

Are Exercise Behavioral Regulations Differentiated by BMI Category?

A Self-Determination Theory Perspective

A Research Paper Submitted to the Faculty of the

Department of Kinesiology

West Chester University

West Chester, Pennsylvania

In Partial Fulfillment of the Requirements

For the Degree of Master of Science

In Exercise and Sport Physiology

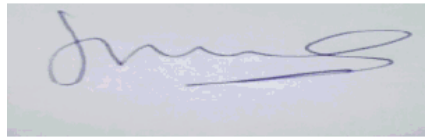
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2012

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Approval of Research Report
For
Master of Science Degree
In
Exercise and Sport Physiology



12/4/2012

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Acknowledgements

I wish to express my appreciation to all those who made this research project possible. First I want to thank Dr. John Williams for his support as my research advisor in this study and in other projects during my graduate coursework. His encouragement and constructive criticism has facilitated my level of critical thinking in research design and in reporting of findings. I want thank the following professors who have helped me to better understand and use statistics in research data analysis: Dr. V. Krishna Kumar, Professor in the Department of Psychology; Dr. Stacie Metz, Assistant Professor in the Department of Health; and Professor Paul Dinsmore from the Department of Mathematics.

I would like to give many thanks to the following professors for their guidance and support that they provided in their coursework specialties: Dr. Sheri Melton in clinical exercise physiology; Dr. Jeannine L. Stuart in three exercise physiology-based courses; and Dr. David Stearne in biomechanics, whose insane project timeline became highly interesting. Also, I would like to extend my appreciation to Dr. Paul Smith of the IRB who recognized the importance of this study.

I want to give a special thanks to Dr. Craig Stevens for being my project sponsor, and in answering my countless questions during my tenure as graduate assistant at the Human Performance Lab. Also, I would like to thank Dr. Frank F. Fry for approving my collaboration with Dr. Williams during this research project.

I also want to thank the following people from the Community YMCA of Eastern Delaware County (www.cyedc.org) who permitted my research: Michael Ranck,

President/CEO; Michele Hengey, Marketing & Public Relations Director; Duane Johnson, Lansdowne YMCA Branch Director; Miriam Ranalli, Lansdowne YMCA Health & Wellness Director; Kyle Strohman, Ridley Area YMCA Branch Director; and Colleen Greeley, Ridley Area YMCA Health & Wellness Director. Many thanks go out to Dennis Patten, a Lansdowne YMCA member, who assisted me in promoting the study.

I want to express my gratitude to David Markland PhD C.Psychol for his permission to use the Behavioural Regulation in Exercise Questionnaire-2 (BREQ-2) for this research project. Likewise, my appreciation goes out to Philip M. Wilson, Wendy M. Rodgers, Christina C. Loitz, and Giulia Scime for their integrated regulation questions.

Finally, I am very grateful to the participants who gave a few minutes of their day to contribute to scientific knowledge in the field of exercise motivation and adherence.

This work is dedicated to my father, Spiros Hartas, and mother, Stavroula Hartas, who were too busy caring for eight kids to attend college themselves.

Author Note

The present investigator is employed at the YMCA where the study was implemented, both as fitness professional and webmaster. Nevertheless, the research was conducted without any known conflicts of interest.

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Abstract

Are Exercise Behavioral Regulations Differentiated by BMI Category?

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Recognizing the growing epidemic of obesity worldwide and the ensuing health ramifications, the primary purpose of this research project was to explore the exercise motives of individuals from a local YMCA using the principles of the self-determination theory (SDT). An online version of the Behavioural Regulation in Exercise Questionnaire-2 was used on the SurveyMonkey website to collect responses for this cross-sectional ethnographic investigation.

It was expected in the primary proposition that people in the overweight or obese Body Mass Index (BMI) categories who were not exercising specifically for weight loss would reveal a higher degree of intrinsic motivation than those in the same BMI categories who were exercising explicitly to lose weight. Furthermore, a secondary proposition predicted that individuals who exercised for ≥ 6 months would indicate greater identified regulation than those having exercised for < 6 months. Finally, it was anticipated from three additional secondary propositions that introjected regulation would statistically differ according to participants' gender, age, and race.

Most of the respondents ($N = 116$) were in the normal BMI category (40.9%; $M = 27.82$, $SD = 6.67$), female (69.0%), ≥ 40 years old (55.2%; $M = 43.17$, $SD = 13.82$), White

(80.9%), not Hispanic nor Latino (99.1%), exercised for weight loss (58.3%), and had engaged in physical activity (PA) for ≥ 6 months (68.1%).

The result of a two-way analysis of variance (ANOVA) was not statistically significant for the interaction effect of intrinsic motivation across BMI categories and by whether participants exercised specifically for weight loss. The main effect of intrinsic motivation by BMI category was significant but not the main effect of whether participants exercised exclusively for weight loss. Moreover, results of a one-way between-subjects ANOVA showed a significant difference between participants that exercised for < 6 months and those having exercised for ≥ 6 months. Lastly, three separate one-way between-subjects ANOVAs compared the degree of introjected regulation based on respondents' gender, age, and race with results indicating no significant effects.

It was deduced from the primary finding that it is not possible for individuals to become intrinsically motivated when they exercise expressly to lose weight. It was also revealed that people who exercised for ≥ 6 months demonstrated greater identified regulation than those engaged in PA for < 6 months. Finally, results indicated that introjected regulation did not contrast with regard to a person's gender, age, or race. Overall, conclusions supported the foundations of SDT emphasizing that those who exhibit a higher index of self-determination ultimately experience favorable PA outcomes. Results from this study could benefit individuals who exercise with the sole intention of losing weight.

Keywords: SDT, intrinsic motivation, motivation, exercise adherence, obesity

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CHAPTER I

Introduction

It is the new epidemic, although it is not physically contagious. The World Health Organization (WHO) states that since 1980, its worldwide incidence has more than doubled. Once considered a predicament for developed nations, it is now on the rise in low- and middle-income countries, especially in urban settings. The disorder of being overweight or obese is presently associated with more deaths worldwide than the condition of being underweight (WHO, 2011, March). Although it is ultimately preventable, many find it problematic to re-attain a normal body weight status once they have accumulated the excessive body weight. International exercise science organizations, such as the American College of Sports Medicine (ACSM), have published guidelines on how to reduce one's overfat state. Recommendations typically involve a combination of increasing physical activity (PA) while reducing energy intake. The weight-loss protocol becomes more exact with each reiteration of a position statement proclamation. But what happens when exercise science organizations incessantly conduct research down to the molecular level, develop "prescriptions" to reduce obesity, but the advice is not then acted upon by individuals? When non-exercisers commence a new exercise regimen, up to 50% of them will stop exercising within three to six months (Chambliss & King, 2010). For newcomers to PA with goals to ameliorate their overweight/ obese circumstance, is it possible to persuade these individuals to steadfastly adhere to an exercise protocol? Can they be motivated to help

themselves? Assuming that it is conceivable to motivate these people to engage in a consistent PA regimen, which motivational factors should be considered? Subsequently then, the primary intent of this study was to augment our understanding of the motivational patterns of exercising individuals who are in the overweight and obese *Body Mass Index* (BMI) categories.

In the United States, approximately 33.8% of males and 47.9% of females are attempting weight loss (Whiteley & Milliken, 2011). In 2009-2010, data has shown that more than one-third of U.S. adults were obese. Although obesity rates have plateaued in recent years, there has been a steeper rise in obesity among males than females (Ogden, Carroll, Kit, & Flegal, 2012). Health-related medical conditions account for approximately \$117 billion annually of the total U.S. healthcare costs (Thompson, Gordon, & Pescatello, 2010). Recent increases in obesity rates are related to modernization and automation which typically result in the reduction of daily PA. Successful weight loss maintenance has been attributed to increased amounts of PA (Thomas, Bond, Hill, & Wing, 2011). With regular exercise and a concomitant reduction of body weight, a myriad of chronic health conditions may be averted such as cardiovascular disease, various types of cancers, type 2 diabetes, and many musculoskeletal disorders (Thompson et al., 2010). Given the many health benefits associated with regular PA, convincing individuals to begin and maintain a regular exercise program is vital for prevention. Nevertheless, 30% of adults in the U.S. are not engaged in any daily PA at all and only 10% of sedentary individuals will start a new exercise regimen within one year (Weinberg & Gould, 2011). Especially in the era of the

information age, it is no secret that exercise confers many health-related benefits. Yet obesity prevalence remains high and PA levels continue to be low. What could explain such a paradox?

In an attempt to clarify the psychological mechanisms involved in successful adherence to exercise, researchers are focusing more on factors of motivation for maintaining PA. One of the key theories of motivation today is the *self-determination theory* (SDT; Deci & Ryan, 1985; Ryan, 1995; Ryan & Deci, 2000). The theory proposes that all people are driven to satisfy three basic human needs which include (a) *competence*, to be confident in one's ability to successfully complete a task; (b) *autonomy*, to make volitional decisions without pressure from others; and (c) *relatedness*, to socially interact and connect with others in a caring capacity (Weinberg & Gould, 2011). The degree to which these psychological factors become fulfilled defines whether individuals are more intrinsically or extrinsically motivated. *Intrinsic motivation* describes a psychological state whereby people perform an activity because they find it enjoyable and rewarding for its own sake. Conversely, *extrinsic motivation* refers to a situation in which individuals engage in an action due to outside sources exerting pressure to perform the activity. For example, someone may exercise to appease concerns from their physician about their health status. The SDT is influential in the field of exercise psychology because it accounts for degrees of *behavioral regulation* that explain motives to initiate and sustain PA. This study will employ an online version of the *Behavioural Regulation in Exercise Questionnaire-2* (BREQ-2; Markland & Tobin, 2004) to assess the degree and nature of *self-regulation* of a YMCA membership.

Statement of the Problem

To discover solutions to the problems of physical inactivity and obesity, with their resulting chronic disease manifestations, this research attempted to:

- Translate findings of PA behavioral regulations into practical recommendations, benefiting those seeking to increase their exercise adherence and thereby improve their health status.
- Make theoretical inferences in exercise motivation research since investigations are scarce for the overweight/ obese and for the African American populations.
- Contribute to scientific knowledge in the exercise psychology domain about factors in motivations for exercise.
- Effectuate the consistency facet of individuals' wellness regimen, thereby magnifying corresponding health benefits.
- Engender a positive societal outcome since it has been recognized that persistent PA decreases health risks. A healthier population will prospectively result in reduced health care costs for citizens.
- Afford economic benefits to fitness facilities. If exercise adherence levels of fitness center members increase, then those people are certain to realize a healthier profile in addition to an expected weight loss (for those with such goals). Member satisfaction would conceivably be the outcome and translate into higher membership retention rates, given that those people will be motivated to continue exercising. Having more members using a

fitness facility should increase the probability of the business remaining solvent and be impacted less from economic downturns. More fitness facilities being financially viable should result in more people having more opportunities to exercise.

Hence, the main purpose of this investigation was to explore the behavioral regulation of exercisers from various BMI categories. This was the first known study to address behavioral motivations for exercise by BMI category of a YMCA membership using the BREQ-2 with an integrated regulation subscale administered from an online setting.

Propositions

One primary and two secondary propositions were examined in this study as follows:

Primary proposition. Participants in both the overweight BMI (ov-BMI) and obese BMI (ob-BMI) categories who are not exercising specifically for weight loss will indicate greater intrinsic motivation than those in their respective BMI categories who are exercising for weight loss.

Secondary proposition 1. Respondents who have exercised consistently for at least six months will demonstrate a higher degree of *identified regulation* for physical activity compared to those who have exercised for less than six months, consistently or not. (Exercising consistently is defined as 20-40 minutes of moderate intensity for a minimum of three days per week).

Secondary proposition 2. Participants' level of *introjected regulation* will significantly differentiate among the categories within each of the demographic variables of gender, age, and race/ ethnicity. Specifically:

Secondary proposition 2.1. A statistical difference in introjected regulation will be revealed between male and female participants.

Secondary proposition 2.2. A statistical difference in introjected regulation will be evident between participants <40 years old and those \geq 40 years old.

Secondary proposition 2.3. A statistical difference in introjected regulation will manifest between participants in the category of race (i.e., American Indian or Alaska Native; Asian; Black or African American; Native Hawaiian or Other Pacific Islander; White). Similarly, a statistical difference will transpire between participants in the category of ethnicity (i.e., Hispanic or Latino; non-Hispanic or Latino).

Delimitations

Select categories of individuals were excluded from this study given that a respondent's BMI measurement needed to accurately represent their state of overfatness. It is well documented that a high BMI is not necessarily representative of excess body fat. Therefore, bodybuilders and pregnant women were not asked to participate in the survey to avoid jeopardizing the internal validity of the study. Additionally, those under 18 years of age were disqualified because the main interest in this study was adult exercise motivational behaviors. Finally, the survey was administered only within a certain time period and that date restriction may have precluded some individuals from participating.

Limitations

The present study contained the following limitations:

- Only people with a computer and Internet access were able to take the survey. Some research has shown that individuals who have access to the web are different than those who do not have Internet availability (Skitka & Sargis, 2006).
- Only people that visited the YMCA website home page that noticed the survey link and those that observed postings around the YMCA had the opportunity to take the survey.
- Being that the survey was on the Internet, there could be no guarantee that a respondent was a member of the YMCA. It was possible for a non-member to participate if they wished and there was no cost-effective way to control that factor.
- The experimental context of someone partaking in a web survey is not identical to a lab setting. For example, environmental control can be administered in the lab whereas a web survey can be completed from any place, which may contain distractions.
- Individuals in the study were self-selected to participate and therefore the sample was not randomly selected. Consequently, the results cannot be interpreted as being representative of the exercising population. A critical constraint of the web-based survey protocol is the inability to use probabilistic sampling methods and therefore the research cannot be

generalized beyond those participating in the study (Truell, Bartlett, & Alexander, 2002).

- The BREQ-2 is a self-report assessment tool and there is no way to verify that respondents honestly answered each question.
- The BREQ-2 did not employ questionnaire lie detection techniques but instead relied on the truthful response of the participants.
- If participants needed clarification about instructions or specific questions, there was no real-time assistance available, as there would have been in a lab setting.
- The geographical region that respondents likely resided in was limited to eastern Delaware County, in the Commonwealth of Pennsylvania, United States.
- There was no way to determine the true response rate of the survey because of the open-ended nature of the invitation to participate over the Internet.
- Although not likely, there was opportunity for an individual to partake in the online survey multiple times.
- There was a possibility of inaccurate reporting of height and weight which would have affected BMI categorization and subsequent analysis.
- The cross-sectional design of the survey prevented cause and effect inferences of the results.

- The study did not distinguish between individuals exercising alone versus those engaged in group exercise which involves group dynamics to motivation.
- The study did not differentiate between exercising at the YMCA and exercising in general, such as performing PA at home or outdoors.
- Although one of the questions asked whether the participant had been exercising for less than or longer than 6 months, the investigation did not attempt to discern the participants' exercise longevity by the stages of change from the Transtheoretical Model that had been used in other studies.
- The present researcher was the sole ethnographer in the study so there was a possibility of experimenter bias.
- There was a chance that those who agreed to participate in this study were in some way different than those who did not participate, reflecting response bias.
- Some highly motivated individuals may have truthfully overestimated their exercise achievements and precipitated misclassification bias.
- There may have been those who overstated their true levels of exercise engagement to please the researcher, resulting in social desirability bias.
- Acquiescence bias may have also become a factor if some respondents willfully agreed with the majority of the BREQ-2 questions, *very true for me*.

- Respondents may have over-selected responses at the extreme ends of the Likert scale (i.e., *not true for me* and *very true for me*) resulting in extreme response bias.

Definition of Terms

For the purposes of this study, the following terms are defined.

Amotivation. This is lack of intention to perform an activity or a deficit in the energization toward that action. The person feels incompetent and believes outcome is not dependent on action, success requires excessive effort, or the strategy being implemented is not effective. There is a lack of control which could lead to learned helplessness. Amotivation may occur from continual negative feedback, when believing that success is controlled by others, or when one consistently fails to succeed.

Autonomy. This is one of the three *nutriments* of the *basic psychological needs* (i.e., autonomy, competence, and relatedness). Autonomy refers to the ability of making choices freely, without coercion, that affect one's outcomes. With autonomy, people believe that they are the originators of their destiny and any expressed behaviors reflect an expression of their selves.

Basic psychological needs. It specifies that there are three basic psychological needs (i.e., *nutriments*) necessary to support human development: autonomy, competence, and relatedness.

Behavioral regulation. It refers to reasons for behaving in a certain way and is embodied by the six *SDT subscales*.

Behavioural Regulation in Exercise Questionnaire-2. This is the questionnaire used in the present online survey to assess exercise motivation using the behavioral regulation continuum (i.e., *self-determination continuum*) of the SDT.

BMI. See *Body Mass Index*.

Body Mass Index. This is the ratio of weight to height as measured by kg/m^2 to indicate an individual's weight status. The WHO BMI categories were used in this study (i.e., normal 18.50 to 24.99; overweight 25.00 to 29.99; obese ≥ 30.00). Thus, *n-BMI* referred to the normal BMI category, *ov-BMI* to the overweight BMI category, and *ob-BMI* to the obese BMI category.

BREQ-2. See *Behavioural Regulation in Exercise Questionnaire-2*.

CET. See *Cognitive Evaluation Theory*.

Cognitive Evaluation Theory. This mini-theory articulates how social contexts (e.g., exercise domain), autonomy, and competence can influence intrinsic motivation. The CET examines three broad types of motivation: extrinsic, intrinsic, and amotivation.

Competence. This is one of the three nutrients of the basic psychological needs (i.e., autonomy, competence, and relatedness). Competence refers to the belief that one is able to demonstrate skill proficiency and to successfully carry out a task.

Construct. This is typically a latent psychological paradigm that becomes indirectly evident and can be inferred from one's conspicuous conduct.

External regulation. It is an extrinsically-based motivation where one exhibits the lowest level of *self-determination* because of external pressures to attain rewards or to

avoid punishments. External regulation represents one of the six SDT subscales and is one of the four behavioral regulations within extrinsic motivation.

Extreme response bias. This occurs when respondents over-select answers at the extreme ends of the Likert scale (i.e., *not true for me* and *very true for me*).

Extrinsic motivation. This defines someone's behavior that is motivated by expectations of results which are unrelated to exercise and the PA is just a means to an end (e.g., losing weight); the activity is not done for its inherent pleasure. Typically, the person is attempting to avoid negative consequences or is trying to obtain a reward. Four types of behavioral regulations are embodied in this type of motivation: external, introjected, identified, and integrated.

Identified regulation. It is also referred to as identification. This describes a regulation whereby a person values, accepts, and identifies with the purpose of an activity. The individual willfully performs the action although it may not be inherently pleasing. Identified regulation behavior is freely chosen which makes it self-determined. There is evidence that identification predicts exercise intentions. Identified regulation represents one of the six SDT subscales and is one of the four behavioral regulations within extrinsic motivation.

Integrated regulation. It is also referred to as integration. This form of regulation provides the greatest self-determination in any of the extrinsic motivation types. Activities are performed volitionally and the choice to participate reflects congruence with other facets of one's self. With integrated regulation, there are no conflicts present so that the behavior can be cultivated long-term. Integration was not

part of the BREQ-2 but was included by the present author. Integrated regulation represents one of the six SDT subscales and is one of the four behavioral regulations within extrinsic motivation.

Internalization. This refers to the process through which an individual acquires an attitude, belief, or behavioral regulation and progressively transforms it into a personal value. The behavior could begin at the non-self-determined end of the *SDT continuum* and over time become internalized as identified or perhaps integrated regulation.

Intrinsic motivation is not a byproduct of internalization because that behavior is innately enjoyable to the individual and does not need to be integrated into the self.

Intrinsic motivation. This refers to having fun while engaged in an activity, enjoying the excitement of an activity, or attempting to master new skills. An individual feels in-the-moment and receives satisfaction that is inherent in the activity. There is no external reward and no controlling factor. The intrinsically motivated individual also has a desire to master optimal challenges. To persist in exercise over time, intrinsic motivation is one of the most important factors to sustain that drive.

Introjected regulation. It is also referred to as introjection. This form of self-regulation represents internal urges and pressures to perform an action and is only a partial internalization. It is still not regarded as self-determined because the individual's behavior is acted out from internally-generated rewards and punishments. Introjection reflects a controlling type of motivation that is initiated by compulsiveness, guilt, shame, anxiety, pride (i.e., ego-related gratification), and contingent self-esteem. Introjected

regulation represents one of the six SDT subscales and is one of the four behavioral regulations within extrinsic motivation.

Locus of causality. This specifies whether the origin of an event is internal or external to the person.

Locus of control. This denotes whether individuals affirm that outcomes are under their own control or by some outside agent.

n-BMI. See *Body Mass Index*.

Nutriments. The three basic psychological needs of autonomy, competence, and relatedness are referred to as nutriments because they are considered essential to one's growth, integrity, well-being, and they promote personal development.

ob-BMI. See *Body Mass Index*.

OIT. See *Organismic Integration Theory*.

Organismic Integration Theory. This is one of the most important components of SDT for the purposes of this study because it describes the mechanisms whereby behaviors could be internalized into a person's sense of self from non-self-determined (i.e., external regulation) to self-determined (i.e., integrated regulation) actions.

ov-BMI. See *Body Mass Index*.

Perceived locus of causality. This represents the degree to which one is self-determining with respect to one's behavior and specifies the behavior's origin which can be internal or external to a person. An internal perceived locus of causality (PLOC) makes people feel more satisfied with their actions and translates into a higher degree of effort than those who are compelled to act for external reasons.

PLOC. See *Perceived locus of causality*.

Relatedness. This is one of the three nutrients of the basic psychological needs (i.e., autonomy, competence, and relatedness). Relatedness refers to the social connection and belongingness with others, to care for them as well as to be cared for, and developing a sense of community. Relatedness has a weaker association with well-internalized exercise behaviors than the other two nutrients indicating that it acts more like a catalyst for the process of internalizing new behaviors.

SDT. See *Self-Determination Theory*.

SDT continuum. See *Self-determination continuum*.

SDT subscales. These are the six subscales of the self-determination theory ranging from the most self-determined form of behavior to a complete lack of motivation: intrinsic motivation, integrated regulation, identified regulation, introjected regulation, external regulation, and amotivation.

Self-determination. This refers to situations when individuals determine their own fate without compulsion from outside influences; having free will.

Self-determination continuum. This represents the six subscales of SDT that are situated along a continuum and epitomize behavioral regulations as gradients ranging from amotivation, through the four regulations of extrinsic motivation (i.e., external, introjected, identified, integrated), to intrinsic motivation. Extrinsic behaviors do not necessarily have to start at the least self-determined side of the continuum (i.e., external regulation) and proceed by the process of internalization to the most self-determined end (i.e., integrated regulation). Instead, a behavior may enter the continuum at any point.

Self-Determination Theory. The SDT is a general theory of motivation and personality and consists of five mini-theories. This study is based on the tenets of SDT which propose that autonomy, competence, and relatedness are the three basic human needs and the extent to which they are fulfilled will determine one's type of motivation.

Self-regulation. This is the ability of a person to change behaviors according to the expectation of a standard.

CHAPTER II

Literature Review

In this chapter, a review of prior findings was conducted in the obesity and physical inactivity domains, psychology of weight loss, exercise prescription and physical activity (PA) adherence strategies, personality factors of those attempting to lose weight, various theories of motivation along with the self-determination theory (SDT), and lastly, an examination of the effectiveness of using an online survey for data collection.

The Problem of Obesity

The World Health Organization (WHO; 2011, March) reports that 1.5 billion people worldwide were overweight in 2008. Furthermore, 200 million men and nearly 300 million women were obese, representing 10% of the world's population. Two-thirds of people reside in countries where diseases related to obesity kill more people than symptoms from starvation. Globally, obesity ranks as the fifth leading cause of mortality with 2.8 million adult deaths attributed to excessive body weight. Across the globe, obesity contributes 44% to the incidence of diabetes, 23% of heart disease, and between seven percent and 41% of some cancers (WHO, 2011, March).

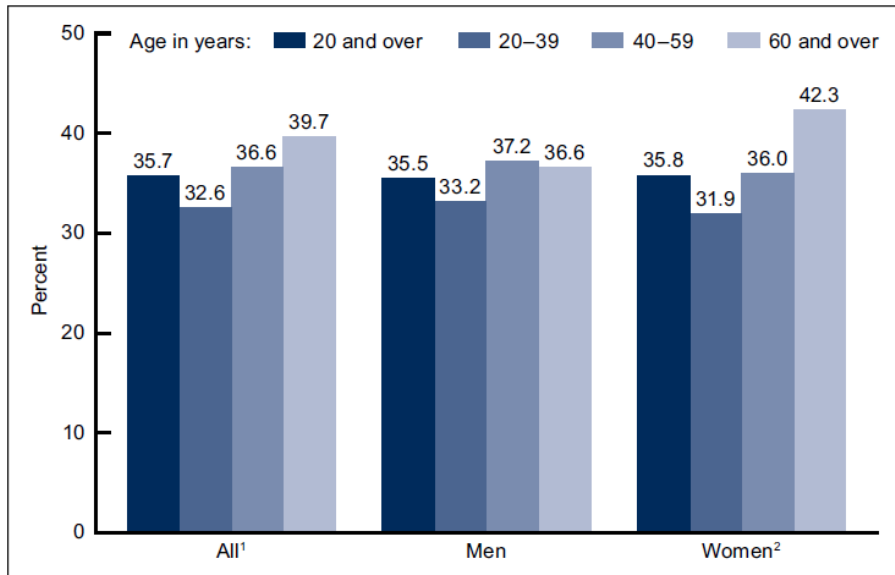
Similar trends are reported in the U.S. with two-thirds of adults being overweight or obese (Whiteley & Milliken, 2011). According to the National Institutes of Health (NIH; 2011), the Body Mass Index (BMI) of Americans reveals that most are overweight

(BMI between 25.00 and 29.99) and more than one-third are in the obese category (BMI of 30.00 or greater); see Table 1 for BMI categories as defined by WHO. Furthermore, the pervasiveness of extreme obese adults (BMI of 40.00 or greater) has risen dramatically. In fact, individuals in the U.S. who are in the normal BMI range are in the minority (NIH, 2011). Figure 1 illustrates the obesity rate by gender and age and Figure 2 shows the obesity trends in the United States over the past 35 years.

Table 1
World Health Organization Classification of Adult BMI Categories

Classification	BMI (kg/m ²)
Underweight	<18.50
Severe Thinness	<16.00
Moderate Thinness	16.00 - 16.99
Mild Thinness	17.00 - 18.49
Normal Range	18.50 - 24.99
Overweight	≥25.00
Pre-obese	25.00 - 29.99
Obese	≥30.00
Obese Class I	30.00 - 34.99
Obese Class II	35.00 - 39.99
Obese Class III	≥40.00

Adapted from "Obesity and Overweight Fact Sheet," by the World Health Organization, 2011, March. Retrieved from <http://www.who.int/mediacentre/factsheets/fs311/en/index.html>



¹Significant increasing linear trend by age ($p < 0.01$).

²Significant increasing linear trend by age ($p < 0.001$).

