russell, Cameron, & Beaulieu, 1999), and represents one of the most prevalent behavioral health risks in industrialized countries (US Department of Health & Human Services, 1996). Physical benefits of exercise have also been well documented and include a reduced risk of diabetes, heart disease, high blood pressure, bone density loss, premature death, and improvement in weight management and overall fitness (Bouchard, Shephard, & Stephens, 1994). Research suggests that the benefits of regular exercise extend beyond the primary prevention of chronic physical diseases, as regular exercise has been demonstrated to improve mental well-being and quality of life (Courneya, Mackey, & Jones, 2000).

Despite the health threats posed by inactivity, research indicates that 60% of the population remains insufficiently active to receive health benefits from physical activity, and 25% of the population is considered sedentary (Stephens & Caspersen, 1994; US Department of Health & Human Services, 1996). Furthermore, the attrition rates from structured exercise programs remain high with approximately 50% of exercise participants terminating their involvement within the first six months of enrollment (Craig, Russell, Cameron, & Beaulieu, 1999). Therefore, understanding the individual factors that may influence adherence to an exercise regimen will aid in implementing effective intervention strategies.

Studies in the field of health promotion and exercise psychology have recently focused on determining psychological variables that influence exercise adherence. Little research, however, has been devoted to the psychological mechanisms by which personality traits affect health-related behaviors (Bermudez, 1999; Hoyle, 2000). One possible mechanism is motivation. Researchers have examined the association between personality traits and exercise participation motives, but it is hard to discern a consistent pattern in the findings. The study of such surface motives does not in itself reveal much about the underlying motivational processes. By adopting a self-determination theory perspective it may be possible to elucidate the motivational processes by which personality traits influence engagement in health-related behaviors such as exercise. Therefore, the focus of this study is to examine the relationship between personality and the extent to which exercise behavior is regulated in a self-determined fashion.

This study will seek to determine if an individual’s personality type influences self-determination relative to exercise behavior (i.e., does one personality type show higher or lower levels of self-determination than the other four types?). If personality can be linked to other known determinants of exercise such as motivation, participants could be matched to exercise programs that meet their needs. Or interventions to maximize exercise adherence could be developed based on personality profiles.

7. DESCRIBE THE RESEARCH METHODOLOGY IN NON-TECHNICAL LANGUAGE. The UFIRB needs to know what will be done with or to the research participant(s).

The following procedures will be followed:

1. This study will utilize a cross-sectional, paper and pencil, survey research design. Due to the cross-sectional nature of the research design, survey data will be collected on a single
occasion (Creswell, 2005). Surveys will be distributed by, completed on, and returned via the PI (Creswell, 2005; Dillman, 2000).

2. A convenience sample of undergraduate students at the University of Florida will be invited to participate in the study (N=450). The target population will be undergraduate students enrolled in non-major classes in the College of Health and Human Performance at the University of Florida. Each subject will be given a one-page cover letter that will include an informed consent and instructions on how to complete the survey (see attached).

3. The following surveys will be administered via paper and pencil: NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992), Behavioral Regulation in Exercise Questionnaire - 2 (BREQ-2; Markland & Tobin, 2004), Leisure-Time Exercise Questionnaire (LTEQ; Godin, Jobin, & Bouillon, 1986), and a demographic questionnaire (See Attached). After each survey is completed they will be returned to the PI.

4. Descriptive statistics will be calculated to determine baseline frequency rates in each personality type, self-determination scores, and frequency rates for BMI, gender, age, race/ethnicity, and academic class. Bivariate analyses will be used to analyze research question one. Analyses for all four research questions will be tested at a .05 significance level for \( \alpha \). MANOVA will be used to assess research question two. Multiple regression will also be used to examine the mediation and moderation associations between each of the five personality types (independent variable), total self-determination score (independent variable), and exercise behavior (dependent variables) (i.e. research questions three and four).

8. POTENTIAL BENEFITS AND ANTICIPATED RISK. (If risk of physical, psychological or economic harm may be involved, describe the steps taken to protect participant.)