NOTE: Estimates were age adjusted by the direct method to the 2000 U.S. Census population using the age groups 20-39, 40-59, and 60 and over.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2009-2010.

Figure 1. Prevalence of obesity by gender and age in the United States, 2009-2010.

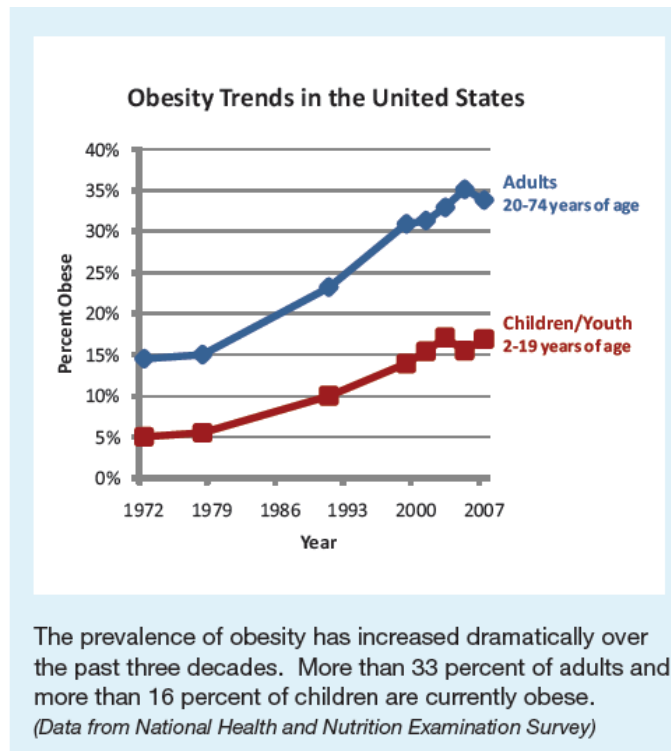
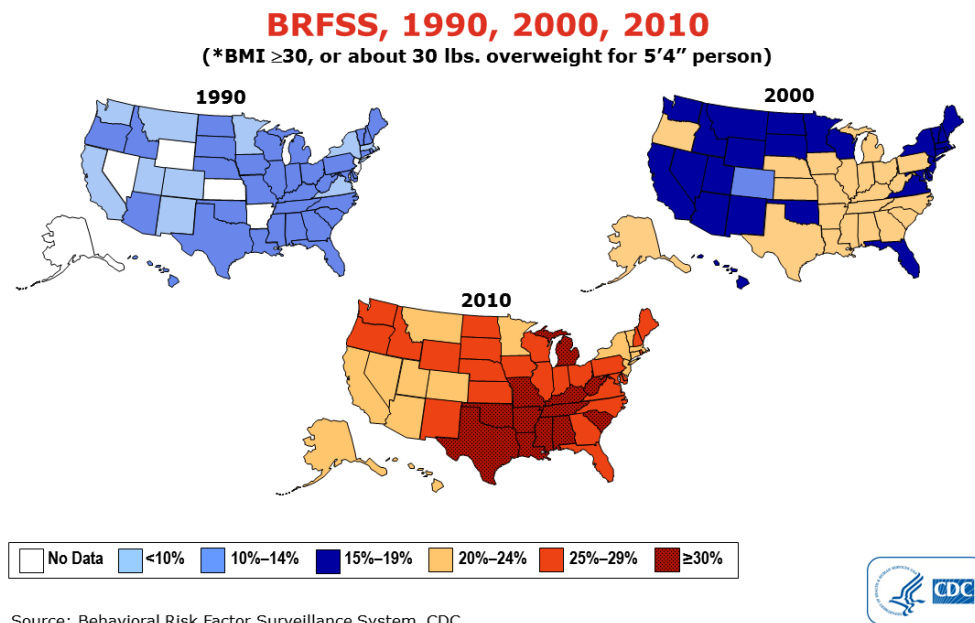


Figure 2. Obesity trends in the United States.

Adapted from “Strategic Plan for NIH Obesity Research: Summary” (NIH Publication No. 11-5493-a), by the National Institutes of Health, 2011. Washington, DC: U.S. Government Printing Office.

The Centers for Disease Control and Prevention (CDC; 2012, March) administers a national Internet database of obesity statistics by state and county. To attest how obesity has risen dramatically over the past couple of decades, Figure 3 illustrates that evolution from the year 1990, to 2000, and finally to 2010. According to 2010 estimates, Pennsylvania had a 28.6% obesity rate. The latest assessments for Delaware County were for 2008 and that obesity prevalence was 27.0%. These CDC indicators reaffirm that the obesity problem was existent in the locale in which this study was conducted.

The grim statistics reveal that obesity is pervasive in modern society, resulting in various pathologies.



Source: Behavioral Risk Factor Surveillance System, CDC.

Figure 3. Obesity trends* among U.S. adults from the years 1990, 2000, and 2010.

Obesity has been identified as a major independent risk factor for cardiovascular disease (CVD), which according to WHO estimates, kills 16.7 million individuals worldwide yearly. In 2004, CVD killed more people than accidents, respiratory disease, cancer, and diabetes combined. In fact, CVD was identified as the cause of 36.3% of deaths and a causative factor in 58% of all mortality that year (Nagelkirk, 2010). It is estimated that obesity also contributes up to 75% of hypertension cases. Moreover, a strong correlation has been demonstrated between abdominal fat and insulin resistance with these being the two significant-most risk factors for acquiring the metabolic

syndrome, increasing the probability for developing CVD. Greater risks are indicated for men with a waist circumference ≥ 101.6 cm (40 in) and women ≥ 88.9 cm (35 in) as shown in Figure 4.

	BMI (kg/m ²)	Obesity Class	Disease Risk* Relative to Normal Weight and Waist Circumference	
			Men ≤ 102 cm (≤ 40 in) Women ≤ 88 cm (≤ 35 in)	> 102 cm (> 40 in) > 88 cm (> 35 in)
Underweight	< 18.5		—	—
Normal [†]	18.5 – 24.9		—	—
Overweight	25.0 – 29.9		Increased	High
Obesity	30.0 – 34.9	I	High	Very High
	35.0 – 39.9	II	Very High	Very High
Extreme Obesity	≥ 40	III	Extremely High	Extremely High

* Disease risk for type 2 diabetes, hypertension, and CVD.

† Increased waist circumference can also be a marker for increased risk even in persons of normal weight.

Figure 4. Classification of overweight and obesity by BMI, waist circumference and associated disease risk.

Adapted from “The Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: The Evidence Report” (NIH Publication No. 98-4083), by the National Institutes of Health, 1998. Washington, DC: U.S. Government Printing Office.

The Problem of Physical Inactivity

In the mid-1990s, the U.S. Surgeon General, NIH, CDC, and the American College of Sports Medicine (ACSM) published milestone recommendations for PA and later, the American Heart Association along with ACSM endorsed an increase in the prescription of exercise volume. In 2008, the U.S. Department of Health and Human Services (HHS) published national PA recommendations for the first time with their *The*

Physical Activity Guidelines for Americans report (www.health.gov/paguidelines/).

Epidemiologists typically attempt to distinguish between PA and physical fitness in predicting the risk of chronic disease (Kraus, 2010) but for the purposes of this study, a distinction will not be made between PA and physical fitness.

A dose-response association has been linked between the amount of PA and the resulting quality of health. As expected, more PA affords greater health benefits. Additionally, an inverse dose-response relationship has been found between PA and a myriad of health concerns, such as cancer, stroke, hypertension, quality of life, independent living ability in older adults, bodyweight status, and all-cause mortality (Thompson et al., 2010; Kraus, 2010; see Figure 5). Moreover, it has been shown that type 2 diabetes has a strong inverse relationship with the amount of self-reported PA assessed during a long-term study (Ryan & Joseph, 2010). Actually, research has consistently shown that those who sustain high levels of PA or physical fitness display a lower risk for all-cause mortality (Kraus, 2010). A Canadian study of adults found that PA had positive influences on health-related quality of life. Results across BMI levels indicated that inactive individuals had a fair/poor self-rated index of health for both males and females. However, being active regardless of BMI category showed little negative impact on this scale (Herman, Hopman, Vandenkerkhof, & Rosenberg, 2012). This finding suggests that PA is the primary determinant, rather than bodyweight, for predicting healthy outcomes.

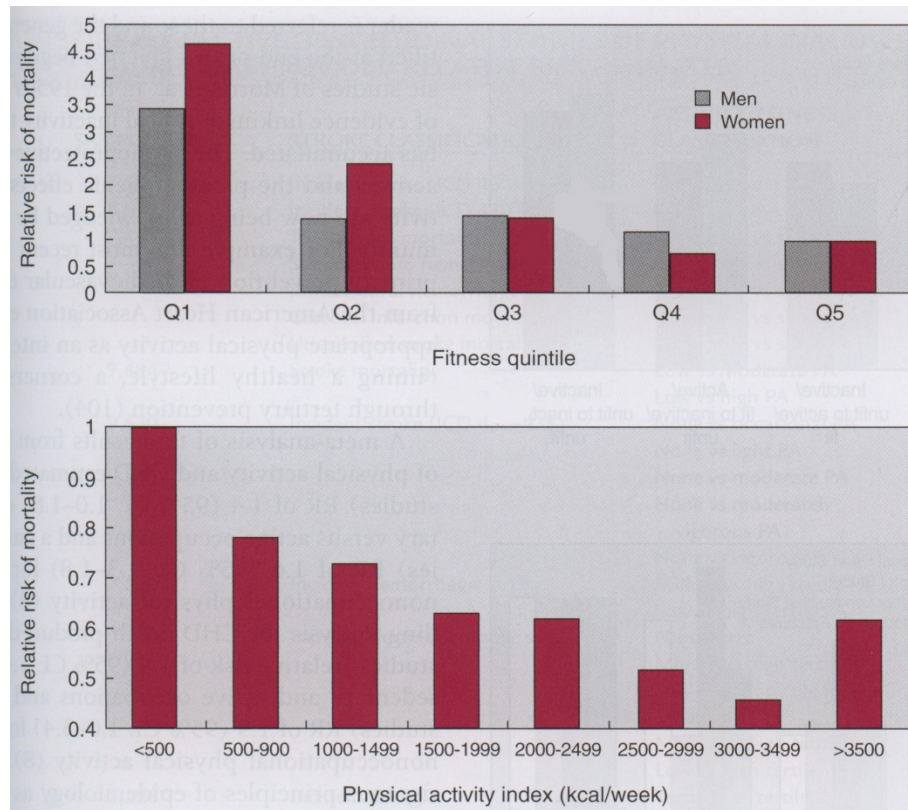


Figure 5. Relative risks of all-cause mortality across levels of cardiorespiratory fitness. Aerobics Center Longitudinal Study (top panel) and physical activity in the Harvard Alumni Study (bottom panel).

Adapted from *ACSM's Resource manual for guidelines for exercise testing and prescription* (p. 169), by J. K. Ehrman, A. deJong, B. Sanderson, D. Swain, A. Swank, & C. Womack (Eds.), 2010, Philadelphia, PA: Lippincott Williams & Wilkins.

Physical inactivity is pervasive regardless of gender, age, and race/ ethnicity, with inequalities existing within those classifications. Females have been found to be more physically inactive than males. Older adults are also less physically active than younger people. Finally, African Americans and Hispanics reported lower inactivity levels (33%) than Whites (22%; Weinberg & Gould, 2011). Figure 6 depicts how the PA of males and females in the U.S. steadily decreases with an increase in age. In fact, a lack of PA is not

just a U.S. phenomenon but is relevant in less advanced countries as well. Physical inactivity has been deemed a major risk factor for all-cause mortality in many developing nations (Kraus, 2010).

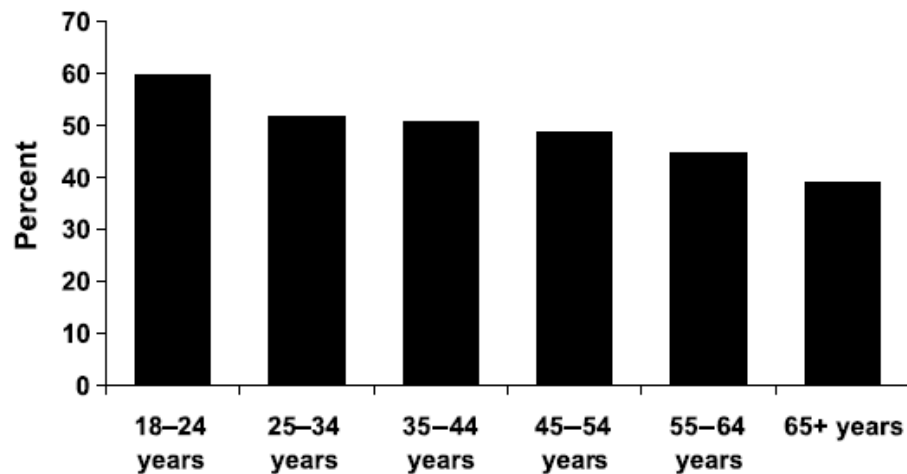


Figure 6. Prevalence of U.S. men and women meeting the CDC/ACSM physical activity recommendations by age, 2005.

Adapted from “Physical activity and public health: Updated recommendation for adults from the American College of Sports Medicine and the American Heart Association” [Special communications], by W. L. Haskell, I-M Lee, R. R. Pate, K. E. Powell, S. N. Blair, B. A. Franklin...A. Bauman, 2007, *Medicine & Science in Sports & Exercise*, 39, pp. 1423-1434.

The CDC accumulates data and maintains national maps of physical inactivity trends. In only a five year span (i.e., 2004-2009), the rate of inactivity showed a marked increase, see Figure 7. In 2008, about one in four U.S. adults did not engage in leisure time PA. In Delaware County, the physical inactivity incidence (23.8%) was only slightly better than the national average (25.4%; CDC, 2012, March).

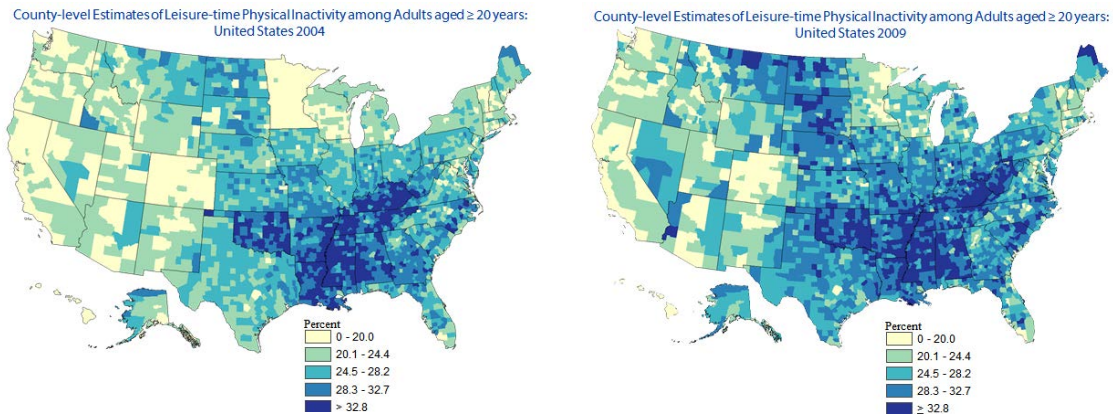


Figure 7. County-level estimates of leisure-time physical inactivity among adults aged ≥ 20 years in the U.S. for 2004 (left) and 2009 (right).

Source: Behavioral Risk Factor Surveillance System, CDC.

The chief reason that individuals cite for not engaging in PA is the lack of time (69%), even with the notable health benefits brought about by exercise. Yet, in many instances the perceived lack of time is a matter of reprioritizing one's daily schedule. Other rationales used for being physically inactive include a lack of energy to exercise and a lack of motivation (Weinberg & Gould, 2011). Obviously, the latter case provides the impetus for the present study.

The Psychology of Weight Loss

A study conducted by Teixeira et al. (2006) examined psychosocial effects related to diet, body image, and exercise of middle-aged overweight and obese women involved in a weight reduction program. The findings revealed that diet had a measureable impact with initial weight loss but that intrinsic motivation was a more prominent predictor of

long-term weight reduction. The authors concluded that the significance of one's cognitive processes, such as self-efficacy and motivation type, was correlated to the effective completion of the lifestyle weight management program. Successful self-regulation, or the ability to alter one's behavior to a standard, is most likely to occur when one is motivated in a self-determined way. Pelletier, Dion, Slovinec-D'Angelo, and Reid (2004) examined the reason why some individuals are efficacious in self-regulating their eating behaviors while others repeatedly failed at such attempts. The results showed that healthy eating behaviors could be predicted by one's self-determined regulatory style.

Long-term maintenance of weight loss typically involves cognitive behavioral therapy to control for stimuli to eating cues, self-monitoring of flawed cognitive processes regarding weight control, incorporating stress management techniques, and integrating social support. Regardless, long-term compliance to eating regulations remain low unless the behavioral program includes cognitive-based intervention. Moreover, exercise alone with no diet mediation does not typically maintain the weight lost over the long-term (Salmon & Jablonski, 2010). The National Weight Control Registry, founded in 1994, is a national database that collects behavioral information of individuals who have successfully lost weight and kept it off. These members indicated a high level of control in their eating behaviors and reported that they seldom overate due to emotional stresses or to the accessibility of tasty foods. Most members (89%) combined exercise and diet to preserve their weight loss, while far fewer dieted alone (10%) or just exercised (1%) to maintain their body weight (Thomas et al., 2011).

A psychological benefit of feeling competent in the performance of exercise can translate into a rise in dietary adherence, which then increases the likelihood of successful weight loss (Tanofsky & Wilfley, 1996). Positive outcomes in weight management are characteristically predicted by long-term exercise adherence. Even a modest five to 10% reduction in body weight has been demonstrated to cultivate self-efficacy, mood, self-esteem, and body image (Andersen, 1996). Therefore, an initial and obtainable weight-reduction goal for obese individuals is to lose 10% of their bodyweight over a 6-month period of behavioral therapy (NIH, 1998). Lastly, a study by Mata et al. (2009) indicated that self-regulation in exercise behavior can lead to improved self-control in eating habits during a weight control intervention of women. The authors concluded that the positive effect of motivation on behavioral weight management outcomes may be useful in postulating new psychological models of behavior change across multiple domains, such as exercise and diet.

The Exercise Prescription

There are two main categories of exercise prescription for the non-athletic general population. The first type involves exercising for health benefits, such as to maintain good health or to improve one's chronic condition. For example, PA would be performed to lower one's hypertensive levels. The second form of exercise recommendation is the regimen to lose weight. Each of the two forms is discussed separately.

Exercise for health benefits. The HHS (2008, October) in their national guidelines for PA recommended that adults perform 150 minutes or more of moderate-

intensity PA per week. Alternatively, an individual can engage in at least 75 minutes per week of vigorous-intensity PA. For added health benefits, people can increase their duration to 300 minutes a week of moderate intensity or 150 minutes a week of vigorous intensity. Moderate PA is described as brisk walking which generates a noticeable increase in heart rate for 30 minutes, or done as 10-minute bouts. Additionally, moderate with vigorous activity can be combined to meet HHS recommendation. For instance, individuals can walk for 30 minutes two days per week and then jog for 20 minutes for another two days per week (Haskell et al., 2007).

Exercise for weight loss. Exercising for weight loss typically involves a greater volume of PA than does exercising to maintain or improve one's health. Yet, exercise seems to have minimal effect on the amount of weight lost in the first six months of a weight reduction program in contrast to lowering one's caloric intake. Nonetheless, PA does have significance in preserving any weight already lost (Thompson et al., 2010). Remaining physically active after achieving weight loss goal is critical since it has been shown that 33% to 50% of the amount of weight lost is regained within one year of the intervention.

Various suggestions have been pronounced for the appropriate volume of exercise for those seeking to lose weight. Recent studies indicate that 45 to 60 minutes of PA on most days per week seem to prevent a relapse of weight regain. The International Association for the Study of Obesity advises to perform 60 to 90 minutes of exercise on most days of the week (Moore, Lyerly, & Durstine, 2010). The ACSM, in its Position Stand (2009) on exercise and weight loss strategies, reported that moderate intensity PA

between 150 and 250 min•wk⁻¹ (i.e., minutes per week) appears to prevent weight gain. However, this volume of exercise only induced minor weight losses. Instead, other studies revealed that PA >250 min•wk⁻¹ promoted the greatest weight loss (ACSM, 2009). Additionally, members of the National Weight Control Registry who had successfully lost weight and kept it off self-report that their level of PA in calories expended averaged at 2,571 kcal week⁻¹ (Thomas et al., 2011), an extensive amount.

Exercise Adherence Strategies

Self-motivation and support from others are important factors for individuals when starting a fitness regimen or beginning a diet to lose weight (Volpe, 2010). Exercise data for dropout rates reveal that the 6-month period is a good index as to whether people will adhere to the regimen, considering that 50% of exercisers drop out by that time; see Figure 8. Interest and enjoyment of PA have been significant predictors of exercise consistency compared to body-related goals, such as trying to lose weight (Vlachopoulos & Neikou, 2007). Physical activity provides the opportunity to engage in social interaction, which has been shown to increase adherence. For example, participation rates are higher for females who self-report that the social component is an important motivational factor in their exercise program (Ryan, Frederick, Lipes, Rubio, & Sheldon, 1997). Activity enjoyment and socializing with others appear to be vital in exercise continuation. It is uncommon for individuals to maintain their program long-term if they do not experience satisfaction and fun from the activity. Likewise, some individuals go to fitness facilities to fight loneliness and to meet others. Actually, it is

estimated that 90% of those who exercise prefer to work out with a partner or engage in group exercise. Of those who are “regular” exercisers, only 25% of them usually exercise alone (Weinberg & Gould, 2011).

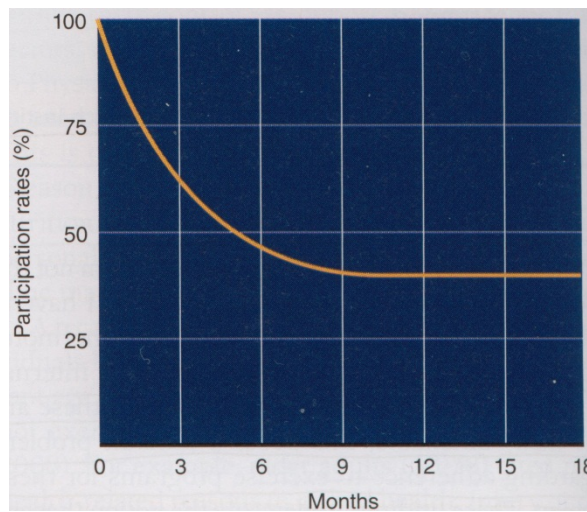


Figure 8. Change in rate of exercise program participation over time.

Adapted from *Foundations of sport and exercise psychology* (p. 420), by R. S. Weinberg & D. Gould, 2011, Champaign, IL: Human Kinetics.

The crucial motives that consumers cite for joining a fitness facility are to get into physical shape (84%) or to stay in shape (79%); see Table 2. Men and women join facilities for different reasons, as would be expected, but the top two reasons are identical for both genders: (a) location of facility within 12-15 minutes; and (b) general convenience of the facility; see Table 3. Conversely, individuals may leave because of facility-driven reasons or for personal factors. Facility-driven reasons that cause people to terminate their membership include overcrowding, staff/ management dissatisfaction, and cleanliness. Personal factors of why people leave include losing motivation to

exercise, not having an exercise partner, and not achieving results; see Table 4. Furthermore, Table 5 summarizes the disassociation of what prospective members presuppose of fitness facilities, their reasons for joining, and their justifications for leaving.

Table 2
Top Reasons Consumers Join Health and Fitness Facilities

Top Overall Reasons	Top Specific Reasons
To get in shape (84%)	To get in shape (64%)
To stay in shape (79%)	Need a place to exercise (54%)
Need a place to exercise (73%)	To stay in shape (49%)
Equipment availability (72%)	Equipment availability (40%)
Liked facility (71%)	Need motivation (33%)
Friendly staff (63%)	Liked facility (30%)
Good price (61%)	Good price (29%)
Need motivation (60%)	Friendly staff (22%)

Adapted from *ACSM's Resource manual for guidelines for exercise testing and prescription* (p. 769), by J. K. Ehrman, A. deJong, B. Sanderson, D. Swain, A. Swank, & C. Womack (Eds.), 2010, Philadelphia, PA: Lippincott Williams & Wilkins.

Table 3

Differences Between Men and Women in Making Decisions for Joining Health and Fitness Facilities

Men	Women
Location, location, location (fitness facility needs to be within 12-15 minutes of home or work)	Location, location, location (fitness facility needs to be within 12-15 minutes of home or work)
Convenience	Convenience
Quality and quantity of facilities and equipment	Cleanliness of the facility
Price-values equations	Group exercise programs
Availability of equipment	Friends are members
Staff quality and service delivery	Nonintimidating environment
Competitive environment	Staff quality and service delivery
	Program for kids
	Price-values equations

Adapted from *ACSM's Resource manual for guidelines for exercise testing and prescription* (p. 769), by J. K. Ehrman, A. deJong, B. Sanderson, D. Swain, A. Swank, & C. Womack (Eds.), 2010, Philadelphia, PA: Lippincott Williams & Wilkins.

Table 4

Facility-Driven and Personal Reasons for Quitting Health and Fitness Facilities

Facility-Driven Reasons	Personal Reasons
Overcrowding	Did not make enough use of the facility
Dissatisfied with staff	Lost interest or motivation
Lack of attention by staff	Did not have a partner
Unresponsive management	Switched to home exercise
Favorite staff member left	Switched to exercising outdoors
Facility was not clean	Did not achieve desired results
Culture of the facility	
Equipment was not well kept	
Dishonest business practices	

Adapted from *ACSM's Resource manual for guidelines for exercise testing and prescription* (p. 770), by J. K. Ehrman, A. deJong, B. Sanderson, D. Swain, A. Swank, & C. Womack (Eds.), 2010, Philadelphia, PA: Lippincott Williams & Wilkins.

Table 5

The Disconnect Between Perception and Reality Concerning Why Individuals Join and Quit Health and Fitness Facilities

Perception of Facility	Join For	Leave For
Worth the money	Good price	Overcrowded
Fun	Available equipment	Lost interest
Knowledgeable staff	Get in shape or stay in shape	Could not afford
For fit people	Staff quality or service	No partner
For young people	Cleanliness (women)	Results not achieved
Overcrowded	Friends are members (women)	Lack of attention by staff
	Nonintimidating environment	Culture of facility
	Group exercise program (women)	Poor programs
		Dissatisfied with staff; No connection

Adapted from *ACSM's Resource manual for guidelines for exercise testing and prescription* (p. 770), by J. K. Ehrman, A. deJong, B. Sanderson, D. Swain, A. Swank, & C. Womack (Eds.), 2010, Philadelphia, PA: Lippincott Williams & Wilkins.

The ability to make choices regarding exercise mode, intensity, duration, and frequency are positively correlated with activity persistence. For instance, the amount of time exercised per week is associated with the level of interest and enjoyment of the activity. An individual's type of motivation is an important determinant in whether that person is successful in sustaining exercise persistence. People who are extrinsically motivated (e.g., those who are attempting to lose weight) have been found to work out fewer hours per week than those who exercise for enjoyment. Intrinsically motivated individuals (e.g., those with an internal compulsion to engage in PA) become absorbed in the activity and time seems to be inconsequential. Conversely, people extrinsically motivated feel pressure to attain their goal and many are not able to persist long-term (Frederick-Recascino, 2002).

Adherence to exercise has two antecedents: personal and environmental explanations. Demographic factors, such as having a higher income, not smoking, more education, male gender, or higher socioeconomic status, have a strong link with greater PA. Very little research has been done on the non-White population, although in one study African American females' activity levels dropped by 100% from the ages of 10 to 19 while activity for White girls fell by 64% (Weinberg & Gould, 2011). Another personal factor for reliably predicting adherence is past participation. Those exercising for six months are more likely to continue activity into the future. Environmental factors that affect adherence includes social (e.g., friends and family), physical (e.g., facility distance, time, and weather), and fitness regimen characteristics (e.g., intensity of exercise and duration). A study by Carron, Hausenblas, and Mack (1996, as cited in Weinberg & Gould, 2011) revealed that social support predicted adherence stronger than other factors. Physical activity idiosyncrasies have revealed that moderate intensity exercise has a lower drop-out rate (25%-35%) that does vigorous exercise (50%). Greater adherence rates are indicated when exercisers have the opportunity to self-pace their intensity levels. Self-selecting exercise intensity is antithetical to recommendations historically advised by fitness organizations, like the ACSM. However, in their 2011 Position Stand, the ACSM now recommends that exercisers remain below their ventilatory threshold and that they engage in an activity they find enjoyable to improve their chances of long-term adoption. This softening of the rigid prescriptions reflects the direness of the obesity epidemic and the increasing appreciation of the significance of motivation in the exercise domain.

One element that could undermine a participant's PA adherence is that the exercise prescription is established on fitness data, usually normative, while not considering the psychological readiness of the exerciser. Most fitness plans are not flexible in their recommendations for intensity, frequency, or duration and prove too difficult for some individuals. The customary regimen typically does not empower exercisers to change self-regulatory behaviors (Weinberg & Gould, 2011). Dishman and Buckworth (1997, as cited in Weinberg & Gould, 2011) found that people may relapse with less severity if they anticipate the setback and realize that it can be thought of as only temporary. It is best if individuals do not consider adherence as an "all or none" situation where a small slip in attendance causes the participant to view it as a complete failure and then quit altogether (Napolitano, Lewis, Whitley, & Marcus, 2010). Self-monitoring has proved beneficial for long-term adherence but this approach has been difficult to implement because self-administration (e.g., maintaining exercise or diet logs) is resisted by many individuals (Chambliss & King, 2010).

One method that exercisers can use to increase their level of adherence is to be mindful during activity engagement instead of being focused on an extrinsic objective, such as losing a certain amount of weight. It is best if individuals engage in the activity from a process perspective rather than being preoccupied with outcomes. Some researchers advise that the importance attached to an activity by the exerciser is the vital component of successful adherence. Morgan (2001, as cited in Weinberg & Gould, 2011) contends that the type of exercises that individuals typically engage in a fitness center are found to be nonpurposeful by most people, such as rowing, stair climbing,

treadmill walking or jogging, lifting weights, and other nonmeaningful activities.

Additionally, the ACSM Position Stand (2011) explicates that any positive distractions that exercisers find engaging (e.g., television, instructor's personality, and music) can also create positive affective experiences for individuals and may even contribute to activity perseverance.

Personality Factors

Personality plays a key role in an individual's motivational propensities with competence being prominently figured into many theories of personality, especially the self-theories. Meanwhile, social cognitive theorists use the self-efficacy paradigm to explain one's faith in their ability to successfully complete given tasks. Also, personality theories espouse the conscientiousness quality of an individual to explicate certain characteristics such as industriousness (Conroy, Elliot, & Coatsworth, (2007).

Psychoanalytic theories postulate a synthesis function of the ego by an active organism. Humanistic theories suggest that each individual has an actualizing propensity. Finally, cognitive developmental theories propose that an organism has an integrative predisposition (Deci & Ryan, 2002a). The aforementioned personality approaches all contributed to the development of the SDT.

Personality traits are considered relatively stable characteristics that exist across many domains. The Big Five model is the most widely used theory of personality and contains five such factors: (a) neuroticism (i.e., nervousness, anxiety, depression, and anger) versus emotional stability; (b) extraversion (i.e., enthusiasm, sociability,

assertiveness, and high activity level) versus introversion; (c) openness to experience (i.e., originality, need for variety, and curiosity); (d) agreeableness (i.e., amiability, altruism, and modesty); and (e) conscientiousness (i.e., constraint, achievement striving, and self-discipline). A meta-analysis of dozens of studies by Rhodes and Smith (2006, as cited in Weinberg & Gould, 2011) revealed that extraversion and conscientiousness were the personality traits mostly associated with PA whereas neuroticism was negatively correlated. The majority of contemporary studies conducted in sports psychology fall under the phenomenological approach to personality which argues that traits and states (i.e., situations) determine one's behavior. Individuals assess their subjective experience to an event and interpret their own selves in the environment. Proponents of this psychological construct suggest that both traits and states must be considered when predicting one's behavior. According to Raykov and Marcoulides (2011), *constructs* are "indirectly observable entities ... which can be inferred from overt behavior" (p. 1).

Self-esteem is a personality trait that indicates one's self-worth or feeling of pride. Individuals who are externally driven pressure themselves to attain extrinsic goals by a means of conditional self-esteem. If they excel at an activity, they tend to self-glorify their achievements but if they fail, they become critical of themselves. By relying on external validation of their self-worth, these individuals engage in PA as a means to an end and not for the enjoyment. People who have low self-esteem also tend to compare themselves with others. They usually try to match themselves against someone with a higher standing (e.g., one with a greater fitness level or who has lost more weight), resulting in feelings of inferiority and this negative affect could impact their association

with others (Vansteenkiste, Soenens, & Lens, 2007). Fitness programs typically result in substantial increases in one's self-worth (Weinberg & Gould, 2011).

Another critical personality factor cited in the literature regarding an individual's general sense of self-confidence is the trait of self-efficacy, which is the belief of one's ability to execute or complete a task efficaciously. Self-efficacy can predict exercise involvement, especially in the early stages. Therefore, exercise leaders should ensure that participants engage in activities that they feel confident in mastering at the time that the new exercisers begin their program (Chambliss & King, 2010). There is a feedback loop encompassing self-efficacy and exercise engagement: self-efficacy rises with PA and activity increases with a concomitant rise in self-esteem. Reports indicate that self-efficacy and self-motivation are the best estimators of exercise adherence (Weinberg & Gould, 2011; Napolitano et al., 2010).

Other Theories of Exercise Behavior and Motivation

The SDT is just one of many models that can be applied to exercise motivation and will be examined in detail in an upcoming section. Here, other theories will be surveyed and where applicable, compared to SDT.

Theories of achievement motivation. Achievement motivation denotes an individual's energies in striving for excellence while working through difficulties and then taking pride in that achievement (Gill, 2000, as cited in Weinberg & Gould, 2011).

There are four theories that are categorized under *achievement motivation*: (a) Need

Achievement Theory; (b) Attribution Theory; (c) Achievement Goal Theory; (d) and Competence Motivation Theory.

The Need Achievement Theory suggests that both traits and states produce a resultant tendency of emotional reactions and an achievement behavior is the outcome. The Attribution Theory (AT) considers the reasoning that people employ in describing their outcomes. Three attributes of AT are stability of success or failure; locus of control (i.e., whether a person controls an element); and locus of causality (i.e., whether the origin of an event is internal or external to the person). Locus of causality is an integral part of the SDT model and will be detailed in the next section. The Achievement Goal Theory (AGT) contains three aspects that can regulate motivation: achievement goals, perceived ability, and achievement behavior. With AGT, individuals evaluate the meaning of success or failure by considering their achievement goals and how those goals interface with their self-worth. According to this theory, task-oriented individuals choose moderate-to-difficult activities because they are not afraid of failure. They define a successful consequence by comparing their current to their previous performances (Wang & Biddle, 2007). Conversely, outcome-oriented people find it difficult to attain their elevated perceived competence because they have to make normative comparisons with others, whose performance they cannot control. Finally, the Competence Motivation Theory holds that individuals have an impulse to achieve competence which drives their motivation (Weinberg & Gould, 2011). The SDT also incorporates competence into its framework of basic psychological needs.

Theories and models of exercise behavior. The Health Belief Model specifies that individuals immerse themselves in healthy behaviors only after they judge a condition to be severe enough for action. The Theory of Planned Behavior postulates that an individual's belief of their capacity to regulate a behavior is the main determinant of success (Weinberg & Gould, 2011). The Social Cognitive Theory (SCT) specifies that self-efficacy (i.e., competence) is the pivotal factor regarding as to whether individuals perform a behavior (Vallerand & Fortier, 1998). The SCT has been highly influential at producing positive change in exercise behaviors (Napolitano et al., 2010). Research in SCT-based motivation has dominated the literature in sports psychology in the recent decades. The SDT in particular has spawned hundreds of studies and owes its success to the rigorous modeling of human motivation (Duda, Cumming, & Balaguer, 2005). The Transtheoretical Model (TM; i.e., Stages of Change Model) examines behaviors that advance through six sequential stages: precontemplation stage, contemplation stage, preparation stage, action stage, maintenance stage, termination stage. The TM has been successful in identifying the readiness of people to change behaviors and to subsequently administer appropriate interventions. Research by Lippke, Ziegelmann, and Schwarzer (2005, as cited in Weinberg & Gould, 2011) found that people's level of self-efficacy was differentiated by the TM stages. The Physical Activity Maintenance Model was developed particularly to increase exercise adherence levels and incorporates the following overarching features: goal setting, self-motivation, self-efficacy, exercise environment, and the individual's life stresses. Finally, Ecological Models attempt to explain how personal and environment variables interact to produce behavioral outcomes.

Exercise schema. An intriguing theory of exercise behavior involves what its proponents assert is self-schema, which are cognitive structures that individuals deem fundamental to their psyche and are abstractions based on past experiences (Kendzierski, 1990). There are three categories of schematic entities in the domain of exercise: (a) *exerciser schematics* who unmistakably view themselves as exercisers; (b) *nonexerciser schematics* believe that they are completely nonexercisers; (c) and *aschematics* who do not have any affinity to exercise at all (Kendzierski, Sheffield, & Morganstein, 2002). Kendzierski and Costello (2004) propose that a schema generates a perceptual organization for conceptualizing information and affords exerciser schematics an ability to interpret schema-applicable environmental cues. An exerciser schematics' breadth of domain-relevant knowledge provides them with greater expectations of succeeding should there be a lapse in performance (e.g., resuming exercise after a layoff). Individuals who define themselves as exerciser schematics rebound much quicker after a lapse versus nonexerciser schematics and aschematics (Kendzierski & Morganstein, 2009).

Exerciser schematics perform more workouts per week, do more exercises, and restart an exercise routine if they had been inactive recently (Kendzierski & Sheffield, 2000). Proponents of the schema theory argue that exerciser schematics interpret a lapse as unstable (e.g., lack of effort) whereas aschematics view their lapse as stable (e.g., lack of ability) and therefore suffer negative emotions causing lower self-efficacy and decreased motivation. It appears that exerciser schematics possess more strategies for managing situations when they do not feel like exercising (Kendzierski, 1988).

Exercisers who establish exercise blueprints engage in PA to the extent that they develop a schema for exercise. Another domain where self-schema is relevant is in one's dieting behavior. Since schematics are better able to effectuate their intentions, they are also adept at sustaining healthy eating regulations (Kendzierski & Costello, 2004).

Models of self-regulation. Self-regulation is described as the capacity to sustain a behavior despite encountering barriers to that behavior (Napolitano et al., 2010). The following self-regulation models have a social cognitive viewpoint: Bandura's Model of Self-Regulatory Process, Kirschenbaum's Five-Stage Model of Self-Regulation, and Zimmerman's Self-Regulated Learning Model. The Model of Self-Regulatory Process by Albert Bandura (1986; as cited in Duda et al., 2005) proposes that self-regulation is contingent on three aspects: goals, self-assessment, and self-efficacy. Kirschenbaum's Five-Stage Model of Self-Regulation involves interplay between cognitive, affective, physiological, and environmental factors. The model comprises of problem identification, commitment, execution, environment management, and generalization (Duda et al., 2005). Zimmerman's Self-Regulated Learning Model is based on the learning of skills instead of evaluating the activity. The model proposes that a learner will evolve through four stages: observation, emulation, self-control, and self-regulation (Duda et al., 2005).

Self-Determination Theory

Motivation is described as an internal human energy that directs a particular behavior. The study of motivation examines the "why" of human behavior (Deci &

Ryan, 1985). Research into motivation previously used a mechanistic perspective (i.e., drive theory and gestalt theory) but the dominant viewpoint today involves social cognitive methods (i.e., self-efficacy theory, AGT, and SDT). People are presumed to rationalize their behavior under the social cognitive frameworks (Wang & Biddle, 2007). Whereas mechanistic theories assume that people are controlled by their biological and ecological inputs, organismic theories of motivation view individuals as acting volitionally to control their emotions and drives (Deci & Ryan, 1985).

The SDT is a meta-theory of motivation using personality and social psychology constructs to explain internal and external behavioral tendencies using an organismic dialectic scheme (Deci & Ryan, n.d.; Chatzisarantis & Hagger, 2007; see Figure 9). The SDT is structured after the life sciences whereby organisms are growth-oriented and actively seek to master their external and internal environment and then attempt to integrate those experiences into a unified sense of self (Deci & Ryan, 2002b; Wang & Biddle, 2007; Deci & Ryan, n.d.). According to SDT, individuals have an innate striving for personal growth to optimally interface with and effectively conquer their environments (Duda et al., 2005). Consequently, the dialectical perspective of SDT ensues when people's interactions with their society either obstructs or nurtures their active disposition (Deci & Ryan, 2002b). The SDT has become the predominant theory of motivation in the exercise and sport domain because it encompasses both causes (i.e., determinants) and outcomes (i.e., consequences) using just a few constructs (Chatzisarantis & Hagger, 2007; Vallerand & Fortier, 1998).

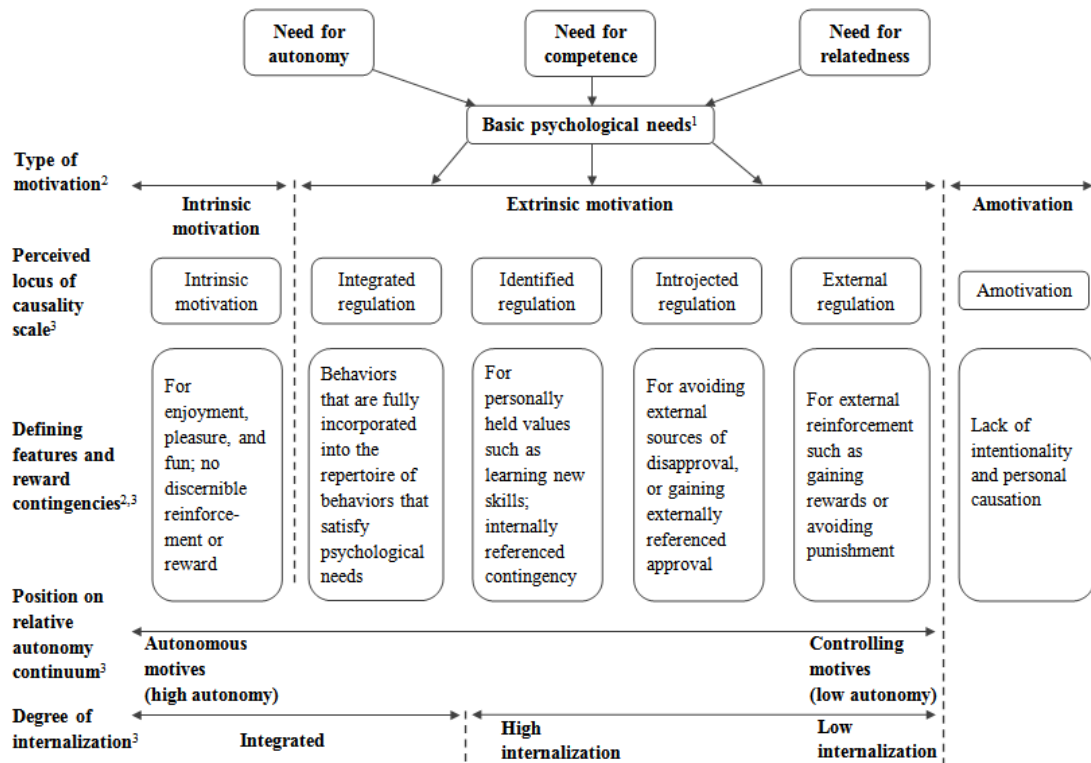


Figure 9. Schematic representation of the self-determination theory. Depicted are three of the component subtheories: Basic psychological needs theory¹, cognitive evaluation theory², and organismic integration theory³.

Adapted from *Intrinsic motivation and self-determination in exercise and sport* (p. 8), by M. S. Hagger and N.L.D. Chatzisarantis (Eds.), 2007, Champaign, IL: Human Kinetics. Copyright 2007 by Martin S. Hagger and Nikos L.D. Chatzisarantis.

Basic Psychological Needs Theory. An essential concept of SDT is that three *basic psychological needs* (i.e., nutrients) are necessary to support human development: autonomy, competence, and relatedness; see Figure 9.

Need for autonomy. Autonomy refers to the ability of making choices freely, without coercion, that affect one's outcomes. With autonomy, people believe that they are the originators of their destiny and any expressed behaviors reflect an expression of their selves (Deci & Ryan, 2002a; Conroy et al., 2007). Autonomy is considered to be the key nutrient in the SDT framework for an individual's growth (Koestner & Losier,

2002). Studies have shown that success over a two-year period in a very-low-calorie diet intervention was related to the individual's autonomy orientation (Ryan & Deci, 2007).

Need for competence. The SDT defines competence as feeling that one is able to demonstrate skill proficiency and to successfully carry out a task (Deci & Ryan, 2002a). Perceived competence has been shown to be a crucial element in the initial stages of an exercise program and a key in predicting intrinsic motivation (Vallerand, 2007). When an individual feels confident that they can perform a particular activity, their behavior towards exercise in general is improved (Edmunds, Ntoumanis, & Duda, 2007a). Males have a greater competence motivation than females suggesting the traditional roles played by men to display competence in many life domains (Frederick-Recascino, 2002).

Need for relatedness. Relatedness in SDT vernacular is the social connection and belongingness with others, to care for them as well as to be cared for, and developing a sense of community. To be related with others implies that people need to secure a psychological sense of unity (Deci & Ryan, 2002a). Out of the three SDT nutrients, relatedness has a remote association to intrinsic motivation than does autonomy and competence (Deci & Ryan, 2002a). Nevertheless, it does have an essential motivational function in exercise participation for activities that some people consider less interesting (Frederick-Recascino, 2002).

The three nutrients have various degrees of influence on motivational regulations. For instance, only competence has been correlated with activity adherence and dropout, and not autonomy or relatedness. This discovery accentuates the significance of individuals' need to feel capable to partake in PA and this holds true for

both males and females (Vlachopoulos & Neikou, 2007). Interesting interrelationships exist between the three basic psychological needs. The SDT specifies that autonomous need satisfaction can only be realized when competence and relatedness are fulfilled. Also, whereas competence and autonomy are moderately correlated, there is a weaker association between them and relatedness. For people who feel autonomous in their fitness regimen, perceived competence is a less important factor. Relatedness has a weaker association with well-internalized exercise behaviors than the other two nutrients indicating that it acts more like a catalyst for the process of internalizing new behaviors (Wilson & Rodgers, 2007).

Cognitive Evaluation Theory. The *Cognitive Evaluation Theory* (CET) articulates how social contexts (e.g., exercise domain) can influence intrinsic motivation. The CET also looks at how rewards can play a positive or negative role in influencing intrinsic motivation. Additionally, the theory explains how autonomy and competence nurture intrinsic motivation (Deci & Ryan, n.d.). The CET states that an individual's interpretation of an event is more salient in impacting motivation than is the objective outcomes of the event (Deci & Ryan, 1985). The concept considers three broad types of motivation: extrinsic motivation, intrinsic motivation, and amotivation; see Figure 9.

Extrinsic motivation. When a person's behavior is motivated by expectations of results that are unrelated to the actual activity, then that person is being driven by extrinsic motivation (Ryan & Deci, 2007). An extrinsically motivated individual performs PA as a means to an end (e.g., losing weight) and not for the inherent pleasure experienced in the activity. An outcome is expected from engaging in the activity,

whether it is avoiding negative consequences or receiving some reward (Vallerand & Fortier, 1998). Certain types of extrinsic motivation are considered autonomous, such as the instance of someone exercising because of the health benefits that it offers. Therefore, extrinsic motivation should not always be viewed as a behavioral type to avoid. However certain motives (e.g., losing weight to please others) are both extrinsic and controlling, which result in pressure to perform. Studies have indicated that long-term adherence is not maintained when people are compelled to exercise for extrinsic outcomes (Markland & Ingledew, 2007). Markland and Vansteenkiste (2007) also point out that the expressions “extrinsic” and “intrinsic” are not necessarily the same as “external” and “internal.” An individual can be extrinsically motivated and yet that behavior may be autonomous because it emanates from the self, such as exercising to lower one’s blood pressure.

Intrinsic motivation. Individuals who are intrinsically motivated strive to have fun, enjoy the excitement of the activity, and attempt to master new skills (Weinberg & Gould, 2011). For example, people engage in exercise because they get satisfaction that is inherent in that activity (Ryan & Deci, 2007). An operational definition of intrinsic motivation is that a person will engage in a behavior that has no external reward and there is no controlling factor (Deci & Ryan, 1985). People possessing intrinsic motivation are process-oriented and are in-the-moment during the activity. They are wholly absorbed by the task they are involved with (Koestner & Losier, 2002). There is a correlation between being intrinsically motivated with the emotional states of enjoyment, competence, satisfaction, and the pleasure of persistence in that particular activity

(Frederick-Recascino, 2002). The intrinsically motivated individual has a desire to master optimal challenges (Deci & Ryan, 1985).

Robert Vallerand in his Hierarchical Model of Intrinsic and Extrinsic Motivation proposed three aspects of intrinsic motivation. *Intrinsic motivation to know* refers to becoming involved in a conduct for the pleasure of learning or exploring that new behavior. *Intrinsic motivation to accomplish things* denotes the pleasure of mastering new skills while trying to surpass one's previous performance. *Intrinsic motivation to experience stimulation* infers to becoming involved in a task because of the pleasurable sensations and the aesthetic pleasure that are part of that activity (Vallerand, 2007; Weinberg & Gould, 2011). To persist in exercise over time, intrinsic motivation is one of the most important factors to sustain that drive. People may begin a fitness regimen for extrinsic reasons (e.g., to lose weight) but if the exercise is not deemed as enjoyable, they will ultimately not persevere (Ryan & Deci, 2007).

Amotivation. Ryan and Deci (2007) define *amotivation* as the lack of intention to perform an activity or a deficit in the energization toward that action. If a person feels incompetent in performing an activity or if its execution does not result in the outcome the person seeks, amotivation is the likely result. Additionally, if the individual believes that the action is aimless and has no real value (e.g., exercise on a treadmill), this too could lead to amotivation. Individuals often experience a lack of control (Weinberg & Gould, 2011) which could lead to learned helplessness (Conroy et al., 2007). Exercisers may feel that success requires excessive effort or the strategy being used to achieve a goal will not be effective. Amotivation may result from continual negative feedback,

when believing that success is controlled by others, or when one consistently fails to succeed. There is a theoretical link between extrinsic motivation and amotivation because when individuals become dependent on receiving positive external feedback for a psychological boost, they can become amotivated and feel helpless when that feedback ceases to confirm their competence (Deci & Ryan, 1985). Vallerand and Fortier (1998) suggest that the amotivation construct is useful in predicting exercise perseverance.

Informational and controlling events. The CET states that situations like exercise contexts can have both *informational* and *controlling* components (Ryan & Deci, 2007). The informational aspect provides an ideal challenge for an individual where a task is difficult to complete but yet attainable. Additionally, informational connotes that an individual receives competence feedback in which positive information is conveyed and critically negative feedback is avoided. Informational suggests freedom and choice in one's attempt for an effectual interchange with the environment through an emphasis on task engagement, which helps to enhance self-efficacy and intrinsic motivation (Deci & Ryan, 1985). When an event is informational, it promotes autonomy which typically results in higher creativity, adaptability, excellence, and sustainability of exertion (Sheldon & Elliot, 1998).

A controlling event reduces an individual's autonomy because it incorporates tactics to coerce the person in behaving certain ways or applies pressure for winning a competition. Controlling measures reduce one's creativity, mental adaptability, and self-esteem (Deci & Ryan, 1985). An individual can perceive an environment as controlling by facing deadlines, being under surveillance, receiving negative feedback, and being

denied freedom and choice. Sheldon and Elliot (1998) compared autonomous and controlled goals and found that controlled goals are not sustained because they arise from external incentives or internal impulses and are not representative of the true aspirations and values of the individual. Controlled goals are not self-owned and when difficulties arise, an individual does not have difficulty in abandoning that goal.

Activities such as weight loss, pleasing others, or exercising to improve appearance involve extrinsic motivation that embodies controlling dynamics which are associated with lower self-esteem and body image disturbances (Markland & Ingledew, 2007). Males are more perceptive of the informational aspect of praise but females may be more sensitive to the controlling aspect of praise. Deci and Ryan (1985) contend that the genders are socialized to manifest the differential response to praise in which males interpret it as competence information and females construe praise as controlling their conduct. The authors suggest that it is best to give praise to females by circumventing references to performing an activity diligently just for other people and to also avoid specifying the extent of how capable they “should be” in achieving their intended behavior.

Organismic Integration Theory. The *Organismic Integration Theory* (OIT) is one of the most important components of the self-determination theory for the purposes of this study. The OIT explicates the mechanisms whereby behaviors are taken in or internalized. For example, some behaviors may initially be performed for non-intrinsic motives (e.g., exercise to please a spouse) but could eventually become integrated into the person’s sense of self (Hagger & Chatzisarantis, 2008). The OIT differentiates

extrinsic motivation into four gradations (i.e., external regulation, introjected regulation, identified regulation, and integrated regulation). Amotivation resides at the least self-determined end and intrinsic motivation on the opposite side of the SDT continuum representing the greatest level of self-determination; see Figure 10.