The study involves analyzing self-reported data. Participants will not be required to provide their name or any personal identifying information. The identity of the participants will remain confidential. Hence, the participants experience no more than minimal risk by participating in this study.

9. DESCRIBE HOW PARTICIPANT(S) WILL BE RECRUITED, THE NUMBER AND AGE OF THE PARTICIPANTS, AND PROPOSED COMPENSATION (if any):

1. The researcher will contact instructors in the College of Health and Human Performance at the University of Florida to inquire about their willingness to allow their students to participate in this study during class time and the approximate number of students enrolled in their classes.

2. The researcher will invite a convenience sample of undergraduate students enrolled in classes in the College of Health and Human Performance to participate in the study (N=450).

3. Each participant will receive a description of the study and the informed consent before completing the surveys.
10. DESCRIBE THE INFORMED CONSENT PROCESS. INCLUDE A COPY OF THE INFORMED CONSENT DOCUMENT (if applicable).

The participants will be asked to read and sign the attached informed consent prior to the use of any data for research purposes. See Attachment.

__________________________   ______________
Principal Investigator's Signature    Date
Abigail S. Batia, MESS

I approve this protocol for submission to the UFIRB:

__________________________  ______________
P.I. Faculty Supervisor Signature  Date
Jill W. Varnes, Ed.D.

I approve this protocol for submission to the UFIRB:

__________________________   ______________
Dept. Chair’s Signature    Date
Robert Weiler, Ph.D.
APPENDIX F
PARTICIPANT INFORMED CONSENT

Project Title: The Relationship between personality, self-determination, and exercise behavior.

Purpose of the research study: Abigail Schwab Batia (aschwab@hhp.ufl.edu) is a doctoral candidate in the department of Health Education and Behavior. This study proposes to assess the relationship between personality and the extent to which exercise behavior is regulated in a self-determined fashion.

What you will be asked to do in the study: You are being asked to complete the following surveys.

Time required: The surveys will take approximately 30 minutes to complete.

Risks and Benefits: Your participation in this study poses no more than minimal risk. Neither your name nor your UFID will be connected with your survey results. There is no benefit to the participant in completing this survey.

Compensation: There will be no compensation for completing the surveys.

Confidentiality: Your identity will be kept confidential to the extent provided by law. No names will be used in any report.

Voluntary Participation: Your participation in this study is completely voluntary. There is no penalty for not participating.

Right to withdraw from the study: You have the right to withdraw from the study at anytime without consequence.

Whom to contact if you have questions about the study: Abigail Schwab Batia, MESS at aschwab@hhp.ufl.edu or Dr. Jill W. Varnes, EdD, at jvarnes@hhp.ufl.edu, Department of Health Education & Behavior, 05 Florida Gym, (352) 392-0583.

Whom to contact about your rights as a research participant in the study: UFIRB Office, Box 112250, University of Florida, Gainesville, FL 32611-2250; ph 392-0433.

Thank you in advance for participating in this survey. The information you provide will be extremely beneficial in enhancing an understanding of the mechanisms behind exercise behavior. Your help in this matter is greatly appreciated.

I have read the procedure described above. I voluntarily give my consent to participate in this study. I have received a copy of this description.

________________________________________       ______________
Name                           Date
LIST OF REFERENCES


BIOGRAPHICAL SKETCH

Native to Florida, born in Tallahassee, Abigail Schwab Batia has lived in north central Florida all her life. She grew up in Perry, Florida before moving to Gainesville, Florida to attend the University of Florida as an undergraduate in exercise and sport science. She graduated in 2002 with highest honors with a specialization in physical education.

After graduating, Abbie continued on at the University of Florida where she received a master’s degree in exercise and sport science and a specialization in exercise and sport pedagogy. While pursuing her master’s degree, she also taught high school health education at P.K Yonge Developmental Research School. Abbie successfully completed her program of study and her master’s comprehensive exams in 2004. She then returned to the University of Florida, as a doctoral student in the College of Health and Human Performance.

Abbie received a Ph.D. in health behavior from the University of Florida, in August 2007. Her research interests include physical activity; personality and motivation; and influences on exercise behavior and her teaching interest include physical education and school health issues. She plans to continue her career in education.