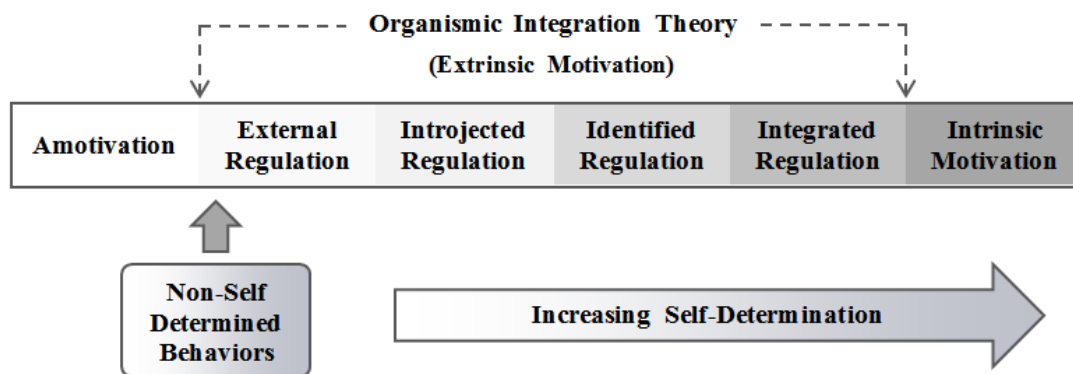


Figure 10. Schematic representation of the organismic integration theory. Non-self determined behaviors are at the left of the diagram. With increased internalization, a behavior may become more self-determined as it moves to the right on the continuum.

Adapted from *Exercise motivation measurement: The Behavioral Regulation in Exercise Questionnaire – The theory*, (2011, March 3), by David Markland. Retrieved from http://pages.bangor.ac.uk/~pes004/exercise_motivation/breq/theory.htm

Deci and Ryan (2002a) emphasize that extrinsic motives do not necessarily have to start at the least self-determined side of the continuum (i.e., external regulation) and proceed by the process of internalization to the most self-determined end (i.e., integrated regulation) of extrinsic motivation. Instead, a behavior may enter the continuum at any point. Moreover, the farther to the right that a behavior is situated in Figure 10, the greater the autonomy of the individual expressing that regulation (Deci & Ryan, n.d.). These behavioral regulations represent a quasi-simplex pattern whereby adjacent regulations are more closely correlated than regulations further along the continuum

(Deci & Ryan, 2002a). The multi-tiered classification of behavioral regulations of the OIT has spawned a considerable amount of research on exercise behavior (Hagger & Chatzisarantis, 2008).

External regulation. Deci and Ryan (2002a) describe *external regulation* as extrinsically-based motivation in which an individual exhibits the lowest level of autonomous behavior, likely because of external pressures to attain rewards or to avoid punishments. External regulation represents the extreme end of the controlling type (i.e., non-self-determined) of extrinsic motivation.

Introjected regulation. The next most self-regulated type of extrinsic motivation, introjected regulation, represents internal urges and pressures to perform an action (Weinberg & Gould, 2011) but is only a partial internalization (Frederick-Recascino, 2002). This type of regulation is still not regarded as self-determined because the individual's behavior is acted out from internally generated rewards and punishments. Although pressures are not externally imposed, the person is driven by internal tensions related to self-esteem predicaments (Ryan & Deci, 2007). Introjection reflects a controlling type of motivation that is instigated by compulsiveness, guilt, shame, anxiety, pride (i.e., ego-related gratification), and contingent self-esteem which leads to maladaptive consequences (Edmunds et al., 2007a). Vallerand and Fortier (1998) expound that internal pressures replace external contingencies and those self-imposed encumbrances are not self-determined, although the individual's motivation is internal.

Identified regulation. Ryan & Deci (2007) suggested that there exists an autonomous form of extrinsic motivation whereby a person values, accepts, identifies

with its purpose, and willfully performs an activity although it may not be inherently pleasing, which they referred to as identified regulation. Weinberg and Gould (2011) noted that identified regulation expresses the “want” instead of the “ought” and it correlates to behavioral outcomes. Identified regulation conduct is freely chosen which makes it self-determined (Vallerand & Fortier, 1998). An individual consciously affirms the behavior along with its perceived autonomy and this represents the moment where an external regulation becomes internalized and self-regulated (Deci & Ryan, 2002a).

Wilson and Rodgers (2004) showed evidence that identified regulation predicts exercise intentions. When the activity is not considered exciting, identified regulation has a stronger role in task engagement than even intrinsic motivation. A person internalizes an activity through identified regulation when the task has benefits that the individual deems as valuable (Edmunds et al., 2007a). While some individuals enjoy the activity of exercise for its own sake, others still persist at exercise although they do not necessarily like it and this is where identified regulation becomes central (Wilson, Rodgers, Fraser, & Murray, 2004). Prior research reveals that more frequent exercise is correlated with identified regulation (Wilson, Rodgers, Loitz, & Scime, 2006). A difference in motivational regulations has appeared between sports and exercise which shows that sporting activities are mostly interesting and thereby involve more intrinsic motivation. However, exercise activities are not as stimulating and therefore identified regulation has a larger role (Vallerand, 2007).

Integrated regulation. *Integrated regulation* provides the greatest autonomy in any of the extrinsic motivation types; see Figure 10. The behaviors are harmonized with

the person's other principles and evolve into voluntary actions that are well integrated within the individual (Ryan & Deci, 2007). With integrated regulation, activities are performed volitionally and the choice to participate reflects concordance with other facets of one's self (Vallerand & Fortier, 1998). Integrated regulation has the best chance of being realized when an individual freely chooses an activity without pressure from external burdens. Introjection is the probable outcome if only relatedness and competence nutrients are present but when autonomy is also incorporated, the likely aftereffect is integrated regulation (Deci & Ryan, 2002a).

Since conflict is not present when an individual is in a state of integrated regulation, a behavior could be cultivated long-term (Pelletier & Sarrazin, 2007). Duncan, Hall, Wilson, and Jenny (2010) posit that integrated regulation is a vital aspect of exercise behavior and that assessing integrated regulation has significant consequences for one's well-being. Wang and Biddle (2007) propound that the integrated regulation construct does not apply to minors but only to an adult population. The present investigator concurs that minors have yet to develop a sense of self and therefore it is implausible to expect them to integrate behaviors, especially exercise. Thus, minors were excluded from participating in the present study as outlined in the delimitations section. Some investigators, however, like Pelletier and Sarrazin (2007) assert that quantifying integrated regulation can be perplexing and contend that there presently is no solution.

Perceived locus of causality. The *perceived locus of causality* (PLOC) refers to the origination of a person's behavior in a given setting which can be internal or external to the person (Weinberg & Gould, 2011). The OIT specifically delineates PLOC as a

gradient of motivation ranging from autonomous to controlling and is depicted as the four sub-scales of extrinsic motivation on the SDT continuum flanked by intrinsic motivation and amotivation on either side (Ryan & Deci, 2007; Wang & Biddle, 2007; see Figure 10). The various motivational inclinations on the continuum correspond to representative levels of self-determination and this permits researchers to predict motivational behaviors in a given context, such as the exercise domain (Vallerand, 2007). When people have a greater internal PLOC for a given conduct, they will feel more satisfied with their actions and that will translate into a higher degree of exertion. A greater behavioral persistence has also been documented for those with internal motives to participate in an activity versus those who are compelled to act for external reasons (Turban, Tan, Brown, & Sheldon, 2007). Deci and Ryan (2002a) suggest that PLOC is ultimately associated with the need for autonomy as explained in the Basic Psychological Needs Theory. The authors propose that intrinsic motivation will diminish with an external PLOC but will be augmented with an internal PLOC.

An intriguing characteristic of PLOC is how rewards adversely moderate an individual's behavior although that intention was obviously amicable. Deci and Ryan (1985) found that monetary rewards had the unexpected effect of lowering one's intrinsic motivation because the person's PLOC shifted to being externally based for that activity. Their research showed that individuals felt pressure to conform to the external imposition and therefore lost their sense of autonomy. The individuals completed the activity as a means to an end to attain the reward but in the process lost their sense of enjoyment with that behavior. Performing a task with a passion for enjoyment, pleasure, and fun for its

own sake is the trademark of intrinsic motivation. If an event is thought to be informational (e.g., positive feedback), it is said to be an internal PLOC, regardless if it originates internally or externally to the individual, and it has a positive outcome because the person feels autonomous and empowered. Conversely, if the event is perceived to be controlling (e.g., monetary incentives to lose weight), it has an external PLOC and it connotes negative affect since the individual interprets the reward as a ploy to force an outcome (Deci & Ryan, 1985).

Ryan and Connell (1989) developed a model of PLOC in which behavioral regulations were examined in two domains and constructed a gradient paradigm ranging from an internal to an external locus of causality. The most recent model of the SDT asserts that within the overarching concept of extrinsic motivation, integrated regulation and identified regulation signifies an internal PLOC along with its positive emotions while introjected regulation and external regulation conform to an external PLOC with its negative consequences (Koestner & Losier, 2002; see Figure 9). A study by Chatzisarantis, Hagger, Biddle, and Karageorghis (2002) revealed that an individual's perceptual shifts in PLOC predicted behavioral persistence and psychological well-being with an internal PLOC precipitating a favorable outcome. Furthermore, research by Williams, Freedman, Ryan, and Deci (1996, as cited in Chatzisarantis et al., 2002) revealed that PLOC projected dietary adherence with an accompanying weight loss during a 20-month study.

Internalization. Deci and Ryan (1985) define *internalization* as the mechanism whereby a person embraces a belief or attitude (i.e., behavioral regulation) and

transmutes that behavior into a value that is integral to the individual's character. The authors contend that internalization symbolizes the ideal socialization where one behaves harmoniously with the prevalent values of the social milieu (e.g., exercising because "it's good for you"). Three elements influence the internalization process: conflict between individual and behavior, level of autonomy, and perceived competence of the actor. Supports for autonomy, relatedness, and competence are pivotal for new behaviors to be internalized (Ryan & Deci, 2007). When the three nutrients of self-determination are available, internalization can proceed optimally to integrate extrinsic motivation into one's self. Contrarily, when these nutrients are absent, the behavioral regulation typically stalls at introjection (Deci, Eghrari, Patrick, & Leone, 1994). Relatedness is important for internalization because an individual will likely take part in the behavior to gain implicit social support. Competence is crucial because if a person does not feel able to actualize a behavior, it is doubtful that the action will be internalized. Deci and Ryan (2002a) emphasized that autonomy is the compelling nutrient for sufficient internalization when the other two aspects are present and will formulate into "persistence, flexibility, and vitality" which typifies self-determination (p. 20). When support for autonomy is lacking, internalization will be incomplete and introjected regulation is the consequence.

According to OIT, intrinsic motivation is not a byproduct of internalization because that specific behavior is innately enjoyable to the individual and does not need to be integrated into the self (Ryan & Connell, 1989). Koestner and Losier (2002) specified that internalization and intrinsic motivation function harmoniously to nurture one's

growth and vitality. In a study by Duncan et al. (2010) on exercise regulations, it was concluded that an exerciser's level of internalization engendered a differentiated outcome conforming to their exercise behaviors. Pelletier et al. (2004) investigated eating behavior regulations according to SDT and found that people regulated their eating patterns in contrasting grades of internalization consistent with individual motives and those with a greater level of self-determined eating practices demonstrated a healthier eating paradigm.

Causality Orientations Theory. The Causality Orientations Theory (COT) models an individual's enduring propensities in the social environment using three forms of causality orientations: autonomy, control, and impersonal (i.e., amotivation; Deci & Ryan, n.d.; Deci & Ryan, 2002a). The impersonal orientation implies incompetence and helplessness in which the individual believes that a task cannot be mastered (Deci & Ryan, 1985). The COT asserts an intriguing distinction between controlling versus informational environments: Controlling settings beget results when individuals must comply with imposed demands but informational climates produce outcomes when individuals themselves decide to initiate an action. The *locus of control* denotes whether people affirm that outcomes are under their or someone else's control whereas *locus of causality* signifies the perceived source of the origination of a behavior as being internal or external to themselves. If individuals presume that implementing a certain behavior will achieve a desired consequence, then they possess an internal locus of control. If however individuals suppose that success occurs due to luck or fate, then they embrace an external locus of control (Deci & Ryan, 1985).

Goal Contents Theory. The Goal Contents Theory (GCT) distinguishes between extrinsic and intrinsic goals and how they could influence motivation, particularly in the wellness domain. The GCT contrasts intrinsic goals (e.g., relationships and growth) with extrinsic goals (e.g., physical appearance and performance outcomes) and asserts that the latter goals promote health disturbances (Deci & Ryan, n.d.). However, some individuals strive for physical beauty because they want to live up to society's expectations while others do so because they personally value the attainment of physical attractiveness. Generally, adhering to intrinsic goals connotes autonomy for engaging in a specific behavior but the pursuit of extrinsic goals implies controlling factors being prevalent (Vansteenkiste et al., 2007).

Efficacy of an Online Survey

Skitka and Sargis (2006) reported that translational research is the most common type of online survey being administered, which entails transforming the paper and pencil questionnaire format into a web-based interactive layout. The present researcher likewise transposed the paper version of the BREQ-2 into the closest matching layout that SurveyMonkey permitted using their page design tools. Rhodes, Bowie, and Hergenrather (2003) explained that the advantages of an online survey are quick accessibility to prospective participants and previously hidden populations (i.e., those who respond because of total anonymity of survey), candidness in answering, and a lower cost of administering the survey. The authors asserted that web surveys produce higher quality data since the interactive nature of the survey increases clarification of the process

and that additionally, there is a lack of interviewer bias. If properly standardized, the web survey becomes reproducible so that others could reconstruct the research (Birnbaum, 2004). In a study to compare the completeness of questionnaires, Truell et al. (2002) reported that web surveys had much higher response completeness than did mail-based surveys. Lastly, Buchanan and Smith (1999) found that individuals answer more honestly using computer-based surveys.

Disadvantages of online surveys have been observed as well. Researchers in the past discovered that web users are not representative of the entire population: They tend to be more educated, younger, and wealthier than non-web users (Skitka & Sargis, 2006). Racial and gender disparities (i.e., more White males are online) of Internet users have also been reported in previous research which was known as the “digital divide” (Rhodes et al., 2003). Nonetheless, Granello and Wheaton (2004) indicate that demographics of web users have been more inclusive in recent years, especially with the advent of the smartphone with advanced Internet capabilities. In fact, SurveyMonkey currently supports the iPhone, iPod Touch, and iPad devices and are working to add survey-taking capabilities for the Blackberry and Android mobile phone platforms. Thus, it could be presumed that more underrepresented groups had the opportunity to participate in the present study. Dropout rates have been found to be higher for online surveys than for lab-based studies (Birnbaum, 2004). Another disadvantage of the online survey is the absence of a test administrator who could clarify any potential confusion with the procedure, especially in answering questions about the informed consent (Varnhagen et al., 2005). Online respondents could submit multiple times (Duffy, 2002); complete the

survey in a flippant or mendacious manner (Kraut et al., 2004); or be distracted by their surroundings, perhaps in the company of people, whereas the environment is more constant in a lab setting (Skitka & Sargis, 2006).

It is nearly impossible to tabulate the response rate of a web survey (i.e., specific individuals not targeted) due to the open-ended nature of the invitation to participate (Skitka & Sargis, 2006). Online survey response rates are usually lower than telephone or mail surveys and it appears that most people still prefer the paper survey (Kraut et al., 2004). However, Lonsdale, Hodge, and Rose (2006) found a perceptible trend in an improved response rate of online surveys versus mail surveys with web surveys having fewer missing responses. The self-selection characteristic of the web survey indicates that generalizability cannot be applied from the results (Birnbaum, 2004) due to the nonprobability sampling of study participants (Truell et al., 2002). In an interesting experiment, Pettit (2002) wanted to see if it was possible to generalize data from an online survey to results from a paper-based questionnaire. The researcher concluded that the correlations between the two types of tests were similar, in addition to other psychometric properties. Krantz and Dalal (2000, as cited in Birnbaum, 2004) reviewed previous studies to compare data from online and paper surveys and established that the two sets of results were similar. In fact, Gosling, Vazire, Srivastava, and John (2004) found that web survey data has equal quality as that of paper-based questionnaires. Nonetheless, web technology is relatively new and more research is needed to examine the psychometric ramifications of changing the paper survey into its online equivalent since items may be interpreted differently on a web page and consequently confounding

the questionnaire's validity (Granello & Wheaton, 2004). Meanwhile, Lazar and Preece (1999, as cited in Granello & Wheaton, 2004) contend that if the web-based format is similar to the paper version, it is acceptable to translate the questionnaire from paper to the web. Furthermore, Kraut et al. (2004) concluded that any risks to participants in taking an online survey are comparable to risks from partaking in a paper-based survey. By their complex nature, web surveys require a pilot study to test the readiness of the process and reduce unanticipated technical glitches (Granello & Wheaton, 2004). A pilot study was conducted for the present research.

Summary

Obesity is a worldwide epidemic affecting even the cities of nations who had historically experienced malnutrition and this trend is on the rise. An overweight status negatively impacts an individual's health and the consequences are a concomitant increase in the risk of becoming afflicted with diabetes, heart disease, and cancer. While it is the contributory factors of PA and diet that are the primary antecedents of a healthy body weight, this investigation will emphasize on exercise motives. Physical inactivity is becoming more prevalent especially with the advent of automation. Studies have shown that decreased PA is responsible for numerous health problems and is a major risk factor for all-cause mortality. Females, African Americans, and Hispanics have reported the lowest PA predicaments. Intrinsic motivation and self-efficacy have been associated with successful self-regulatory behaviors for long-term weight reduction. Non-athletes typically exercise for health reasons and they may also engage in PA for cosmetic

motives, such as attempting to lose weight. For effective weight loss, a greater volume of exercise is essential.

A well-documented timespan in which many individuals drop out of their fitness regimen is the six-month period. This is where up to 50% of new exercisers stop exercising. People who are active for six months are more likely to continue exercising into the future. Most fitness plans are not flexible in their recommendations for intensity, frequency, or duration and prove too difficult for some people. An individual's personality is an important factor in the exercise domain with research revealing that extraversion, conscientiousness, and self-efficacy are the personality traits mostly associated with PA.

While other theories of exercise behavior and motivation exist, such as TM and exercise schema, this study will employ the SDT to interpret the findings. The SDT is prominent in exercise psychology because it quantifies behavioral tendencies that explain motivation using personality and social psychology constructs. The basic psychological needs of autonomy, competence, and relatedness are the key nutrients of SDT and their satisfaction lead to an increased self-determination for a behavior. Three forms of motivation exist in the SDT framework: intrinsic, extrinsic, and amotivation; see Figure 9. With intrinsic motivation, individuals engage in exercise because they enjoy the pleasure of an activity. Extrinsic motivation connotes contingencies for performing PA, which may be internal to the person or emanate from others. Amotivation is the lack of any interest or intention to participate in an exercise regimen. When people experience informational events (e.g., receive supportive competence feedback) rather than

controlling events (e.g., being dictated an exercise prescription to lose weight), the extent of their self-determination is strengthened.

The OIT classifies extrinsic motivation into four gradations of self-regulation along the SDT continuum, from the least self-determined (i.e., external regulation) to the most self-determined (i.e., integrated regulation), with the two regulations in between functioning as increments in dimension of motivation (i.e., introjected progressing to identified regulation); see Figure 10. External regulation is the least self-determined motivation style and occurs when individuals engage in activity to circumvent punishments and external pressures or to acquire rewards. Introjected regulation is behavior that is partially internalized and exemplifies internal urges that are based on compulsiveness, guilt, shame, anxiety, pride (i.e., ego-related gratification), and contingent self-esteem. With identified regulation, the individual values, accepts, identifies with the behavior's essence and becomes engrossed in the activity although it may not be innately enjoyable. Identification represents a noteworthy signpost on the SDT continuum in that the behavior begins to be internalized and moves closer to becoming self-determined. Identified regulation is a compelling behavioral orientation in the exercise domain. Integrated regulation epitomizes the most self-regulated extrinsic SDT construct that was subsumed from internalization because it symbolizes harmony between the new behavior and peculiarities of one's persona. It should be reiterated that intrinsic motivation is not actualized from internalizing an extrinsic engagement because it occupies a position that is outside of the four extrinsic motivation stages; see Figure 10.

The perceived locus of causality, which could be internal or external to an individual, specifies that the gradients of regulation situated along the SDT continuum ranges from autonomous to controlling and results in behavioral consequences that impact one's degree of motivation; see Figure 9. The SDT postulates that an exercise behavior could be internalized if all three psychological needs are present. Internalization of exercise occurs when one fully embraces the activity which then becomes assimilated into one's character. Environments could be perceived as being either controlling or informational. In controlling settings, individuals feel compelled to comply with expectancies while informational contexts encourage individuals to initiate the action. A person's locus of control designates whether an outcome is under one's control whereas locus of causality specifies the perceived origin of a behavior (i.e., internal to the person or external). Goals also have an intrinsic and extrinsic dichotomy. Intrinsic goals foster relationships and growth but with extrinsic goals, individuals covet physical appearance and performance outcomes. Research has shown that extrinsic goals precipitate health disorders. According to Vallerand (2007), the SDT framework is structured in the following motivational causal sequence: social factors (e.g., exercise to lose weight) \Rightarrow psychological mediators (i.e., the three nutrients) \Rightarrow types of motivation (i.e., the six regulations) \Rightarrow consequences (e.g., exercise persistence).

Surveys conducted via the Internet have a set of advantages and disadvantages over paper-based versions. The benefits include quick accessibility to prospective participants, lower cost of administration, better quality of data than paper survey from interactivity, comparable results to paper survey, lack of interviewer bias, and an

equivalent risk to the participant as a paper survey. A drawback is that online surveys are not representative of the entire population with racial and gender disparities of Internet users having been reported previously, although the demographics of web users have been more inclusive in recent years. Another obstacle is that self-selection in taking an online survey signifies that the findings cannot be generalized due to the nonprobability sampling of participants. Notwithstanding, the number of advantages still outweighs the disadvantages and this investigation was therefore conducted with confidence that the online survey would match or surpass the rigorousness of a paper survey.

The problem has been stated in this investigation as being the high pervasiveness of physical inactivity with one of its consequence being the epidemic levels of obesity. A possible solution which has been pondered in the exercise psychology domain is the use of motivation to improve exercise adherence and thereby reduce the incidence of obesity. Motivation can be used as both a diagnostic tool to scrutinize behavioral regulations (i.e., reasons for acting) and as a treatment method to augment exercise participation. The most researched scheme of motivation today is SDT.

This extensive literature review was intended to provide a sufficient recapitulation of the SDT theoretical framework as it pertains to the propositions of this investigation. The case has thereupon been presented for a need to conduct a study of regular exercisers (i.e., non-athletic participants) using a local YMCA to discern their motivational dispositions. Any discoveries unearthed from this study could conceivably provide practical benefits for those seeking to improve their exercise adherence levels and ultimately be rewarded with a healthier physical and psychological profile.

CHAPTER III

Method

This research project received permission from the Human Subjects Committee of the Institutional Review Board at West Chester University of Pennsylvania; see Appendix F.

Participants

One hundred and sixteen respondents participated in this online survey. Demographic descriptive statistics and frequencies of the data as well as the two investigator questions of whether participants exercised specifically for weight loss and how long participants exercised are presented in Table 6. Most of the respondents were in the normal Body Mass Index (BMI) category (40.9%), female (69.0%), ≥ 40 years old (55.2%), White (80.9%), not Hispanic nor Latino (99.1%), exercised for weight loss (58.3%), and have exercised for ≥ 6 months (68.1%). The BMI ($M = 27.82$, $SD = 6.67$) of the overall sample corresponded to the overweight group of the World Health Organization (WHO) classification and ranged between 18.32 and 55.03 on the Quetelet index. The age ($M = 43.17$, $SD = 13.82$) of the overall sample ranged between 19 and 80 years old.

Table 6

Descriptive Statistics of Demographic Variables, Whether Participants Exercised Specifically for Weight Loss, and How Long Participants Have Exercised

Participant characteristics	<i>n</i> ^a	%
BMI categories (kg/m ²) ^b		
Normal (18.50 to 24.99)	47	40.9
Overweight (25.00 to 29.99)	35	30.4
Obese (≥30.00)	33	28.7
Gender		
Male	36	31.0
Female	80	69.0
Age ^c		
<40 years old	52	44.8
≥40 years old	64	55.2
Race		
American Indian or Alaska Native	2	1.7
Asian	2	1.7
Black or African American	18	15.7
Native Hawaiian or Other Pacific	0	0.0
White	93	80.9
Ethnicity (Hispanic or Latino)		
Yes	1	0.9
No	114	99.1
Exercised for weight loss		
Yes	67	58.3
No	48	41.7
How long exercised		
<6 months	36	31.9
≥6 months	77	68.1

Notes.

N = 116.

^a Because not all questions were answered by each participant, some categories may not total *N*.

^b BMI (*M* = 27.82; *SD* = 6.67).

^c Age (*M* = 43.17; *SD* = 13.82).

Participants for this research originated from a self-selected convenience sample who had visited the home page of the website of a local YMCA. It could not be guaranteed that the respondents were actual members of the YMCA, although in all likelihood they were, because there was no way to screen out non-members from visiting the home page and voluntarily participating in the study. Nevertheless, if a non-member completed the survey, it would in no way jeopardize the integrity of the study and in fact, would add to it by increasing the number of respondents.

No incentive or compensation was offered for completing the survey based on confidentiality restrictions, especially since the respondent was not to be identified. Additionally, with the SurveyMonkey options purchased, it was not possible to limit an individual from submitting the survey multiple times simply to win a reward. Although technology exists to prevent the same computer from submitting the survey more than once, it is still possible for a person to submit the questionnaire multiple times by using a different computer each time. In the absence of a reward, it was the investigator's opinion that an individual did not have a compelling reason to complete the survey multiple times. What was more likely to occur was that a household would use the same computer to submit a survey from more than one member of the same residence. Therefore, to avoid excluding other people of the same household from participating in the study, the SurveyMonkey setting was enabled to allow multiple responses from the same computer.

Research Design

This was a cross-sectional online ethnographic study using the industry standard Behavioural Regulation in Exercise Questionnaire-2 (BREQ-2) questionnaire which had been successfully tested for validity and reliability and used in dozens of behavioral motivation investigations. Random sampling and random group assignment was not implemented in the research design. Five independent variables (IVs) embodied the participant's demographic characteristics: height and weight to calculate BMI, gender, age, and race/ ethnicity. Two questions of interest to the investigator served as additional IVs: (a) "Are you exercising for weight loss?"; and (b) "How long have you been exercising consistently up until now, whether done at our YMCA or continued from a previous fitness facility?" The 23 questions of the BREQ-2 (BREQ-2 actually has 19 questions plus four for integrated regulation) were pooled into six categories of self-determination and served as the dependent variables (DVs) for this study.

The self-reporting of height and weight has been known to be inaccurate because bodyweight, especially, tends to be underestimated (Brodie, Williams, & Owens, 1994), particularly among men (Gregory, Blanck, Gillespie, Maynard, & Serdula, 2008). A study by Brunner Huber (2007) compared women's responses on a self-reporting questionnaire versus the women's actual height and weight measurements and discovered that weight was underestimated by 4.6 lbs., height was overestimated by 0.1 in., and the resulting BMI was underestimated by 0.8 kg/m². The researcher found that women regardless of their age, education, marital status, or race/ ethnicity, underestimated their weight. The investigator concluded that self-reporting of height and weight accurately

classified 84% of the women into their corresponding BMI category. A similar study is not known to have been conducted for men. Despite the imprecise method of obtaining a participant's BMI, no feasible alternative exists given the nature and design of a web-based survey. Therefore, any conclusions from this research have to be tempered with the realization that the self-reported BMI of this YMCA sample was likely an underestimation the participants' true BMI.

Procedure

This study explored exercise motivations of a YMCA membership using the BREQ-2 questionnaire posted online on SurveyMonkey's website via a link from the YMCA's home page. An announcement of the research was posted on the home page of the Community YMCA of Eastern Delaware County website (CYEDC; www.cyedc.org). Additionally, wellness center patrons were reminded about the survey. Bulletin board notifications of the study were posted at the two YMCA branch facilities as well. A reminder was also posted on the CYEDC's Facebook page and the Health, Well-Being & Fitness web page. The present researcher developed the necessary technical apparatus, (i.e., landing page, links, and buttons) required for this study. The online survey commenced on 17 June 2012 and after 57 days of accepting responses, the study was closed from further participation on 13 August 2012.

The following sequence captures the participant flow process during the present investigation:

1. A hyperlink was placed on the home page of the YMCA website to promote the survey and attract a large number of participants.
2. Prospective participants arrived at the home page by:
 - a. The usual web traffic that occurs when members visit the home page for information about upcoming YMCA events.
 - b. Viewing a bulletin board about the survey and then logging on to the website.
 - c. Being told about the study by the YMCA wellness center staff.
 - d. Getting a Facebook message about the survey.
3. Clicking a hyperlink on the YMCA's home page was the starting point in the survey process.
4. After individuals clicked the link, they were transferred to a landing page, which is a secondary web page on the YMCA website. A landing page is frequently used in business and its specific purpose in this study was to provide the space for the informed consent. There is a finite amount of space allotted on the home page and thus a landing page was required to describe the research and the survey process.
5. The landing page contained the informed consent text with a brief description of the study. There were two web page buttons at the bottom of this web page.

- a. One button was labeled TAKE SURVEY and was preceded with the following verbiage:
 - i. “By clicking the TAKE SURVEY button below, I understand and consent to all of the information stated above. Clicking the TAKE SURVEY button will constitute my voluntary consent to participate in this survey. A new browser window will open so I can take this survey on the SurveyMonkey website.”
 - b. Another button was labeled EXIT SURVEY and was preceded with the following verbiage:
 - i. “By clicking the EXIT SURVEY button below, I will withdraw from this survey. My browser will exit back to the Community YMCA home page. Alternatively, I can close out of this web page by clicking the Close button ('X') at the very top-right of the browser window frame.”
6. Participants would read through the informed consent and if they accepted the terms, they clicked on the TAKE SURVEY button. If the terms of the informed consent were not accepted, the users clicked the EXIT SURVEY button.
- a. The participant therefore had the option to withdraw from the survey before the actual start of the responses. In the informed consent verbiage, it was also explicated that participant could

withdraw from the survey at any time, including after the start of answering the questions.

7. If the TAKE SURVEY button was clicked, a new browser window was opened and users navigated away from the YMCA website to the SurveyMonkey website to take and submit the survey.
8. The web page that the user was transferred to on the SurveyMonkey website contained the actual BREQ-2 questionnaire as well as the Demographic Information Questionnaire; see Appendix A.
9. The survey took less than five minutes to complete.
10. Participants had the option to skip over questions they felt uncomfortable in answering. The investigator did not designate any questions as required, whereby the user would have to answer a question before continuing on to the next question.
11. Participants could have exited the survey at any time by either clicking the “Exit this survey” button at the top-right of the SurveyMonkey web page or by clicking the Close button (‘X’) at the very top-right of the browser window frame to close out of the web browser.
12. After participants answered the last question, they clicked on the “Done” button to submit the responses to the SurveyMonkey secure database server.
13. During the timeframe in which the survey was still open and responses were being accepted, the investigator occasionally reviewed the responses

already submitted by logging on to the SurveyMonkey account. Thus, when it was determined that a sufficient number of responses had been obtained, the data collection portion of the study was closed. This was done via three actions:

- a. Removing the YMCA home page link.
- b. Removing the landing web page on the YMCA website.
- c. Turning off the setting on the SurveyMonkey account that accepted further responses.

Discomforts and Risks

There were no discomforts or risks to participants for their involvement in this study. Nevertheless, respondents were unambiguously notified on the informed consent web page that their participation was voluntary and if they experienced any discomfort during the survey, they could:

- Choose not to participate in this survey.
- Withdraw from participation at any time, whether at the beginning, in the middle, or near the end of the survey. The process of exiting the survey was fully explained on the informed consent; see Appendix E.
- Decline to answer any question they were not comfortable in answering.
- Decide to quit at any time before they finished the questionnaire. If they did exit, their answers were not analyzed.

- Close out of the survey at any point and that they would not be penalized in any way.

Confidentiality

The survey was anonymous; it did not contain questions that personally identified participants. The respondent's name was not asked on the survey and no other personal and identifiable information was requested. The Internet Protocol address (IP address) of the computer that was used for the survey was not stored in any way. SurveyMonkey offered an option that asked whether the survey administrator wanted to "Save IP Address in Results?" To ensure user anonymity, this function was turned off so that a record of the respondent's computer IP address was not saved (i.e., the computer submitting the survey could not be identified). SurveyMonkey had another setting to "Enable SSL" (Secure Sockets Layer), which is a technology that encrypts Internet traffic as it travels between a user's computer and SurveyMonkey's database. It was decided to enable SSL as additional security for safeguarding a respondent's privacy.

The demographic information (i.e., height, weight, gender, age, and race/ethnicity) requested on the Demographic Information Questionnaire did not contain sufficient specificity to identify a particular respondent, as this YMCA has thousands of members. Also, non-members could have conceivably completed the survey since a link was posted on the home page of the YMCA website. Thus, this respondent uncertainty further masked a possible identification of the individual submitting the survey.

Since the method of data collection was electronic via the Internet, there was no paper documentation to secure: no paper informed consent forms and no paper questionnaires. However, safeguards were implemented to secure electronic records of responses, albeit the data still did not contain any personal identifiable information.

- Only the present investigator possessed the logon information to access the secure SurveyMonkey website where all responses were stored. SurveyMonkey promotes that they implement multiple levels of security to ensure protection of data on their web server.
- After the survey period was complete, results were downloaded as an electronic file from the SurveyMonkey website to the investigator's computer. Data analysis was conducted with the contents of this downloaded electronic file.
- The author's computer is password-protected for logging on and therefore provided another layer of protection for the data.
- All records relating to this study will be retained for at least three years after completion of all phases of the research.

Materials

Various other scales aside from the BREQ-2 have been developed that measure exercise motivation with regard to the self-determination theory (SDT).

Other SDT scales. Additional questionnaires assessing exercise motivation:

- Exercise Self-Regulation Questionnaire (SRQ-E)
- Locus of Causality for Exercise Scale (LCE)
- Exercise Motivations Inventory-2 (EMI-2)
- Exercise Causality Orientations Scale (ECOS)
- Motives for Physical Activities Measure - Revised (MPAM-R)
- Perceived Locus of Causality Scale (PLOC)
- Exercise Motivation Scale (EMS)
- Leisure Time Exercise Questionnaire (LTEQ)
- Psychological Need Satisfaction in Exercise Questionnaire (PNSE)
- Basic Psychological Needs in Exercise Scale (BPNES)
- Reasons for Exercise Inventory (REI), among others.

The volume of measures developed for the SDT framework illustrates the popularity and success of the theory in predicting exercise behavioral regulations.

BREQ-2 as the measure. The present investigator chose to use the BREQ-2 as the scale because it was designed to differentiate behavioral regulations across the self-determination continuum; see Figure 10. While other surveys offer similar functionality, the original Behavioural Regulation in Exercise Questionnaire (BREQ) and BREQ-2 questionnaires are popular psychological tools to assess exercise motivation. The BREQ

originally assessed external regulation, introjected regulation, identified regulation, and intrinsic regulation (intrinsic regulation and intrinsic motivation are synonymous terms; BREQ-2 uses intrinsic regulation and SDT uses intrinsic motivation). Deci & Ryan's SDT model (Deci & Ryan, 1985; Ryan, 1995; Ryan & Deci, 2000) however includes the amotivation and integrated regulation subscales, which the original BREQ did not incorporate (see Figure 9). The BREQ-2 was developed with the amotivation subscale but it did not include integrated regulation. The standard BREQ-2 therefore measures five of the six SDT subscales of the behavioral regulations continuum. For unit of measure, the scale uses five-point Likert items consisting of *not true for me*, *sometimes true for me*, and *very true for me* with numerical representations of 0-4. Zero indicates *not true for me*, "2" represents *sometimes true for me*, and "4" means *very true for me*. The values "1" and "3" are not associated with a verbal description of agreeability on the actual questionnaire but are situated adjacent to values that do contain such descriptors (i.e., "2" and "4") and therefore the meaning of the values "1" and "3" can be inferred.

The BREQ-2 contains 19 questions with each of the five subscales comprising of four questions, with the exception of the introjected regulation subscale which has three questions. Representative questions from each of the five subscales are as follows:

- Amotivation: "I don't see why I should have to exercise."
- External regulation: "I exercise because other people say I should."
- Introjected regulation: "I feel guilty when I don't exercise."
- Identified regulation: "I value the benefits of exercise."
- Intrinsic regulation: "I exercise because it's fun."

Validity and reliability of BREQ-2. In the area of psychometrics validity refers to the degree that a questionnaire evaluates a psychological construct, while reliability is the consistency of the scale in measuring that construct. Mullan, Markland and Ingledew (1997) developed the original BREQ to assess four of the six SDT subscales: external, introjected, identified, and intrinsic forms of regulation of exercise behavior. The amotivation subscale was also examined for inclusion but their data showed that the amotivation subscale was highly skewed and was therefore excluded from the final BREQ version. The authors performed exploratory factor analysis (EFA) without amotivation which showed that internal consistency and discriminant validity were sufficient. An EFA examines the variability of observable and related items to determine if fewer, unobserved and uncorrelated items (i.e., factors) are actually responsible for the variance detected. An EFA condenses the number of related variables that cause the variability (Suhr, n.d.).

Scrutinizing the internal consistency of a scale involves examining Cronbach's α correlation between various questions that purport to measure the same psychological construct, thus measuring reliability. For example, if the following two questions show agreement, then they are consistent in that they indeed measure identified regulation: "It's important to me to exercise regularly" and "I think it is important to make the effort to exercise regularly." Conversely, discriminant validity evaluates whether constructs that are not theoretically related are in actuality not associated.

Confirmatory factor analysis (CFA) by Mullan et al. (1997) revealed that the behavioral regulation continuum of SDT was substantiated by the BREQ and exhibited a

simplex configuration. A CFA tests the association between observable related items and their unobserved and uncorrelated factors by examining their variance (Suhr, n.d.). A simplex pattern is one in which the correlation of adjacent variables along a continuum are more closely associated than variables further away in the continuum. For example, the BREQ evaluates the following SDT subscale continuum: external, introjected, identified, and intrinsic regulation. Thus, a valid association in this simplex gradient is that external regulation is more closely associated to introjected regulation than it is with intrinsic regulation since they lie closer together on this continuum.

A two-phase study by Wilson, Rodgers, and Fraser (2002) also analyzed the psychometric properties of the BREQ. Findings from Phase 1 supported the simplex model of self-determination and verified the internal consistency of the BREQ. Phase 2 found evidence for construct validity of the BREQ by correlating subscale indexes to the theoretical constructs of SDT. Reliability was tested with Cronbach's α and results revealed sufficient internal consistency. The CFA outcomes also confirmed the multidimensional framework of the BREQ. Phase 1 and Phase 2 thus validated the BREQ and established that it measures motivation using a multidimensional framework point of reference.

Although the BREQ (original version) had been successfully tested for validity and reliability, the questionnaire still omitted the amotivation subscale. A study by Markland and Tobin (2004) tested the BREQ with the amotivation factor reestablished and found it had acceptable factorial validity using CFA techniques. Factorial (structural) validity involves clustering the correlations of related items to examine

whether the groupings (i.e., four questions within the amotivation subscale) tie in with the theoretical model (e.g., SDT) in describing the variance of the items. The results of the study revealed a simplex structure of motivation according to the SDT continuum model. The authors named the new version of the scale as Behavioural Regulation in Exercise Questionnaire-2 (BREQ-2), which would be able to evaluate a wider range of motivational regulations than the original BREQ with the inclusion of the amotivation subscale. Murcia, Gimeno, and Camacho (2007) too validated the BREQ-2 but did so in a Spanish population. They conducted EFA and CFA which explained 68.8% of factor variability. The authors concluded that the BREQ-2 complied with validity and reliability requirements and that the scale detected motivational regulations of the SDT continuum for their populace. Additionally, Moustaka, Vlachopoulos, Vazou, Kaperoni, and Markland (2010) translated BREQ-2 into a Greek version. By using CFA and other techniques, the researchers tested the BREQ-2 for its psychometric properties and established that the Greek form of the BREQ-2 is both valid and reliable. Results of that study also supported the existence of the SDT continuum as representing the behavioral regulation gradients of the SDT. Although Wilson et al., (2006) theorized that the amotivation subscale was more applicable for a sedentary population, the present researcher presumed that measuring amotivation in the exercise domain had practical outcomes since many individuals start and stop exercising for various reasons. Therefore the BREQ-2 version of the scale was chosen for this study since it incorporated the amotivation regulatory category.

Sensitivity of BREQ-2. The present author could not find published data regarding the sensitivity of the BREQ or the BREQ-2. Nonetheless, the investigator is convinced that the questionnaire did not attempt to assess highly sensitive and possibly embarrassing subject matter. Instructions posted on the BREQ-2 by Markland & Tobin (2004) emphasize that “there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise.” Each of the BREQ-2 questions was aimed to differentiate exercise motivation levels and did not therefore probe for any notable personal information. The present author, with an interest in studying exercise motivation across BMI, gender, age, and race/ ethnicity, was well aware that some individuals may be sensitive to questions on the Demographic Information Questionnaire (i.e., the investigator’s section of the survey; see Appendix A). To ensure that the appropriate terminology would be used for the racial and ethnic category choices, the present researcher employed the race/ ethnicity lexicon advocated by the Office of Management and Budget (1997, October). Moreover, instructions on the informed consent web page specified that any question could be skipped that felt uncomfortable for an individual and an additional reminder was posted on the survey itself to address the possible sensitive nature of these questions, particularly vis-à-vis participants’ race/ ethnicity. The following phraseology was posted prior to the question in which an individual’s race/ ethnicity were inquired:

Questions 5 and 6 below ask for race/ ethnicity but please note that they are asked for research purposes only. You may skip questions 5 and 6 if you are uncomfortable in answering them.

The purpose of obtaining such demographic information was to describe the general traits of the respondents, which may offer clues as to how exercise motivation, and thereby exercise adherence, could be influenced by such characteristics. Rhodes et al. (2003) found that sensitive topics are more openly disclosed by the use of web surveys rather than the traditional paper questionnaires. However, caution has been advised when implementing web-based questionnaires. It is difficult to constrain access using the Internet and special care needs to be given for those who may be sensitive to age and emotional maturity (Pettit, 2002). Moreover, Truell et al. (2002) recommended that web surveys with high levels of sensitivity should be anonymous. The present researcher made every attempt to address user sensitivity in this research.

Integrated regulation inclusion. The present BREQ-2 contains five of the six behavioral regulations that are integral to the SDT: intrinsic motivation, identified regulation, introjected regulation, external regulation, and amotivation. However, integrated regulation is not included in the questionnaire because Markland (2011, March 3) found it difficult to differentiate between integrated regulation with identified and intrinsic motivation. Nevertheless, Wilson et al., (2006) were able to successfully include integrated regulation into the original BREQ using three studies. They developed a new subscale that comprised of four questions adapted from other instruments which tapped into the most autonomous aspect of extrinsic motivation. One such question, “I consider exercise a fundamental part of who I am”, exemplifies how the new subscale probes the integrated regulation construct of respondents. The CFA results from these studies verified construct and structural validity in the BREQ with the incorporation of integrated

regulation. Criterion validity was also evident, which predicts a behavior based on a collection of variables. Finally, internal consistency of the BREQ remained satisfactory with the addition of integrated regulation and thereby establishing reliability. Although research by Wilson et al. (2006) confirmed validity and reliability for the integrated regulation subscale using the original BREQ, the present author used the BREQ-2 version instead because it incorporated amotivation. González-Cutre, Sicilia, Águila, and Hernández (2011), in the only known published study to use BREQ-2 with the inclusion of integrated regulation as developed by Wilson et al. (2006), were able to obtain an acceptable Cronbach's α value of .86 for integrated regulation indicating reliability of this subscale. In the present survey, the four integrated regulation questions were equally distributed throughout the BREQ-2 so that they composed of every fifth question. Moreover, the sequence of the BREQ-2 questions was not randomized to account for order effects because only one known study (Wilson et al., 2004) had implemented such a process and furthermore, Markland and Tobin (2004) had not recommended this practice.

BREQ-2 scoring key. There are two ways of evaluating results of the BREQ-2. One way is to compute the score in multidimensional mode whereby the mean scores of each of the six subscales are calculated separately using the questions representing those subscales. Another method is to combine the means of all subscales into a single value using a weighted scheme to represent an individual's overall self-determination level, which is known as the self-determination index (SDI) or the relative autonomy index (Pelletier & Sarrazin, 2007). The multidimensional scoring system was employed for the present study because the six subscales of the SDT continuum expose possible

differentiation of behavioral regulations and permit scrutiny at the subscale level. Using the SDI, regulatory motivation styles could not be evaluated since the means of each of the six subscales had to be summed. Thus, Pelletier and Sarrazin (2007) advocate using the multidimensional method to explore motivational behaviors via the SDT continuum because doing so “can lead to a better understanding of the distinct affective, cognitive, and behavioral consequences that characterize each type of motivation” (p. 147).

The BREQ-2 Scoring Key in Appendix D describes the evaluation classification scheme of the six behavioral subscales for the 23 BREQ-2 questions as implemented in this research. Each of the six behavioral regulations contained four questions, with the exception of introjected regulation which had only three questions. To obtain results for each of the six behavioral regulation subscales, the mean score of all questions pertaining to a particular regulation was obtained. As an example, the four intrinsic motivation questions are numbered 4, 12, 18, and 22 in the present questionnaire. Assume that an individual answered in the following way:

- Question 4 response had a value of “3”
- Question 12 response had a value of “2”
- Question 18 response had a value of “3”
- Question 22 response had a value of “4”.

The mean score would then be calculated for the four intrinsic motivation responses for this individual ($M = 3.0$ for example above). A higher mean score indicates a greater propensity for self-determination since this person scored high in the intrinsic motivation subscale. Similarly, an individual having a high mean score for external

regulation denotes an increased predisposition to be influenced by external events, such as pressure from others. Thus, by tallying the means of each subscale using this format, a theoretical gradient of behavioral regulations of a sample could be ascertained. The example above using one person's response is presented for clarification of the scoring process for the BREQ-2. Individual responses were not analyzed in the actual results, but instead, the data was scrutinized by using group means.

SurveyMonkey. It was decided to use SurveyMonkey as the method of presenting and collecting the BREQ-2 because this firm is well known in psychological research as a robust online system for implementing survey-based studies. The SurveyMonkey Gold Plan was procured which allowed for greater flexibility in conducting the present research. A key feature of this plan was that the survey data could be downloaded in SPSS format and ready for analysis. Thus, no data entry was performed by the researcher which eliminated data entry errors and speeded up analysis.

Pilot Study

A pilot study was conducted with 10 YMCA members and/or coworkers. The package PASW Statistics 18.0.3 (formerly SPSS and presently IBM SPSS; the software will be referred to as SPSS in this report) was used to tabulate the pilot study responses. The BMI ($M = 26.28$, $SD = 6.19$) of the participants corresponded to the overweight category of the WHO classification and their average age ($M = 41.00$, $SD = 10.29$) was in the lower middle-age group. The majority of those responding were female (70.0%), White (88.9%; one non-answer), and were not exercising for weight loss (90.0%). There

were no Hispanic or Latino participants. An equal number of people (50.0%) reported that they were exercising consistently for less than six months as well as for six months or longer.

A home page link on the YMCA website was not posted for the pilot study. Rather, the investigator personally asked members and coworkers to visit the YMCA landing web page directly, which contained the informed consent and the hyperlink to the SurveyMonkey website. It was unnecessary to post the home page link for the pilot study because only 10 responses were to be analyzed for procedural confirmation. If the home page link had been posted for the pilot study, it was highly likely that more than 10 responses would have completed the survey before the investigator had a chance to remove the home page link. Those partaking in the pilot study that were not personally requested to do so would perhaps not have participated in the actual study as well, which would have been a loss of potential responses. In addition, there was a possibility for user confusion in posting the survey link on the home page for a short time period and then reposting the same link at a later time.

Only for the pilot study, the participant also completed five feedback questions at the end of the questionnaire (see Appendix C) to discover whether:

- The SurveyMonkey website was an effective instrument for data collection versus a BREQ-2 paper questionnaire
- Users experienced any technical difficulties while completing the questionnaire on the SurveyMonkey website
- Participants were confused about the wording in any of the questions

- The time to complete the questionnaire was five to 10 minutes as expected
- There were too many questions on the survey.

Results of the pilot study did not reveal any flaws to the procedure. No one reported that the online survey was more difficult than a paper survey or that they had any technical difficulty in completing the questionnaire. One person mentioned that the BREQ-2 question “I feel ashamed when I miss an exercise session” was not applicable to the exercise domain. That individual was also the only African American that completed the pilot study and therefore sensitivity of the question was contemplated by the investigator but it was resolved that the objection was not related to a person’s race/ethnicity. The present author concurs that being ashamed is an affect that is not typically associated with exercise. However, it was decided to keep that question in the BREQ-2 for two reasons: (a) only one person objected to that question; and (b) it is an integral part of the BREQ-2 to measure introjected regulation. The BREQ-2 has only three questions to gauge introjected regulation whereas the other five subscales (i.e., intrinsic motivation, integrated regulation, identified regulation, external regulation, and amotivation) each contain four questions. Therefore, reducing introjected regulation from three to two questions would have made it more difficult to assess that SDT subscale. No other questions were found to be confusing. The time in minutes to complete the survey ($M = 4.15$, $SD = 1.00$) was shorter than the five to 10 minutes originally estimated. This finding was reflected in an updated informed consent and it was hoped that a faster completion time would spur a higher interest in the research and thus more participants. Finally, no one stated that there were too many questions on the survey. Feedback from

the pilot study confirmed that users felt comfortable with the survey's design and the live version was identical to the pilot study, except for the last five feedback questions.

For the pilot study, the investigator developed an SPSS algorithm to determine BMI using that program's Syntax Editor. Both the English method [(pounds / total inches²) * 703] and the metric version [weight kg / height m²] were used in the pilot study to compare calculation accuracy. The BMI numbers from the calculations were very similar and the differences were likely due to rounding errors. It was decided to use the metric formula for calculating BMI for the live data given that metric is the system of measurement for the International System of Units. To validate the SPSS BMI calculations, the numbers obtained were matched against those of the Online BMI Calculator on the Centers for Disease Control and Prevention (CDC) website (www.cdc.gov/healthyweight/assessing/bmi/). The values were similar and the minor differences were likely because the CDC calculator presented the BMI using one decimal place, suggesting that the internal web page calculations were also conducted with one decimal place. Conversely, the present author used two decimal places in SPSS to determine BMI since WHO also utilizes two decimal places to classify BMI.

It was discovered in the pilot study that it is possible to complete some or all of the questions but to never click the "Done" button on the last page to submit responses to be saved on the SurveyMonkey server. The present investigator surmised that the limbo state of such a response implied that the participant had doubts about proceeding and did not definitively want to complete the survey. To ensure that these uncompleted responses

were not included in the analysis, a SurveyMonkey data filter was enabled to exclude these incomplete submissions from being downloaded in the SPSS file.

Data Analysis

The initial manipulation of data consisted of preparing the downloaded file for preliminary analysis to perform assumption testing of appropriate variables, check the internal consistency of the subscales, and to examine subscale inter-correlations.

Data preparation. Upon concluding the open invitation time period for completing the survey, the SPSS results file was downloaded from SurveyMonkey for examination. The data was analyzed by the SPSS 18.0.3 software package. Data manipulation procedures were performed on the SPSS file to remove unnecessary variables, establish appropriate data types, and assign the correct level of measurement. The data was visually inspected in the SPSS editor. Each cell that was empty was followed up on SurveyMonkey's website analytic tool to inspect the data as it was entered online by the respondent. There were a few instances whereby the participant had entered non-numeric data along with numeric data which caused the system to produce a blank for that answer. For instance, one reply had "189lbs." for body weight so the "189" had to be manually entered into SPSS for that person. Additionally, the data was scanned for invalid entries. One case typed "65" in the *inches* field, indicating their overall height in inches, rather than entering a value of "5" for that field. All such errors were fixed and the data became usable for analysis. Because it was not mandatory to answer each question, some respondents left some questions unanswered. The next step

involved generating a continuous *BMI* variable from the height and weight data by using SPSS code in the program's Syntax Editor. That BMI variable was then recoded into an ordinal variable based on the WHO BMI categories (normal 18.50 to 24.99; overweight 25.00 to 29.99; obese ≥ 30.00). One respondent had a BMI of 18.32 which placed this individual in the underweight category (< 18.50), just below the normal BMI grouping. Rather than eliminating this participant from analysis, it was decided to include that person in the normal BMI range, given that there were only 116 participants overall. Furthermore, the continuous variable *age* was recoded into a nominal variable with the categories of < 40 years old and ≥ 40 years old. Finally, six SDT subscale variables were created from the raw data of the corresponding subscale questions.

Preliminary analysis. All subsequent analyses were conducted using two-tailed tests with a statistical significance level of $\alpha = .05$. Although the BREQ-2 is an ordinal scale since the answers are selected as rank order, in psychological analysis such responses are often treated as interval data to permit advanced statistical testing beyond that of descriptive statistics (Kumar, 2012). The Likert item text descriptions corresponded to the numerical values of 0-4; see BREQ-2 in Appendix B. Therefore, analyses of the six SDT subscales were conducted as if the level of measurement of the BREQ-2 data was interval. To conduct statistical processes on the subscales, six variables were generated in SPSS that contained the raw data of the corresponding questions for each of the six subscales (i.e., amotivation, external regulation, introjected regulation, identified regulation, integrated regulation, and intrinsic motivation).

Additionally, a variable was created with the combined raw responses of all six SDT subscales. Analysis in the next section was conducted with these summary variables.

SDT subscales. Examination of the subscale data began with the SPSS “Frequencies” and “Explore” commands to output a descriptive statistics summary that included the number of missing values, mean, standard deviation, skewness, standard error of skewness, kurtosis, standard error of kurtosis, frequency table, histogram overlaid with a normal distribution curve, Shapiro-Wilk normality test, normal Q-Q Plot, and a detrended normal Q-Q Plot. A normal distribution of each SDT subscale could not be expected since on one end, amotivation measures a lack of intention to exercise and thus a respondent who is not amotivated would naturally select *not true for me* for a particular amotivation question, translating to a numerical value of zero for scoring. Therefore if the overwhelming majority of the respondents are not amotivated, as would be expected, then the mean of the four amotivation questions of this subscale would be near zero. Upon inspecting the frequency distribution of the amotivation subscale, it indeed revealed that 83.9% of the respondents chose *not true for me* for their answer; see Table 7. The high positive skewness of amotivation translates to a mean of 0.26 (± 0.66), very close to zero as could be predicted; see Table 8. On the other side of the SDT continuum with a high negative skewness is identified regulation, in which 55.7% of the responses were *very true for me* with a mean of 3.12 (± 1.21). Introjected regulation, situated near the center of the SDT continuum, was the closest subscale to constituting a normally distributed histogram; see Appendix G for histograms of all six SDT subscales. A Likert scale, as is the BREQ-2, typically consists of only five choices so a normally

distributed set of answers is not realistic for each of the six SDT subscales. Instead, Likert data should be characterized by a mound-shaped distribution rather than a pure normal distribution curve (University of Northern Iowa, n.d.).

Table 7

Relative Frequencies of Likert Item Responses for the Six SDT Subscales with Combined Subscale Totals

Subscales	Response options ^a	Value ^b	<i>n</i> ^c	% ^d
Amotivation	Not true for me	0	386	83.9
	-- ^e	1	37	8.0
	Sometimes true for me	2	32	7.0
	--	3	2	0.4
	Very true for me	4	3	0.7
External regulation	Not true for me	0	342	74.0
	--	1	59	12.8
	Sometimes true for me	2	38	8.2
	--	3	5	1.1
	Very true for me	4	18	3.9
Introjected regulation	Not true for me	0	89	25.6
	--	1	54	15.6
	Sometimes true for me	2	104	30.0
	--	3	50	14.4
	Very true for me	4	50	14.4
Identified regulation	Not true for me	0	30	6.5
	--	1	18	3.9
	Sometimes true for me	2	77	16.6
	--	3	80	17.3
	Very true for me	4	258	55.7
Integrated regulation	Not true for me	0	68	14.8
	--	1	40	8.7
	Sometimes true for me	2	82	17.8
	--	3	100	21.7
	Very true for me	4	171	37.1
Intrinsic motivation	Not true for me	0	34	7.3
	--	1	38	8.2
	Sometimes true for me	2	111	23.9
	--	3	116	25.0
	Very true for me	4	165	35.6
Combined responses of all SDT subscales	Not true for me	0	949	35.7
	--	1	246	9.3
	Sometimes true for me	2	444	16.7
	--	3	353	13.3
	Very true for me	4	665	25.0

Notes.

^a Response options for the 5 Likert items on the BREQ-2 scale.

^b Ordinal value assigned to responses but treated as interval for analysis.

^c Frequency count of responses per Likert item.

^d Some percentages do not add up to 100% due to accumulated round-off error.

^e BREQ-2 does not have a descriptive response option for these Likert items.

N = 116; however some respondents did not answer every question.

Table 8

Descriptive Statistics and Correlation Matrix of the Six SDT Subscales

Subscales	M^a	SD	Skew.	Kurt.	α	1	2	3	4	5	6
1. Amotivation	0.26	0.66	2.85	8.67	.81	–					
2. External Regulation	0.48	0.97	2.28	4.77	.83	.18**	–				
3. Introjected Regulation	1.76	1.36	0.17	-1.10	.78	-.16**	.03	–			
4. Identified Regulation	3.12	1.21	-1.26	0.60	.85	-.34**	-.16**	.32**	–		
5. Integrated Regulation	2.58	1.43	-0.62	-0.94	.91	-.35**	-.15**	.31**	.53**	–	
6. Intrinsic Motivation	2.73	1.23	-0.70	-0.44	.93	-.39*	-.20**	.13*	.44**	.55**	–

Notes.

^a Scores range from 0 to 4 and are based on the assigned value for a Likert item response on the BREQ-2.

M = mean; SD = standard deviation; Skew. = skewness; Kurt. = kurtosis; α = Cronbach's coefficient alpha.

* Correlation is significant at the .05 level (2-tailed).

** Correlation is significant at the .01 level (2-tailed).

$N = 116$.

The present author considered that perhaps it may be more suitable to test for a normal distribution by using one variable that contained all of the BREQ-2 raw data: amotivation through intrinsic motivation subscales. Yet, as the frequency distribution shows for “Combined Responses of All SDT Subscales” (see Table 7), 35.7% of the answers were *not true for me* and 25.0% were *very true for me*. Meanwhile, the numerical value “1”, situated between *not true for me* and *sometimes true for me*, was selected only 9.3% of the time. The histogram in Figure 11 illustrates that even when all of the raw data was combined into one variable, the responses still did not approximate a normal distribution. The overall data displayed significant skewness and kurtosis (i.e., $|\text{skewness, kurtosis}| > \text{twice their corresponding Std. Error}$; Metz, 2010) which resulted in an asymmetric distribution. The concentration of the answers at both ends of the Likert scale suggested that *extreme response bias* may have influenced this sample of YMCA participants. The SPSS Explore command was used to check for statistical normality and that function outputs results for both the Kolmogorov-Smirnov and Shapiro-Wilk tests. Sheskin (2011) contends that between these two tests, Shapiro-Wilk is the best test for normality and asserted that the Kolmogorov-Smirnov test is deficient in power. Nevertheless and not surprisingly, neither test revealed a normal distribution for the six SDT subscales individually, nor for the combined responses of all SDT subscales (Kolmogorov-Smirnov, $D = 0.23$, $df = 2657$, $p < .001$; Shapiro-Wilk, $W = .82$, $df = 2657$, $p < .001$).

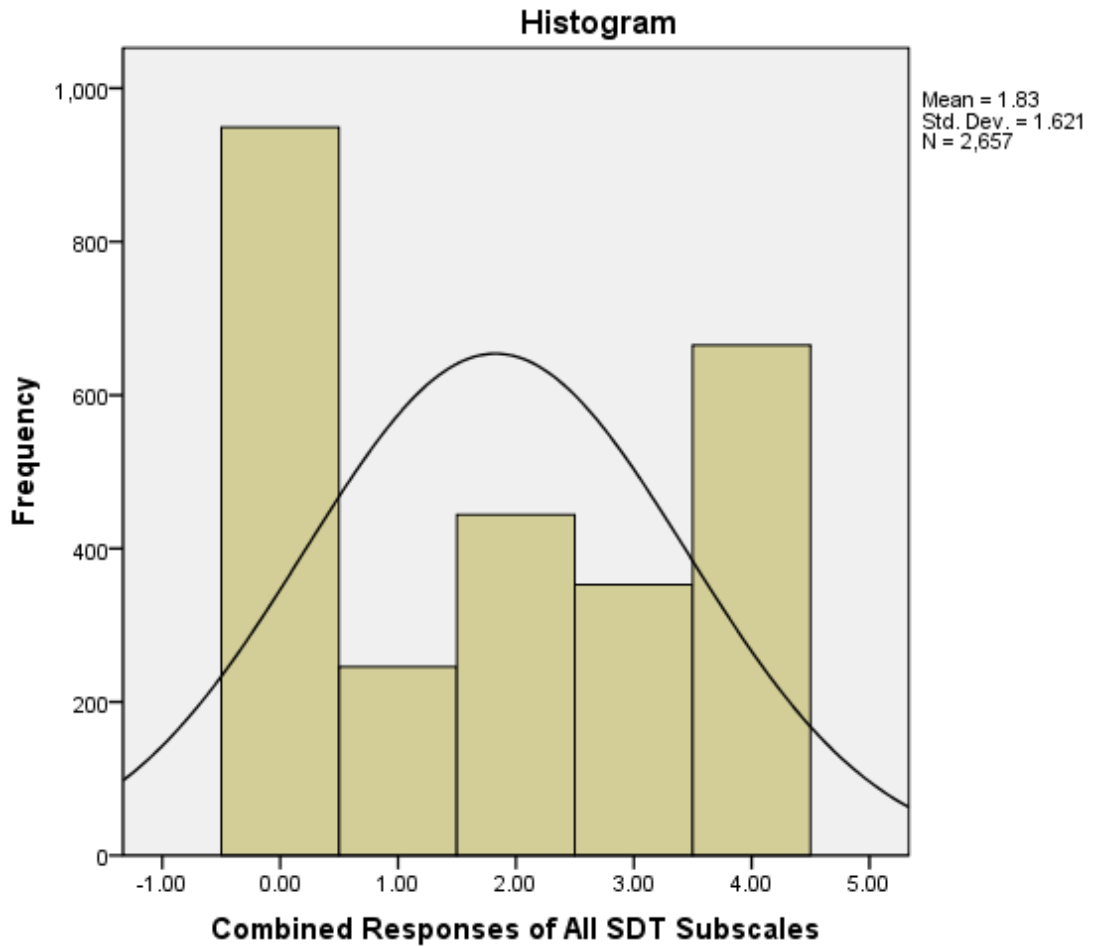


Figure 11. Histogram of the combined responses of all SDT subscales of the BREQ-2 with descriptive statistics. The graph reveals a non-normal distribution.

$M = 1.83$

$SD = 1.62$

Skewness = 0.13

Std. Error of Skewness = 0.05

Kurtosis = -1.57

Std. Error of Kurtosis = 0.10

Table 8 revealed that identified regulation, with the highest mean ($M = 3.12$, $SD = 1.21$), resonated the most with this sample of participants. It was anticipated that intrinsic motivation ($M = 2.73$, $SD = 1.23$) would have been the most salient. Nonetheless, Pelletier and Sarrazin (2007) stated that both identified regulation (i.e., “personally held values”) and intrinsic motivation (i.e., “for enjoyment, pleasure, and fun”) are strongly connected behavioral regulations because the type of motivation that they evaluate is analogous. Furthermore, the pattern of subscale mean scores from this study paralleled previous research (Duncan et al., 2010).

Item analysis was conducted to measure the internal consistency of the BREQ-2 for this sample of participants. Cronbach’s coefficient alpha (α) statistic was computed from the mean inter-item correlation between the questions of each SDT subscale. Cronbach’s α measures the unidimensionality of subscale questions, or the magnitude of the positive relationship between each subscale question (Borgatti, n.d.). A greater α indicates a more reliable subscale for measuring the psychological construct it was designed to assess (Yu, 2001, April). While Cortina (1993) reasoned that an absolute value of Cronbach’s α (i.e., $\alpha = .80$) can be used as a cutoff in determining internal consistency of a scale, George and Mallery (2003, as cited in Gliem & Gliem, 2003, October) proposed a rule of thumb in establishing whether an α amount is sufficient: (a) $\alpha > .9$ is excellent; (b) $\alpha > .8$ is good; (c) $\alpha > .7$ is acceptable. A Cronbach’s α of less than .7 indicates a questionable or worse level of internal consistency of the scale. As Table 8 illustrates, Cronbach’s α was acceptable or better for this study and these results

replicated previous studies (Mullan et al., 1997; Lewis & Sutton, 2011; Markland & Tobin, 2004).

Results of an SPSS correlation matrix shown in Table 8 confirmed the simplex-like pattern of inter-correlations between the six SDT subscales, providing evidence for an underlying continuum and thereby supporting SDT. According to Pelletier and Sarrazin (2007), a “simplex-like pattern indicates that subscales situated closer to one another on the self-determination continuum are more strongly and positively associated, while subscales farther apart are negatively related” (p. 145). Examining the relationships of the SDT subscales presented in the table reveals that all correlations were significant except for the relationship between external regulation and introjected regulation. Vallerand and Bissonnette (1992) recommended that adjacent subscales should be most positively correlated (e.g., in Table 8, intrinsic motivation and integrated regulation, $r = .55$) while subscales farther away on the SDT continuum should have the most negative correlations (e.g., intrinsic motivation and amotivation, $r = -.39$). Establishing a simplex pattern is critical because it demonstrates construct validity of the gradations along the continuum as espoused by SDT, with the successive ordering reflecting the internalization of behavioral regulations from those that are externally imposed to those that are internally endorsed (Pelletier, Vallerand, & Sarrazin, 2007; Pelletier, Fortier, Vallerand, & Brière, 2001). Ryan and Connell (1989) in their seminal work demonstrating internalization of behaviors and developing a model for the perceived locus of causality, emphasized that “When arranged in a matrix, a perfect simplex model evidences its largest correlations along a main diagonal, and these

increasingly taper off as one moves away from that diagonal” (p. 750). Upon inspecting the diagonal correlations in Table 8 (topmost correlations of columns labeled “1” through “6”), it is evident that the correlation matrix in this study conforms to the expected simplex configuration evidenced by previous SDT research.

The six SDT subscale variables explored in this section described the overall raw data of the subscales. The variable holding the total of all six SDT subscales was also scrutinized. But those indexes were not anchored to their respective cases (i.e., respondents). Instead, all BREQ-2 answers of each respondent were amassed together to discern whether a normal distribution existed. But to conduct statistical tests on the SDT subscales for the propositions in this study, it was necessary to create six new variables, one for each subscale, to constitute the mean value of a subscale for each respondent. For example, an individual may have answered the three introjected regulation questions with the corresponding values of “2”, “4”, and “1”. Therefore, the mean value held in the introjected regulation variable for this respondent would be “2.33” and the same methodology was employed for all respondents. The use of a single index representing the mean value for each of the six SDT subscales permitted comparison between subjects based on the specific question of a proposition. It was thus possible to examine the propositions by the general characteristics of the sample (e.g., males vs. females).

Primary proposition. Prior to running a two-way analysis of variance (ANOVA) to test the primary proposition, the SPSS Explore command was executed to evaluate normality and homogeneity of variance of the DV across all categories of the two IVs. The DV for the primary proposition was intrinsic motivation. The first IV was the

question of whether respondents were exercising for weight loss or not (“Yes” or “No”). The second IV was the BMI variable (normal, overweight, obese).

For the first IV, the Shapiro-Wilk test indicated a non-normal distribution of the DV for both the Yes category ($W = .95, df = 67, p = .007$) and the No category ($W = .87, df = 48, p < .001$). Levene’s test examined homoscedasticity of the first IV and showed that there was homogeneity of variances for intrinsic motivation across both categories, $F(1, 113) = 0.56, p = .458$.

For the second IV, Shapiro-Wilk revealed a non-normal distribution of intrinsic motivation for the normal BMI ($W = .78, df = 47, p < .001$) and overweight BMI ($W = .93, df = 35, p = .028$) categories but displayed a normal distribution for the obese BMI category ($W = .98, df = 33, p = .838$). Levene’s test showed homogeneity of variances for intrinsic motivation, $F(2, 112) = 0.29, p = .752$.

Assumptions for a two-way ANOVA include having: (a) a DV with at least an interval level of measurement; (b) an IV with two or more categories; (c) a normally distributed DV; (d) a minimum of 30 cases total for the ANOVA and $n = 5$ for each cell; (e) and homogeneity of variances of the DV across all IV categories (Abu-Bader, 2010). Random sampling and random assignment were not possible for this online ethnographic study for reasons listed in the Limitations section of this report. Despite violating the assumption of normality (i.e., normally distributed DV), a two-way ANOVA was nevertheless conducted for the primary proposition because Norman (2010) articulated that “parametric statistics can be used with Likert data, with small sample sizes, with unequal variances, and with non-normal distributions” (p. 631).

When running a two-way ANOVA, SPSS also executes Levene's test of equality of error variances and the results showed that there was homogeneity of error variances for intrinsic motivation across all categories of the two IVs $F(5, 109) = 0.48, p = .791$.

Secondary proposition 1. Before executing a one-way ANOVA for secondary proposition 1, tests were conducted to inspect normality and homogeneity of variance of the DV across all categories of the IV. The DV for secondary proposition 1 was the identified regulation variable. The IV was the researcher's own question, "How long have you been exercising consistently up until now, whether done at our YMCA or continued from a previous fitness facility?" with two possible choices ("Less than six months" or "Six months or longer"). Assumptions for a one-way ANOVA are similar to a two-way ANOVA but Metz (2010) recommends having at least $n = 20$ for each category of the IV which was met for this proposition.

The Shapiro-Wilk test of normality revealed a normal distribution for identified regulation in the "Less than six months" category ($W = .97, df = 36, p = .477$) but a non-normal distribution for the "Six months or longer" category ($W = .74, df = 77, p < .001$). Homogeneity of variance was once again exhibited with Levene's test, $F(1, 111) = 2.88, p = .093$, for identified regulation across the two IV categories.

Secondary proposition 2. A one-way ANOVA was conducted for each of the three sub-premises for secondary proposition 2.

Secondary proposition 2.1. Prior to running a one-way ANOVA, normality and homogeneity of variance for the introjected regulation DV was tested across the gender IV categories of male and female. The Shapiro-Wilk test of normality revealed a normal

distribution in introjected regulation for males ($W = .95$, $df = 36$, $p = .135$) but a non-normal distribution for females ($W = .97$, $df = 80$, $p = .027$). Homoscedasticity was confirmed with Levene's test, $F(1, 114) = 0.06$, $p = .810$, for introjected regulation across both gender IV categories.

Secondary proposition 2.2. The Explore command was executed before the one-way ANOVA to check for normality and homogeneity of variance in the introjected regulation DV across the two age IV categories of <40 years old and ≥ 40 years old. The Shapiro-Wilk test of normality showed a non-normal distribution for introjected regulation for participants <40 years old ($W = .96$, $df = 52$, $p = .047$) and for those ≥ 40 years old ($W = .96$, $df = 64$, $p = .031$). Levene's test verified homogeneity of variance for introjected regulation across both age IV categories, $F(1, 114) = 0.16$, $p = .688$.

Secondary proposition 2.3. The Explore command on the question of ethnicity revealed that only one respondent chose Yes for the question "Are you Hispanic or Latino?" Therefore ethnicity was excluded from any ensuing analysis. Furthermore, an Explore command was administered for the question "Please select the racial category or categories with which you most closely identify." Results showed that 93 (80.9%) of the respondents chose White; 18 (15.7%) selected Black or African American; two (1.7%) were American Indian or Alaska Native; two (1.7%) indicated Asian; no one picked Native Hawaiian or Other Pacific Islander; and one person skipped the question. The present investigator knows that there is a fair amount of Asian members at this YMCA and it is unfortunate that more did not partake in the study. A language barrier may have been the rationale for a lack of participation by Asians. By virtue of its unique

geographic location, the YMCA has a multicultural membership and it was also disappointing that only 18 Black or African Americans chose to participate. Therefore, to conduct analysis with race and still satisfy the minimum sample size of $n = 20$ (Metz, 2010), the original race variable was recoded by keeping the White category intact but collapsing the categories of Black or African American, American Indian or Alaska Native, and Asian into a *non-White* race category.

Preceding a one-way ANOVA, another Explore command was completed on introjected regulation across race categories, but this time on the recoded variable. The Shapiro-Wilk test of normality revealed a normal distribution for introjected regulation for the non-White race category ($W = .95, df = 22, p = .321$) but a non-normal distribution for Whites ($W = .96, df = 93, p = .011$). Homogeneity of variance for introjected regulation across both race IV categories was substantiated with Levene's test, $F(1, 113) = 0.22, p = .640$.

To summarize assumptions testing specific to the three propositions, Levene's test for homogeneity of variance of the DV across all categories of the corresponding IV was conducted seven times and resulted in homoscedasticity on all seven occasions. The Shapiro-Wilk test was executed 13 times for the three propositions to check for a normal distribution of the DV across all categories of the corresponding IV. The Shapiro-Wilk test however failed to identify a normal distribution nine times but did determine normality four times. These mixed findings show that responses were equally varied across the appropriate IV categories but the participants' extreme response bias obviated

a normally distributed dataset. Nevertheless, parametric statistical tests (ANOVAs) were completed based on the arguments of Norman (2010) as explicated previously.

Effect size estimate implemented. One-way ANOVAs were conducted for both secondary propositions instead of independent samples t-tests, although both types of tests generate identical results when an ANOVA has exactly two categories. Effect size measures were also reported which indicate the degree of magnitude of the treatment effect. Additionally, effect sizes estimate the proportion of variance in the DV as influenced by the IV (Sheskin, 2011). The reason ANOVAs were chosen was because SPSS generates the effect size η_p^2 (partial eta squared) with an ANOVA output whereas the independent samples t-test in SPSS does not calculate an effect size. However, Kumar (2012) cautioned that SPSS wrongly prints out the label “partial eta squared” for the effect size of a one-way ANOVA when the label should read “eta squared” (η^2). Partial eta squared effect size is only applicable for multifactor ANOVA designs, such as the primary proposition. For the two secondary propositions, the eta squared statistic was reported since one-way ANOVAs were employed. Nevertheless, the effect size value itself, although wrongly labeled as partial eta squared, is actually correct for the one-way ANOVA because η_p^2 and η^2 are equivalent for single factor ANOVA designs like the two secondary propositions (Pierce, Block, & Aguinis, 2004; Levine & Hullett, 2002). Sheskin (2011) recommends to use the following effect size cutoffs for omega squared and Kumar (2012) suggests to apply those same cutoffs for eta squared: (a) $\eta^2 = .0099$ to $.0588$ is a small effect size; (b) $\eta^2 = .0589$ to $.1379$ is a medium effect size; (c) $\eta^2 = \geq .1380$ is a large effect size.

Post hoc test selection. If a significant result was found on the interaction effect in the 3x2 ANOVA of the primary proposition, analysis for simple effects (i.e., effect of a first IV within one level of a second IV) would not be conducted on that interaction per arguments of Kumar (2012), although such exploration is recommended by Sheskin (2011); the main effects would still be reported for a more comprehensive understanding of the data. However, if the interaction effect was not significant but if either or both main effects were significant, post hoc analysis would be performed on the main effects to determine which groups were different for the IV containing three groups (BMI categories). No post hoc tests would be executed for the two secondary propositions since all IVs in every comparison had exactly two groups.

Three post hoc tests were considered for analysis: Tukey's HSD test, Scheffé's method, and the Bonferroni correction. Tukey's post hoc was eliminated from consideration because it required all groups of the IV to have the same sample size, which did not match the pattern of data in this study. Scheffé's post hoc was also not applicable because it is typically used when one or more complex comparisons are performed but in this study only simple comparisons were needed (Sheskin, 2011). Thus, the Bonferroni correction was reported for the 3x2 ANOVA of the primary proposition because it ensured that the familywise Type I error rate did not exceed the targeted alpha level set for this study (i.e., $\alpha = .05$).

CHAPTER IV

Results

After preliminary data analysis was completed, statistical procedures were conducted with SPSS 18.0.3 software program to determine if the study propositions predicted the present findings.

Primary Proposition

A 3 (Body Mass Index [BMI] categories) x 2 (exercised for weight loss) between-subjects factorial analysis of variance (ANOVA) was computed comparing intrinsic motivation by respondents' BMI category and whether they exercised specifically for weight loss; see Table 9 and Table 10.

Interaction effect (BMI categories by whether exercised for weight loss).

Results of the two-way ANOVA revealed that the interaction effect of intrinsic motivation across BMI categories and by whether participants exercised specifically for weight loss was not statistically significant ($F_{(2, 109)} = 0.23, p = .796, \eta_p^2 = .004$).

The interaction effect of BMI category and whether participants exercised specifically for weight loss accounted for only 0.4% ($\eta_p^2 = .004$) of the variance in intrinsic motivation, indicating a very weak effect size.

The overall variance of 21.5% ($R^2 = .22$) in intrinsic motivation of the Omnibus test signified a large effect size and was accounted for by BMI category, whether participant exercised specifically for weight loss, and their interaction.

Table 9

Descriptive Statistics of Primary Proposition for Intrinsic Motivation by BMI Category and Whether Participants Exercised Specifically for Weight Loss

BMI categories	Exercised for weight loss	n^a	M	SD
Normal	Yes	14	3.23	0.86
	No	33	3.14	1.14
	Total	47	3.17	1.05
Overweight	Yes	26	2.91	0.96
	No	9	2.50	1.00
	Total	35	2.81	0.97
Obese	Yes	27	2.05	0.92
	No	6	1.75	0.59
	Total	33	1.99	0.87
Total	Yes	67	2.63	1.04
	No	48	2.85	1.15
	Total	115	2.72	1.09

Notes.

$N = 116$.

^aOne participant did not answer whether they exercised for weight loss.

M = mean; SD = standard deviation.

Table 10

Two-Way ANOVA Summary Table of the Primary Proposition for Intrinsic Motivation by BMI Category and Whether Participants Exercised Specifically for Weight Loss

Source of variance	SS	df	MS	F^a	p
BMI categories	21.84	2	10.92	11.25	<.001
Exercised for weight loss	1.40	1	1.40	1.44	.232
Interaction	0.44	2	0.22	0.23	.796
Error	105.81	109	0.97		
Total	134.72	114			

Notes.

^a $R^2 = .22$

Finally, illustrated in Figure 12 is the profile plot of the estimated marginal means of intrinsic motivation. As the roughly parallel lines of “exercised for weight loss” and “did not exercise for weight loss” indicate, the interaction effect was not statistically significant.

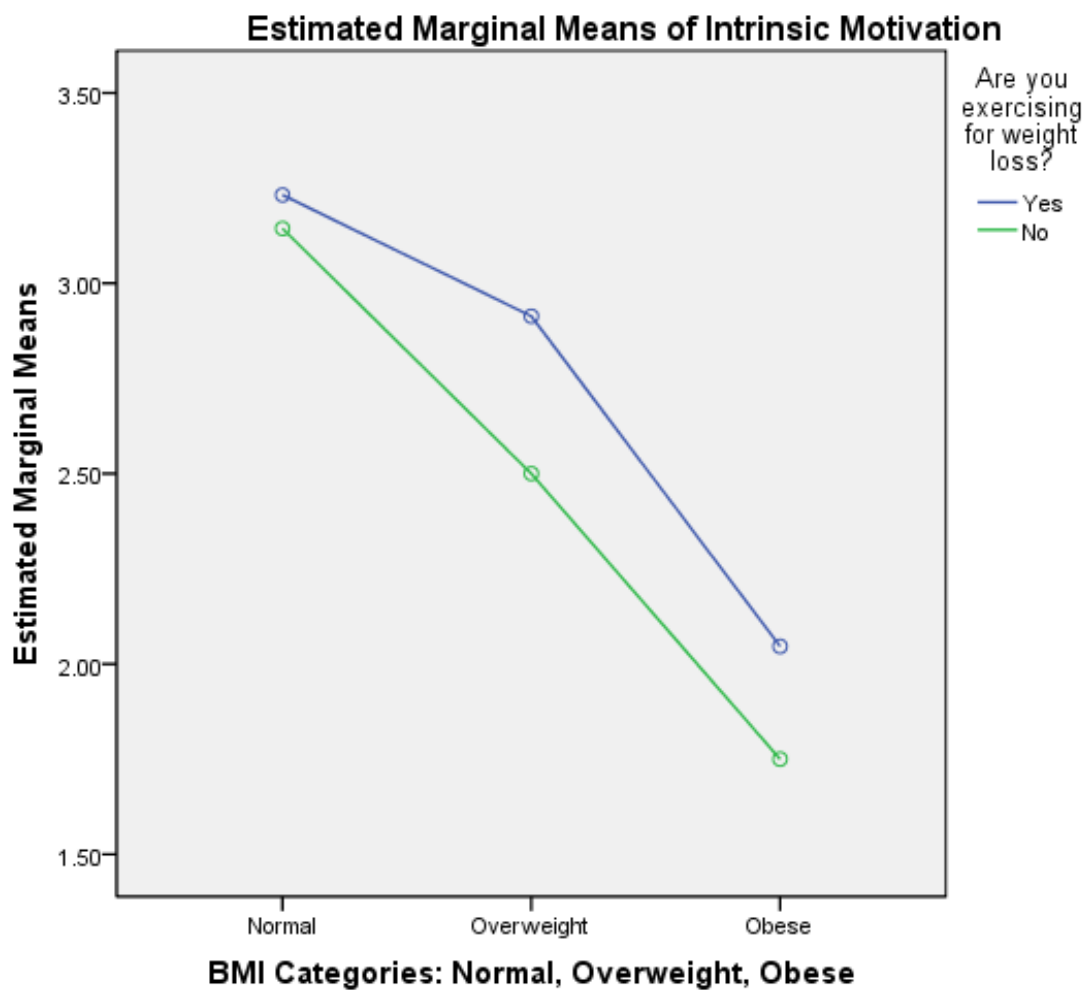


Figure 12. Profile plot of estimated marginal means of intrinsic motivation for the primary proposition. As the graph indicates, the interaction between BMI categories and whether participants exercised specifically for weight loss was not significant.

Main effect 1 (BMI categories). Results of the two-way ANOVA revealed that the main effect of intrinsic motivation across BMI categories was statistically significant ($F_{(2, 109)} = 11.25, p < .001, \eta_p^2 = .171$).

Results of the Bonferroni correction post hoc test showed a significant difference between normal BMI (n-BMI) and obese BMI (ob-BMI) categories ($p < .001$), with those in the n-BMI category reporting a higher level of intrinsic motivation ($M = 3.17, SD = 1.05$) than respondents in the ob-BMI category ($M = 1.99, SD = 0.87$). Additionally, a significant difference existed between respondents in the overweight BMI (ov-BMI) and ob-BMI categories ($p = .003$), with those in the ov-BMI category reporting a higher level of intrinsic motivation ($M = 2.81, SD = 0.97$) than respondents in the ob-BMI category. No significant difference was found between respondents in the n-BMI and ov-BMI categories ($p = .305$).

For main effect one, 17.1% ($\eta_p^2 = .171$) of the variance in intrinsic motivation was accounted for by BMI categories, indicating a large effect size between these two variables.

Main effect 2 (exercised for weight loss). Results of the two-way ANOVA revealed that the main effect of intrinsic motivation across whether participants exercised specifically for weight loss was not statistically significant ($F_{(1, 109)} = 1.44, p = .232, \eta_p^2 = .013$).

For main effect two, 1.3% ($\eta_p^2 = .013$) of the variance in intrinsic motivation was accounted for by whether participants exercised specifically for weight loss, indicating a small effect size between these two variables.

Secondary Proposition 1

A one-way between-subjects ANOVA was conducted to compare the degree of identified regulation by whether participants exercised consistently for at least six months or not; see Table 11 and Table 12. Results showed a significant difference ($F_{(1, 111)} = 54.86, p < .001, \eta^2 = .331$) between participants having exercised for less than six months ($M = 2.42, SD = 0.81$) and those having exercised for six months or longer ($M = 3.50, SD = 0.67$).

The variance of 33.1% ($\eta^2 = .331$) in identified regulation was accounted for by whether participants exercised consistently for at least six months or not, indicating a large effect size between these two variables.

Table 11

Descriptive Statistics of Secondary Proposition 1 for Identified Regulation by How Long Participants Exercised

How long exercised	<i>n</i> ^a	<i>M</i>	<i>SD</i>
Less than six months	36	2.42	0.81
Six months or longer	77	3.50	0.67
Total	113	3.16	0.87

Notes.

N = 116.

^aThree participants did not answer how long they have exercised.

M = mean; *SD* = standard deviation.

Table 12

One-Way ANOVA Summary Table of Secondary Proposition 1 for Identified Regulation by How Long Participants Exercised

Source of variance	SS	<i>df</i>	MS	<i>F</i> ^a	<i>p</i>
Between groups	28.25	1	28.25	54.86	<.001
Error	57.16	111	0.52		
Total	85.42	112			

Notes.

^a*R*² = .33

Secondary Proposition 2

Three separate one-way between-subject ANOVAs were conducted to compare the degree of introjected regulation by gender, age, and race, respectively, with all three ANOVA independent variables (IVs) containing exactly two categories.

Secondary proposition 2.1. Results of the ANOVA comparing the degree of introjected regulation by gender did not show a significant difference ($F_{(1, 114)} = 0.76, p = .384, \eta^2 = .007$); see Table 13 and Table 14.

The variance of 0.7% ($\eta^2 = .007$) in introjected regulation was accounted for by gender, indicating a very weak effect size between these two variables.

Table 13

Descriptive Statistics of Secondary Proposition 2.1 for Introjected Regulation by Gender

Gender	<i>n</i>	<i>M</i>	<i>SD</i>
Male	36	1.63	1.08
Female	80	1.82	1.10
Total	116	1.76	1.09

Notes.

N = 116.

M = mean; *SD* = standard deviation.

Table 14

One-Way ANOVA Summary Table of Secondary Proposition 2.1 for Introjected Regulation by Gender

Source of variance	SS	<i>df</i>	MS	<i>F</i> ^a	<i>p</i>
Between groups	0.91	1	0.91	0.76	.384
Error	135.72	114	1.19		
Total	136.62	115			

Notes.

^a $R^2 = .007$

Secondary proposition 2.2. Results of the ANOVA comparing the degree of introjected regulation by age did not show a significant difference ($F_{(1, 114)} = 0.13, p = .725, \eta^2 = .001$); see Table 15 and Table 16.

The variance of 0.1% ($\eta^2 = .001$) in introjected regulation was accounted for by age, indicating a very weak effect size between these two variables.

Table 15

Descriptive Statistics of Secondary Proposition 2.2 for Introjected Regulation by Age

Age	<i>n</i>	<i>M</i>	<i>SD</i>
<40 years old	52	1.80	1.13
≥40 years old	64	1.73	1.06
Total	116	1.76	1.09

Notes.

N = 116.

M = mean; *SD* = standard deviation.

Table 16

One-Way ANOVA Summary Table of Secondary Proposition 2.2 for Introjected Regulation by Age

Source of variance	SS	<i>df</i>	MS	<i>F</i> ^a	<i>p</i>
Between groups	0.15	1	0.15	0.13	.725
Error	136.47	114	1.20		
Total	136.62	115			

Notes.

^a $R^2 = .001$

Secondary proposition 2.3. Results of the ANOVA comparing the degree of introjected regulation by race did not show a significant difference ($F_{(1, 113)} = 0.34, p = .560, \eta^2 = .003$); see Table 17 and Table 18.

The variance of 0.3% ($\eta^2 = .003$) in introjected regulation was accounted for by race, indicating a very weak effect size between these two variables.

Table 17

Descriptive Statistics of Secondary Proposition 2.3 for Introjected Regulation by Race

Race	n^a	M	SD
Non-White	22	1.62	1.08
White	93	1.77	1.08
Total	115	1.74	1.07

Notes.

$N = 116$.

^aOne participant did not answer to the question of race.

M = mean; SD = standard deviation.

Table 18

One-Way ANOVA Summary Table of Secondary Proposition 2.3 for Introjected Regulation by Race

Source of variance	SS	df	MS	F^a	p
Between groups	0.40	1	0.40	0.34	.560
Error	131.17	113	1.16		
Total	131.57	114			

Notes.

^a $R^2 = .003$

CHAPTER V

Discussion

The purpose of this study was to examine the exercise behavioral regulations of respondents from the Community YMCA of Eastern Delaware County. Amongst the propositions put forth, three self-determination theory (SDT) subscales were investigated: intrinsic motivation, identified regulation, and introjected regulation. As Table 19 illustrates, each of these three regulations describe attributes of one's personality and motivation. What do the results reveal about the motivational dispositions of this YMCA sample of respondents? A discussion of each proposition follows.

Table 19
Conceptual Characteristics of the Three Regulatory Styles

Conceptual features	Regulatory styles		
	Introjection	Identification	Intrinsic
Involvement level	High	High	High
Emotional experience	Negative	Positive	Positive
Locus of causality	External (Controlled)	Internal (Autonomous)	Internal (Autonomous)
Motivating force	Compulsion	Personal importance	Attraction (interest)
Regulatory style	Conditional self-regard (Learned)	Values & identity (Learned)	Emergent emotions (Innate)
Goal orientations	Approach/avoidance (Conflicted)	Approach (Long-term/outcome)	Approach (Short-term/process)
Needs implicated	Autonomy vs. relatedness (Conflicted)	Autonomy & relatedness (Congruent)	Autonomy & competence (Congruent)

Adapted from *Handbook of self-determination research* (p. 105), by E. L. Deci & R. M. Ryan (Eds.), 2002, Rochester, NY: The University of Rochester Press.

Primary Proposition

The main research question attempted to discern whether people in both the overweight BMI (Body Mass Index; ov-BMI) and obese BMI (ob-BMI) categories who were not exercising specifically for weight loss would show greater intrinsic motivation than those in their respective BMI categories who were exercising for weight loss. Results of the analysis were mixed. First, there was no significant interaction in intrinsic motivation between BMI category and an individual's desire to exercise for weight loss. Second, a people's intrinsic motivation significantly differentiated according to their BMI status, particularly the ob-BMI group. Third, intrinsic motivation did not significantly vary between whether individuals engaged in physical activity (PA) explicitly to lose weight or because they simply exercised in general (i.e., not necessarily to lose weight). It was expected that intrinsic motivation would significantly differ between whether or not a person was attempting to lose weight by exercise and that this contrast would be emulated in the ov-BMI and ob-BMI categories. Specifically, it was anticipated that individuals would possess greater intrinsic motivation if they did not exercise for weight loss and that this higher level of motivation would be evident in the ov-BMI and ob-BMI categories.

Using the SDT theoretical framework, the primary proposition attempted to establish that engaging in a controlled behavior (i.e., exercising to lose weight) would elicit less self-determined outcomes (i.e., lower intrinsic motivation) than participating in PA autonomously (i.e., exercising for enjoyment or pleasure). Results revealed that intrinsic motivation significantly differed across BMI categories but it was unclear as to

what evoked that variability. Since the motive to exercise exclusively for weight loss did not achieve statistical significance, there must be an alternative explanation as to why levels of intrinsic motivation significantly varied between BMI categories. One certainly has to ask whether the obvious difference in bodyweight itself between individuals of the three BMI categories could account for the differences in intrinsic motivation. The only BMI group that statistically differed between the other two groups was the ob-BMI group, the heaviest participants in this study.

An alternate explanation therefore for the significant variances in intrinsic motivation across ob-BMI and the other two BMI categories may be due to the fact that the definition of intrinsic motivation itself spells out that the activity is done for “enjoyment, pleasure, and fun.” It could be reasonably argued that those in the ob-BMI category are struggling to maintain their exercise level and therefore exhibit a higher degree of perceived exertion compared with individuals in the ov-BMI and normal BMI (n-BMI) groups. Not only do people in the ob-BMI group have a higher bodyweight which is likely to negatively impact their perceived exertion, but it could be additionally contended that ob-BMI individuals are more deconditioned than those in the ov-BMI and n-BMI groups. Since by definition intrinsic motivation is associated with the psychophysiological affective feedback of how one “feels” during PA, if one group of exercisers (i.e., ob-BMI) are struggling to execute an activity while other groups of exercisers (i.e., n-BMI and ov-BMI groups) are not distressing to that same extent, it could be surmised that a contrast in intrinsic motivation would develop between the aforementioned BMI categories.

When comparing groups with expected disparate exercise capacities, the use of the Borg Rating of Perceived Exertion (RPE) 6-20 scale would provide data about the participant's affective state during a typical exercise bout and would permit more meaningful comparisons between the BMI categories, thus possibly explaining the statistical differences found in this study. Research by Eston and Williams (1988) showed that RPE provides a practical method for determining levels of exercise intensity in healthy individuals. In a review of RPE literature, Williams and Eston (1989) concluded that the "rating of perceived exertion is a reliable index of the actual metabolic cost of the work" (p. 187) of exercisers. Perhaps if incorporating the RPE scale (or a similar device to detect exercise fatigue) along with the Behavioural Regulation in Exercise Questionnaire-2 (BREQ-2), it might be possible to record how exercising at a higher RPE could impact one's intrinsic motivation index.

Research has shown that engaging in higher intensity exercise levels (real or perceived) has an adverse consequence on an individual's ability to persist in the activity. A study by Ekkekakis and Lind (2006) showed that overweight people tend to perceive PA as being less pleasant and more arduous than people of normal weight, especially when those who are overweight engage in prescribed exercise intensity instead of choosing their own level. If a fitness professional imposes an intensity that is only 10% higher than what an exerciser would have self-selected, the pleasure of the activity is significantly decreased. The authors recommended allowing overweight individuals to self-prescribe exercise intensity and to let them perform PA unsupervised (to avoid feeling controlled). An investigation by Segar, Spruijt-Metz, and Nolen-Hoeksema

(2006) revealed that women who have extrinsic reasons to engage in PA (i.e., lose weight) do so at higher intensities to burn additional calories but this extra effort is associated with a negative temperament. Interestingly, a study by Edmunds, Ntoumanis, and Duda (2006) found that strenuous PA was not predicted by intrinsic motivation. The authors did state however that research has historically indicated that intrinsic motivation is crucial for exercise persistence. Therefore, in the present study it was plausible that those in the ob-BMI category were exercising at above their comfort level which would have impacted their RPE and by extrapolation their degree of intrinsic motivation.

Based on the present results and on previous research, the present author postulates that there are two motives as to why people in the ob-BMI category would be attempting to lose weight. Those individuals are engaging in weight loss activity either to improve their health status or to enhance their outward physical appearance. In either case, when people are participating in exercise for the distinct purpose of losing weight, they do so because they expect an “external” outcome to occur. First, if they were exercising for health motives, it was likely that they were coaxed by others close to them or by a medical professional. Regardless, the exercisers became involved in PA to please others in some capacity. Second, if the ob-BMI individuals were trying to lose weight for cosmetic reasons (i.e., to look more attractive), the fact that their body shape is directly observable by others again intimately ties the act of losing weight with external factors (i.e., the social audience). Ryan et al., (1997) concluded that people who exercise for body image purposes have an extrinsic orientation. Certainly, a reasonable person would expect to receive compliments and praise from others if they were successful in losing

weight. Therefore, trying to lose weight “for its own sake” and not being influenced by extraneous factors stands contrary to the definition of intrinsic motivation. An external outcome is expected regardless of the motive (i.e., health or cosmetic). If the present investigator’s premise has veracity, it can then be postulated that it is impossible for someone who is “overweight” (i.e., ostensibly in the ob-BMI category) to be intrinsically motivated when trying to lose weight because the end result of being thinner is innately coupled to external compulsions.

Since successful weight loss involves a long-term commitment, what role can intrinsic motivation play and is there another behavioral regulation that can augment an exerciser’s self-determination? Koestner and Losier (2002) argued that to enjoy the activity and at the same time endure long-term, a combination of intrinsic motivation and identified regulation are necessary. Intrinsic motivation would be vital in the short-term (e.g., emphasis on enjoyment and fun) while identified regulation would be more suitable for long-term perseverance (e.g., personally held value). Identified regulation has been shown to predict exercise persistence more than intrinsic motivation (Wilson et al., 2004). In another finding, Ingledew and Markland (2008) postulated that identified regulation positively predicted health and fitness motives but the effect of intrinsic motivation was neutral for exercise participation. Yet intrinsic motivation can positively contribute to weight loss efforts through indirect means, such as improving one’s physical self-worth (Thøgersen-Ntoumani, & Ntoumanis, 2007). Other studies have found that identified regulation and intrinsic motivations correlate to PA (Markland, 2009) and promoted a perception of physical self-worth (Georgiadis, Biddle, &

Chatzisarantis, 2001). A consensus of findings reveals that intrinsic motivation and identified regulation are both vital for exercising to lose weight.

As a final point for the primary proposition, one has to wonder if the weight loss competitions that are typically hosted in many fitness facilities harmonize with the constructs of the SDT. In these contests, individuals are indeed exercising for weight loss so a consideration into this topic is appropriate for the primary proposition. Such competitions are a form of a reward and the impact that it has on a person involve intrinsic and extrinsic determinants. From an intrinsic viewpoint, the perceived locus of causality delineates whether individuals perceive themselves as being autonomous or as being controlled in making decisions (e.g., choosing the mode, intensity, duration, and frequency of PA). A person having an autonomous predisposition is not as volatile in having their level of intrinsic motivation negatively altered by environmental factors (e.g., rewards; Hagger & Chatzisarantis, 2011; see Table 19). From an extrinsic perspective, the perceived environment of such contests is crucial in how individuals interpret what is expected of them. In an interesting study by Wild, Enzle, Nix, and Deci (1997), the authors found that when participating in an activity, people observe interpersonal cues about the motives of others (i.e., intrinsic or extrinsic disposition) and then formulate opinions about the degree of effort that is expected from them. If the individual perceived that others were extrinsically motivated, the consequence was a decrease in their intrinsic motivation. This finding by Wild et al. (1997) suggests that those who enter weight loss contests and are extrinsically motivated already have a head start in the race to lose weight due to their dampening the intrinsic motivation of others.

Moreover, if people who are exercising to lose weight receive competence-enhancing feedback, they will minimize negative extrinsic contingencies (e.g., promise of reward; Hagger & Chatzisarantis, 2011), remain more intrinsically motivated than those not receiving positive feedback, and this occurs even if the individuals receiving positive feedback eventually lose the contest (Vansteenkiste & Deci, 2003). Clearly, the psychology of contests as they related to SDT is complex and only portions of the dynamics were contemplated. The interested reader may want to review Deci and Ryan (1985) for more information about rewards and their effect on intrinsic motivation.

Secondary Proposition 1

Secondary proposition 1 examined whether YMCA members who had exercised consistently for ≥ 6 months would demonstrate greater identified regulation for PA compared to people who had exercised for < 6 months. Results showed that there was a statistically significant effect of identified regulation on exercise longevity. This finding was consistent with a larger body of research and it supports arguments put forth by SDT regarding the positive influence of identification on exercise persistence. In the present study, identification was the most prominent behavioral regulation with the highest mean value (see Table 8) indicating that the sample of YMCA members who had successfully persevered in PA for ≥ 6 months had in fact internalized behaviors conducive to exercise self-determination.

Other studies involving identified regulation have arrived at similar results. Wilson et al. (2004) discovered that identified regulation best predicted behavioral

regulations for PA and concluded that when a target behavior is not in itself very pleasant (e.g., exercise), identifying with the purpose of the activity may be better for long-term engagement than intrinsic motivation. Numerous investigations involving identified regulation have revealed its benefits as they relate to the exercise domain. Specifically, identification (a) has been associated with strenuous and total exercise (Edmunds et al., 2006); (b) linked to exercise frequency (Duncan et al., 2010); (c) related with future intentions to exercise (Wilson & Rodgers, 2004); (d) correlated to behavioral persistence (Vallerand & Bissonnette, 1992); (e) connected to positive affective, behavioral, and cognitive consequences (Vallerand & Fortier, 1998); (f) and associated with autonomy and competence (Milne, Wallman, Guilfoyle, Gordon, & Courneya, 2008). An interesting argument stated by Daley and Duda (2006) regarded their finding that identified regulation predicted more positive outcomes than did intrinsic motivation. The authors suggested that marketing efforts by public health agencies and fitness facilities emphasize extrinsic motives to engage in exercise (e.g., weight loss, meeting others) which correspond to identified regulation rather than accentuating intrinsic reasons for exercising (e.g., exercise for fun and to feel good) that is associated with intrinsic motivation. Therefore, consumers identify and internalize those values because that is how exercise is “sold” to them and this belief could then be detected with psychological questionnaires. It is unknown as to whether the present sample of YMCA participants was also influenced by such promotional campaigns.

The three basic psychological needs of autonomy, competence, and relatedness are positively associated with high levels of identified regulation (Deci & Ryan, 2002a;

Markland & Tobin, 2010). In this study, it was likely that those who had been engaged in consistent exercise for ≥ 6 months had established a sense of autonomy in their exercise behavior. These exercisers had time to recognize that they were capable of achieving steadfast PA using their own volition and without pressures from the exercise professionals at the YMCA. These members also had time to develop competence in executing their exercise routines. Additionally, it is reasonable to theorize that these members acquired a sense of relatedness through bonds or friendships with other exercisers at the facility. Thus, after six months, the three basic psychological needs had time to thrive and become entrenched into the psyche of these members. Koestner and Losier (2002) asserted that it is critical to promote internalization of exercise (e.g., identified regulation) even if individuals already have demonstrated that they are intrinsically motivated because people who are highly identified for a behavior are more likely to persevere in negotiating in arduous and uninteresting physical activities (e.g., exercise such as stair climbing).

Although identified regulation is considered to be extrinsically motivated behavior, if an individual performs PA autonomously, self-determination has a chance to manifest because that person would identify with the outcomes and may have internalized exercise as a core value (Markland & Ingledew, 2007) or could have energized positive feelings such as pride and virtue (Sheldon & Elliot, 1998; also see Table 19). In fact, Reeve, Jang, Hardre, and Omura (2002) found that when facility administrators designated extrinsic activities to program members but did so in an autonomy-supportive manner, the participants became self-determined with those behaviors. The authors

concluded that it was not the rationale provided for the activities that promoted self-determination but that autonomy was supported. It is likely that participants at the YMCA who had been exercising for ≥ 6 months also felt autonomous in their PA. However, autonomy can only be implied with the BREQ-2 since it is not directly measured using that instrument.

Although the present study did not examine motives in conjunction with the Transtheoretical Model (TM), many intervention programs do use the TM and so it warrants discussing intriguing evidence from previous research. A study by Buckworth, Lee, Regan, Schneider, and DiClemente (2007) revealed that intrinsic motivation was most established in the maintenance stage (i.e., >6 months of intervention with small chance of relapse) and least in the contemplation stage (i.e., strongly inclined to change behavior within 6 months). Additionally, Thøgersen-Ntoumani and Ntoumanis (2006) discovered that exercisers in the maintenance stage were more self-determined for PA than people in the preparation (i.e., intend to act within one month) and action stages (i.e., behavior incorporated for ≥ 6 months). Furthermore, intrinsic motivation and identified regulation were higher in individuals at the action and maintenance stages than they were for the precontemplation (i.e., no intention to act within six months) and preparation stages (Mullan & Markland, 1997). Altogether, these findings suggest that individuals who have been exercising for ≥ 6 months possess a greater level of self-determination than those who are just starting their PA regimen and parallels identified regulation espoused by SDT.

So what is the timeline whereby enduring exercise behaviors can become tangible? Rodgers, Hall, Duncan, Pearson, and Milne (2010) examined how long it takes to become a regular exerciser and found that among new exercisers, identified regulation and intrinsic motivation began to flourish within eight weeks upon initiation of PA. Nonetheless, their investigation showed that newcomers never quite reached the levels of identified regulation and intrinsic motivation of long-time participants and found a lack of stability in self-regulation among new exercisers. Their study supported other research that indicated a fluctuation of motives well after the six-month landmark which is purported to be sufficient for effectual exercise adoption. It is likely that participants in the present study displayed similar motivational patterns. Although this survey asked YMCA participants whether they exercised for <6 months or ≥ 6 months, the exact length of time of PA engagement was not queried. If that data had been collected, it may have been possible to corroborate the findings of Rodgers et al. (2010) that the most self-determined exercisers had been involved in PA the longest (i.e., well beyond six months). Perhaps it takes so long for self-regulation of PA to consummate into an individuals' behavioral predisposition because the exercisers have to rearrange their personal schedules, and likely implement a new schedule, to be able to transform infrequent exercise into a permanent routine. Yet, some researchers (Rose, Parfitt, & Williams, 2005) have criticized the attempt to associate SDT with the TM because they claim that TM can only assess whether an individual is planning to perform PA or whether the person is currently exercising, and is unable to detect exercise behaviors by the stages of change. Furthermore, Mullan and Markland (1997) stated that the reason people are

more self-determined in the later stages of the TM cannot be determined because it is not possible to know if exercise participants display greater self-regulation because they withstood the test of time (>6 months) in the activity or whether they possessed innate self-determination from the beginning.

A final contemplation for secondary proposition 1 is to consider how exercise schema may help to explain the findings. By the sixth month of consistent exercise, it is plausible that the cognitive structures of exercisers have coalesced into a schema framework for exercise which is indeed very similar to identified regulation. Deci and Ryan (1985) emphasized that when an individual acquires identified regulation, a regulatory schema is developed. Research by Kendzierski and Sheffield (2000) revealed that exerciser schematics attribute unstable causes for their lapses in PA (i.e., factors within their control) whereas aschematics blamed their regression on stable origins (i.e., influences beyond their control). Kendzierski (1988) contended that if people develop suitable approaches to prepare for relapses (e.g., tricks or strategies for rebounding) and engage in PA frequently enough, they can cultivate exercise schema. For example, the researcher recommends that new exercisers should invest in fitness attire to reinforce their cognitions of being schematic for exercise. Similar to exercise schema, Chatzisarantis and Brickell (2007) observed that individuals with high levels identified regulation have formed “spontaneous implementation intentions” (p. 767) for PA and are more adept at planning ahead for where and when to commence in exercise. Evidently, if people believe they are regular exercisers and dress for PA as if they already are regular exercisers, then by the process of schematization (i.e., identification) they ultimately

metamorphose into regular exercisers. It would have been interesting to ask in the present survey what type of exercise gear the individuals wore during a typical workout to potentially establish a link between fitness attire, identified regulation (i.e., exercise schema), and longevity of PA participation.

Secondary Proposition 2

Secondary propositions 2.1, 2.2, and 2.3 for gender, age, and race respectively, explored whether exercise motives contrasted between categories in each of those independent variables (IV) for introjected regulation, the least self-determined behavior scrutinized in this study. While investigations with identified regulation show positive outcomes because exercisers identify with that activity, research with introjected regulation has been associated with negative emotional, cognitive, and behavioral consequences (Koestner & Losier, 2002). When individuals are introjected, their locus of causality is markedly shifted from autonomous to controlling, whereby they become engrossed in behaviors just to avoid being nagged to partake in an activity. Alternatively, they may engage in certain behaviors only to please others. Some studies have intimated inconsequential positive effects from introjection but the overwhelming consensus in SDT research is that introjected regulation is associated with non-self-determined ramifications; see Table 19.

Secondary proposition 2.1. It was expected in secondary proposition 2.1 that introjected regulation would significantly differ between males and females. However, a statistically significant difference did not emerge from this research and the very weak

effect size ($\eta^2 = .007$) suggests that males and females in this YMCA sample participate in PA for similar reasons when those motives are examined through the lens of introjected regulation. Although SDT postulates that the basic psychological needs are invariant across gender, there is a dearth of evidence to conclusively support or contradict this assertion (Wilson et al., 2004; Standage, Gillison, & Treasure, 2007). In an investigation on the effects of competitive outcome, Standage, Duda, and Pensgaard (2005) found that the two genders did not show statistical differences in any of the study variables and thereby supporting the presumptions of SDT. Nevertheless, other studies have indicated that there is a disparity in introjected regulation with females having greater levels of introjection than males. Research by Murcia et al., (2007) revealed that females had higher introjection but males were more externally regulated. Furthermore, although the study by Wilson and Rodgers (2002) did not compare behavioral regulations between females and males but instead examined self-esteem and exercise motives of females, the results still contradicted the findings of Murcia et al. (2007) by concluding that females exercised for intrinsic and identified purposes rather than for introjected reasons. While there is no irrefutable consensus on if and how introjected regulation differs between males and females, the majority of findings seem to indicate that females would participate in PA for introjected motives more so than males. Thus, it was anticipated in the present study to discover a disparity between males and females in introjection based on other investigations.

Previous research has been conducted with how feedback is differentially interpreted by males and females. Koestner, Zuckerman, and Koestner (1987) discovered

that the level of self-determination among males and females were affected dissimilarly. Males preferred praise that specified ability but females felt more accepting of praise relating to effort. The SDT hypothesizes that positive feedback received by males tends to be interpreted as informational which then increases self-determined behavior. Conversely, positive feedback received by females is viewed as controlling which lowers self-determination. Thus, men regard positive feedback as evidence of their competence whereas females perceive it as a source of control (Deci & Ryan, 1985). With feedback being apprehended divergently between the genders, one would suspect that a distinction would also arise in introjection since that regulation is germane to “controlling” dynamics and appears to be more salient among females. For example, Duncan et al. (2010) investigated if there were associations between three exercise variables (i.e., frequency, intensity, duration) and behavioral regulations. The authors concluded that exercise intensity was predicted by introjected regulation for females only.

Do the nutrients of the basic psychological needs deviate between males and females? Providing that these nutrients are vital aspects of the SDT framework, it could be subsequently surmised that any disturbances in autonomy, competence, and relatedness would be promulgated downward along the theoretical pathways of the SDT framework model as perturbations in behavioral regulations, such as introjection; see Figure 9. Thus, any discrepancies in the nutrients based on gender would suggest corresponding variances in the six SDT subscales. However, SDT enunciates that both males and females have similar human drives to feel autonomous in their behavior and to relate to others in a meaningful way, although the nutrients may be nurtured according

to various social contexts: culture, age, and gender (Deci & Ryan, 2002b). Nonetheless, other investigators have suggested that autonomy is more meaningful to males and relatedness is more salient for females. Ryan et al. (1997) found that female exercisers that preferred the social connection that PA affords (i.e., relatedness) were less absent compared to other females in the study with a lower disposition for relatedness.

Body image perception is another area where studies have been conducted to compare male and female attitudes. Wilson, Rodgers, et al. (2004) researched gender motives for beginning an exercise regimen and found that females generally report less self-regulated reasons to start PA, such as striving to look better and to improve body image. Specifically, the authors found that introjected regulation had a moderate to strong relationship for exercise motives in females but not in males and concluded that females were more prone to regulate their exertion levels based on intrapsychic conflicts. Other research indicates that introjection magnifies strenuous exercise (Edmunds et al., 2006) and that introjected regulation accrues over time (Edmunds, Ntoumanis, & Duda, 2007b) but that the outcome is a loss in exercise perseverance (Vallerand & Bissonnette, 1992). Social physique anxiety is defined as the distress individuals feel when they perceive that others are scrutinizing their body shape. An investigation by Frederick and Morrison (1996, as cited in Frederick-Recascino, 2002) determined that gender exercise behaviors differed and that females reported greater indices of body-related motives for PA. Thøgersen-Ntoumani and Ntoumanis (2007) found that introjected regulation correlated with social physique anxiety and dissatisfaction with one's body. The same authors (2006) observed that males were more probable to persist in exercise, had greater

levels of self-efficacy, were more satisfied with their physiques, and therefore revealed less social physique anxiety than females. Research involving an individual's perceived body image and social physique anxiety have thusly revealed that the negative internal predilections associated with introjected regulation (e.g., shame, self-guilt, pressure, anxiety, conditional self-worth) are not stable between the genders.

Males have been found to be less critical of their body size than females. Additionally, females routinely overemphasize their body size whereas males view their size as normal (Hart, Leary, & Rejeski, 1989). Furthermore, males attempt to lose weight when they are in fact overweight but females try to lose weight when they believe their ideal body weight has been surpassed, regardless of whether they are genuinely overweight (Markland & Ingledew, 2007). Interestingly, Segar et al. (2006) reviewed findings from studies conducted with African American females that indicated they may not be as self-conscious of their body size as European American females and that this resulted in less social physique anxiety and a likely lower introjected regulation. Self-determination and introjected regulation levels also vary according to the TM (stages of change). In the preparation, action, and maintenance stages of a study conducted by Wilson and Rodgers (2004), males and females displayed comparable degrees of self-determination but females contemplated less self-determined motives to engage in PA than did males. In their study, Rose et al. (2005) showed that introjected regulation distinguished female participants from those in the action and maintenance stages to those in the pre-preparation and preparation stages. Finally, research by Daley and Duda (2006) discovered that among undergraduate students, females who were moderately

active or were in the action stage expressed greater self-determined motives for PA than did males who were also moderately active or exercised in the action stage. In fact, those males mirrored the low self-determination of other males who were in the preparation and preparation stages or those who were not active. The authors interpreted these results as males who have been exercising for less than six months as being vulnerable to dropping out of their fitness regimen due to their low self-regulation for PA. Altogether, reports of gender differences across various theoretical foundations of the SDT framework suggest that it would have been rational to expect a statistical difference in introjection to exist among male and female exercisers. However no such aberrations were exposed in the present study. It is enigmatic to speculate as to why the genders of this YMCA sample were so invariant in their degree of introjection when one examines the literature. Nevertheless, the present finding, although contrary to this proposition, was congruent with the principles of the SDT.

Secondary proposition 2.2. It was anticipated that introjection would statistically vary between study participants that were <40 years old and those that were ≥ 40 years old in the present proposition. Instead, no statistical significance was established and the very weak effect size ($\eta^2 = .001$) insinuates that younger exercisers (<40 years old) and middle-aged to older exercisers (≥ 40 years old) share a tantamount affect for partaking in PA under introjected regulation auspices. The present proposition was grounded on the premise that older exercisers would be more predisposed to suffer with health-related manifestations and would therefore be exercising to ameliorate their well-being concerns by the cajoling of family, friends, and physician, which is the

hallmark of greater introjected regulation. Conversely, it was presumed that on average, younger participants would lack the corresponding health anxieties of older members and would accordingly be exercising with less introjected pressures. Regardless, the obtained results did not corroborate the present author's assumption. Notwithstanding that SDT affirms that the three basic psychological needs are paramount to psychological health for those of any age (Deci & Ryan, 2002b), investigations to test this proposal have been relatively scarce (Frederick-Recascino, 2002).

Nonetheless, a divergence in exercise motives across the age span has previously been found in some studies. While younger people display more intrinsic motivation, especially for sport participation, older individuals have assorted motives for engaging in PA. By middle age, participants appear to exercise for extrinsic reasons, such as weight control and stress release, as they become more aware of social pressures to actualize health and well-being. As adults become older, enthusiasm for PA steadily diminishes and due to the lack of explorations into the motives of older exercisers, antecedents of their decline in motivation remain fundamentally ambiguous (Frederick-Recascino, 2002). A study by Frederick (1999, as cited in Frederick-Recascino, 2002) revealed that both intrinsic and extrinsic motivation attenuates as individuals become older. During an investigation into the relationships between physical self-esteem and PA motives, Wilson and Rodgers (2002) found that introjected regulation was associated with age, although weakly. In researching whether behavioral regulations could forecast PA consequences, Thøgersen-Ntoumani and Ntoumanis (2006) discovered that older exercisers stated a greater incidence of relapsing from exercise but displayed lower social physique anxiety

distress than younger individuals. Generally, these studies suggest that there is variability in exercise motivation as it pertains to age and it could be surmised from the SDT theoretical framework that introjected regulation would likewise become dissimilar.

Contrary to the present investigator's supposition, Brunet and Sabiston (2011) researched exercise motives across three age categories and substantiated that middle-age individuals showed less introjection than younger exercisers. The researchers expected to find lower degrees of introjected regulation in middle-age individuals because the authors theorized that older exercisers would not engage in PA for body image reasons as would younger people. Fogelholm and Kukkonen-Harjula (2000, as cited in Brunet & Sabiston, 2011) found that PA among younger people was associated with introjected regulation and propounded that the need to placate their visceral urges for achieving a desirable body image was the originator of their exercise behavior. In contradiction to the current premise that statistical difference in introjected regulation would manifest because older individuals would conceivably be more motivated to exercise for introjected reasons, research by Murcia et al., (2007) instead observed that older persons exercised because they acknowledged the benefits of PA in effectuating positive health outcomes. The authors thus concluded that it was identified regulation, not introjected regulation, which energized exercise behaviors for older participants.

The finding of Murcia et al. (2007) is incongruent with the present author's argument and epitomizes the difficulty of interpreting results from cross-sectional studies. It is not unlikely that the older participants in the Murcia et al. (2007) study had indeed traversed down the SDT continuum and transposed their exercise behavior over

time from one that eschewed external pressures (i.e., introjection) to one that valued and accepted the purpose of the activity (i.e., identification). As secondary proposition 1 in the present research and other studies have demonstrated, identified regulation is a prominent regulation by the sixth month of exercise. Older individuals, who are new exercisers and are in the early stages of the activity, perhaps do engage in PA for introjected motives. With the passage of time, older exercisers would have had the circumstance to identify with the new engagement and it would be subsequently expected that identified regulation would emerge as the predominant regulation. Thus, the same participants could be presenting both introjected and identified reasons for exercising but construing precisely which of the two motives the individuals deem salient would ultimately be contingent upon how far along the timeline they have sojourned during their fitness regimen.

How can the conflicting findings of the previous studies be reconciled with the present results showing nonsignificance in introjection between participants <40 years old and ≥ 40 years old? Specifically, the present investigator posits that younger people exercised for body image purposes (Fogelholm & Kukkonen-Harjula, 2000; as cited in Brunet & Sabiston, 2011) while older individuals engaged in PA for health-related reasons (Wilson & Rodgers, 2002; Thøgersen-Ntoumani & Ntoumanis, 2006) and that these two motives, albeit markedly dissimilar, engendered a similar affect in introjection for both age groups.

Secondary proposition 2.3. It was predicted that introjected regulation would be significantly different between the race categories of participants. Unfortunately, due to

the low number of non-White respondents, the races of American Indian or Alaska Native, Asian, African American, and Native Hawaiian or Other Pacific Islander had to be collapsed into a single non-White race category in order to conduct meaningful statistical analysis. However, the merging of the race categories attenuated the exactitude of teasing out any peculiarities of exercise motivation between the races. Hence, subsequent explanations of results are generalities and must be tempered accordingly. The present findings did not reveal statistical difference in introjection and the very weak effect size ($\eta^2 = .003$) suggests that participants' introjected motives for PA are similar for White and non-White exercisers. The current proposition presumed that cultural differences in introjected pressures to exercise would manifest differentially. Variation in introjection was expected between the races with the assumption that expressions of extrinsic motives, stemming from self-guilt, anxiety, shame, and internal emotional conflicts, would become accentuated via the prism of the participants' cultural context. Nevertheless, although the present finding contradicted the proposition, the outcome fundamentally supported the foundations of the SDT which assert that fulfillment of the three nutrients of the basic psychological needs (i.e., autonomy, competence, relatedness) are uniformly influential for one's optimal psychological health, regardless of the cultural milieu.

Deci and Ryan (1985; Ryan & Deci, 2000) have diligently argued that the principles of self-determined behavior are largely invariant across cultural contexts. The authors affirm that the basic psychological needs, by definition, apply universally to all cultures but there could be substantial deviations within each community (Deci & Ryan,

2002a). Opponents of this SDT dictum contend that societies that espouse individualism, such as Western nations, have an affinity for autonomous behavioral regulations while countries that endorse collectivism, such as in Southeast Asia and many areas of Africa and South America, are attuned to the nutriment of relatedness. Meanwhile, Deci and Ryan (2002b) acknowledge that while this is a controversial feature within SDT, the ideal of universality of basic needs transcends societal influences and has been backed by studies in evolutionary psychology. The authors argue that it is human nature to strive for both autonomy and relatedness to experience optimal well-being, although these needs could emerge distinctively in various populaces.

Previous investigations have specified that the need for autonomy is equally cherished among both Western and Eastern people. Notwithstanding superficial dissimilarities of cultural beliefs, research has suggested that the nutriments of human motivation are analogous across civilizations (Deci & Ryan, 2008). A study involving Russian and American college students revealed that despite that Russia had been a totalitarian nation for centuries, the outcome for autonomy was as salient to Russian students as it was for American students. Furthermore, the BREQ-2 passed validity and reliability testing in the Greek (Moustaka et al., 2010) and Spanish (Murcia et al., 2007) contexts with the investigators of both studies concluding that the BREQ-2 provided psychometric support for the simplex pattern of the SDT continuum and that the tool would accurately measure the behavioral regulations of their respective citizens in accordance with the SDT underpinnings.

Originally, of special interest in the present study was the prospect of investigating exercise motives of African Americans given that: (a) reports indicate that exercise participation is lower among minorities, especially African American females (Landry & Solmon, 2004); (b) obesity in the African American community has reached epidemic proportions, with one symptomatic consequence being a higher incidence of hypertension; (c) there has been a call for more research into the exercise motives of diverse ethnic groups (Edmunds et al., 2007a); (d) and the opportunity for research was present given the multicultural characteristic of this YMCA's membership. Previous investigations on physical inactivity and race had fixated extensively on European American males. Despite recent studies which have been more inclusive in exploring PA motives of non-White exercisers, more inquiries are imperative for at-risk populations (Landry & Solmon, 2004) and it was hoped that the present investigation would have shed more light on the PA motives of disparate cultures.

What are some of the arguments that have been elaborated by explorations into exercise participation and race? A study by Edmunds, Duda, and Ntoumanis (2005, as cited in Edmunds et al., 2007a) produced mixed results when the authors found that intrinsic motivation was salient for White British females and Black British females but not so for Asian British females. The researchers' interpretation of these findings was that the totality of cultural integration into the new society, in addition to the sustainment of traditional cultural customs, ostensibly accounted for the lack of intrinsic motivation among the Asian British females. Moreover, an investigation by Felton, Parsons, Misener, and Oldaker (1997, as cited in Landry & Solomon, 2004) examined nutrition

and exercise behaviors of African American and European American female college students and discovered that African American females had a lower temperament for healthy habits than did the European American females. The authors concluded that cultural differences between the two race categories were influential in consummating these outcomes.

Lastly, the present proposition was based on the presupposition that sufficient non-White participants would be statistically represented in this YMCA sample and that the expected measure of introjected regulation would be actualized discordantly. An evident observation of the finding from this proposition is that the results truly emulated the theoretical SDT presumptions espoused by Deci and Ryan (1985; Ryan & Deci, 2000). Alternatively, the work of both Edmunds et al. (2005; as cited in Edmunds et al., 2007a) and Felton et al. (1997; as cited in Landry & Solmon, 2004) did not examine introjected regulation specifically but yet a reasonable inference could be drawn from their work, which was that the asymmetry of behavioral regulations across race would correspondingly influence introjected exercise compulsions.

In summarizing the findings for secondary propositions 2.1, 2.2, and 2.3, it appears that the introjected regulation construct of the SDT did not resonate with this sample of YMCA members. Furthermore, the effect sizes for all three secondary proposition 2 sub-premises were nearly identical. What factors could explain the parity of magnitudes and the very weak effect sizes of introjection across the IV categories for gender, age, and race? First, introjected regulation, interestingly, had the closest semblance to a normal distribution of all six SDT subscales; see relative frequencies in

Table 7, skewness in Table 8, and histogram in Appendix G. Second, introjected regulation recorded the lowest Cronbach's α index of all six SDT subscales. Since a higher Cronbach's α denotes greater reliability in measuring a psychological construct (i.e., unidimensionality of subscale questions), this comparatively subpar alpha level (.78) could be evidential that introjected regulation did not evoke a compelling sentiment with these respondents. Third, as the correlation matrix in Table 8 shows, the only correlation that was non-significant occurred between introjection and external regulation. Fourth, by design, BREQ-2 only uses three questions to embody the introjection construct while all other subscales employ four questions. Henceforth, taken altogether these statistical peculiarities enveloping introjected regulation may have been at least partly responsible for the homogeneous and very weak effect sizes.

A closing elucidation for the commensurate effect sizes amidst the three sub-premises of secondary proposition 2 could be linked to the ambiance of the wellness center itself. Facilities like YMCAs typically promote and provide structured settings and therefore exercising in such a venue would allow individuals to cultivate any contextual affordances which are customarily analogous among all members with respect to their perceived autonomy, competence, and relatedness (i.e., the three SDT nutriments). For example, all new YMCA members had the option to receive an introduction to the exercise machines and be assisted in starting and maintaining a fitness program. Additionally, individuals could register and participate in fitness programming that is available to all full members. Thus, there was opportunity for a "commonality of experiences" to originate for both genders and those of any age and race at the YMCA.

Since two-thirds of the respondents had been exercising for ≥ 6 months (68.1%; see Table 6), they would have had enough time to fully assimilate the positive “vibes” of the YMCA and perhaps this supermajority of participants tempered the responses for introjection. Moreover, as people answered the BREQ-2 questions, they may have filtered their responses from a cognitive frame of reference based on their common experiences at the YMCA, regardless of their personal life circumstances. To further elaborate on this conjecture, it is subsequently conceivable that participants predicated their responses for introjection from the lens of a “stable and safe” YMCA environment that was mutually endorsed within this sample. With the presumption that this was indeed probable, it could then be theorized that respondents assimilated all three SDT nutriments into their psyche which thereto dampened any potential disparities in reported degrees of introjected regulation between the IV groups within gender, age, and race.

Conclusion

The present study examined exercise behavioral regulations of “normal exercisers” using the tenets of SDT at a local YMCA. The main focus of the research was to determine if overweight/ obese people who were not specifically exercising for weight loss would indeed reveal a greater level of intrinsic motivation than overweight/ obese people who were exercising for the sole purpose of losing weight. This was the first known investigation to pose such an inquiry. The result was inconclusive because an individual’s intent to lose weight was not a notable factor but the respondent’s BMI status was a significant element. An individual’s BMI status may have been noteworthy

since the definition of intrinsic motivation explicates that the activity should be enjoyable, pleasurable, and fun. Clearly, that description is not wholly embraced by people who are exercising to lose weight, especially for those in the overweight/ obese BMI categories whose perceived exertion levels are higher. Exercising to lose weight is profoundly influenced by a plethora of extrinsic motivational forces. Conversely, intrinsic motivation construct is antithetical to extrinsic motivation because according to SDT, intrinsic motivation cannot be internalized from extrinsic motivation. The novel finding of this study extends previous research and suggests that it appears to be impossible for an individual to engage in weight loss PA while concomitantly sustaining marked degrees of intrinsic motivation. This was the first known study in SDT literature to argue such a deduction. The practical implication from this conclusion is that fitness professionals working with individuals who are attempting to lose weight should concentrate on motivational strategies other than intrinsic motivation exclusively.

A secondary interest of this research was to discern whether identified regulation would be higher for people exercising for ≥ 6 months than for those engaged in PA for < 6 months. Results replicated previous SDT research suggesting a strong influence of identification for those exercising for six months or longer. In fact, identified regulation was found to be the most salient of all six SDT subscales among participants, including integrated and intrinsic regulations. Of course with cross-sectional studies, it is unfeasible to distinguish whether exercise persistence caused a higher degree of identification, or if it was a higher identification level from the outset that was responsible for the perseverance in PA. It was theorized in the present study that given

the six-month demarcation point, there was likely enough time for individuals to develop an affinity for the three SDT nutrients, which subsequently nurtured internalization of exercise and ultimately induced a higher index of identification. Consistent with previous SDT research, a practical recommendation from this study is that future exercise interventions should aspire to foster identified regulation, in conjunction with intrinsic motivation, which has been shown in this and in previous research to be a prominent class of self-regulation and vital for successful long-term exercise adherence.

The present investigation also examined how introjected regulation might have differentiated across the categories for each of the following IVs: gender, age, and race. First, although a case was presented based on previous research to expect greater introjection in females, no such significance was revealed. An alternative explanation for the likeness in introjection was not postulated but the finding was consistent with SDT principles. Second, introjected regulation was statistically virtually identical between participants who were <40 years old and those that were ≥ 40 years old suggesting one of the following: (a) both age groups had matching motives for introjected regulation; (b) or that both age groups had an opposite valence but equal magnitudes to account for no difference in introjection (i.e., different but equally strong motives). It was anticipated that a difference in introjection would become evident from the notion that older participants would exercise for medically-based reasons. Nevertheless, it was theorized that participants <40 years old pursued body image motives and that respondents ≥ 40 years old exercised for health and wellness intentions. Once again, SDT maxims predicted that there would have been no differences in self-determination based on age.

Third, against the assertions of SDT, it was anticipated that there would be observable differences in introjection according to race, which was grounded on the author's premise that the vastly contrasting cultural makeup of the YMCA membership would engender divergent extrinsic motives for engaging in PA. The lack of a statistical significance could be partly attributed to the collapsing of the non-White groups of the race IV due to the paucity of non-White participants. Unfortunately, an opportunity was missed to examine PA motives of minorities, especially considering the ideal geographic location of the YMCA for such an investigation. Overall then, the three secondary proposition 2 outcomes corroborated past findings and were in line with SDT theorems affirming that introjected regulation is invariant regardless of one's gender, age, and race. Accordingly, the practical lesson from the present results is that it is best for exercise practitioners not to condone a climate of expectancy in their facility that introjected motives would deviate for each individual based on the demographic variables of gender, age, and race.

A unique contribution of this investigation was that it was the first known online survey that scrutinized exercise behavioral regulations of a YMCA sample using the BREQ-2 measure that was incorporated with an integrated regulation subscale. Another important strength of this study was that for the first time in SDT research, it was argued that intrinsic motivation is unobtainable when one is engaged in PA specifically to lose weight. While limitations of the present research have already been stated, the most severe weakness was the low number of respondents, particularly those in the non-White race categories. Notwithstanding these limitations, the five findings of the various propositions collectively provide robust support for the theoretical underpinnings of the

SDT. To guide exercise practitioners and facility management in implementing the theoretical frameworks of the SDT, a small sampling of practical recommendations from past studies have been assembled in Appendix H.

There are several points that future research should pursue regarding the suggestions deliberated in this investigation. The primary proposition conclusion that overweight or obese individuals exercising for weight loss cannot synchronously experience intrinsic motivation needs to be studied further to substantiate and expand this claim. Future investigators could also incorporate an affective measure, such as the RPE scale, to record how the psychophysiological variable of perceived exertion might influence a person's intrinsic motivation when exercising for weight loss, principally for heavier individuals. Additionally, these studies could examine other behavioral intentions besides intrinsic motivation for overweight or obese exercisers (i.e., the most self-determined extrinsic motives of integration and identification) to discern if these regulations are more suitable to scrutinize for this population. Regarding the secondary proposition 2.2 presumption that exercisers <40 years old and ≥ 40 years old engaged in PA for equally strong but different reasons needs to be addressed to tease out specific introjected motives for each age group. Similarly, more attempts should be made to explore exercise motives of representative multicultural groups to confirm the postulates of SDT. Although not central to this study, it would be interesting for a future researcher to examine if exercise attire becomes a salient dynamic in the identification process, impacting exercise perseverance, as intimated by exercise schema. Finally, the present survey asked if participants exercised for six months or longer at a "moderate intensity."

A future study might further clarify this descriptor to more precisely define the degree of effort being asked of the exerciser. Researchers have cited a lack of experimental, interventional, and longitudinal studies in SDT and recommended moving beyond cross-sectional studies. These investigators advise that research designs should consider examining new populations with probabilistic sampling techniques to discover the chain of causality that is implied in the SDT framework.

As a parting thought, the present author has witnessed over the years that fitness professionals would prod, plead, push, pull, reward (e.g., incentives from weight loss contests), punish (e.g., using guilt), and otherwise attempt to motivate exercisers to steadfastly persist with their fitness regimen. However, the obesity trend continues, physical inactivity levels are compelling, and half of new exercisers quit their routine within six months. Perhaps it is time for a paradigm change whereby the traditional standard practice of the exercise prescription is transfigured through the fuzzy logic of SDT, spawning a mutual and malleable agreement between exerciser and fitness professional. With techniques such as motivational interviewing, exercise parameters (i.e., mode, frequency, intensity, and duration of activity) that work best for a particular individual would be decided cooperatively, even at the expense of falling short of the American College of Sports Medicine (ACSM) standards. For some individuals, any exercise is better than none and as has been shown in previous studies, coercing people into PA by preset prescriptions with a promise of attaining faraway health outcomes has not proven to be the answer.

Superordinate exercise goals are defined by Segar, Eccles, and Richardson (2011) as aims that resonate within individuals because they represent broader and idealized life purposes. Superordinate goals, such as preventing disease and promoting health, are thought to be imperative for successful self-regulation of behaviors. Yet, research by Segar, et al. (2011) found that superordinate goals were associated with less PA than was exercising with the purpose of improving one's daily quality of life. The authors concluded that busy individuals are less inclined to pursue remote intentions, especially when they feel encumbered by their busy daily lives. This finding may be initial evidence of a shift in exercise motives by today's participants whereby long-term wellness goals are not embraced in a fast-paced modern society. The researchers suggested that to encourage persistence in PA, it might be more purposeful to rebrand exercise as a way to improve the daily life of the individual.

Meanwhile, an investigation by Vazou-Ekkekakis and Ekkekakis (2009) revealed that when females in their study were asked to exercise at an intensity that was self-chosen (i.e., supported autonomy), their heart rates demonstrated that their level of intensity was nonetheless within the recommendations of the ACSM. Additionally, females that had their exercise intensity prescribed to them showed a decrease in autonomy with a concomitant reduction in enjoyment, although the intensity prescribed was identical to the one that was self-chosen. Furthermore, the authors found that if the imposed intensity exceeded the self-chosen pace by just 10%, the resulting higher perceived exertion had a negative impact on the affective quality of the exercise experience, which was previously shown (Ekkekakis & Lind, 2006) to debase exercise

enjoyment and subsequently, persistence in PA. The investigators concluded that there is enough compelling evidence to campaign for a self-chosen PA protocol in the public health domain. Hence, both recent studies of Segar et al. (2011) and Vazou-Ekkekakis and Ekkekakis (2009) supported the precepts of SDT and their discourses may herald a new direction in the exercise arena for ameliorating physical inactivity and obesity.

In applying the previous authors' conclusions to the primary research question of the present investigation, it appears that for overweight or obese individuals aspiring to lose weight, it is best for fitness professionals to be accommodative in formulating a fitness plan designed to harmoniously coexist with an exerciser's predilections.

Sanctioning individuals to autonomously self-select exercise modalities and particularly intensity, promotes the hedonistic-like characterization of intrinsic motivation (i.e., becoming immersed in activity because it is pleasurable, enjoyable, and fun), which may ultimately allure people enough to traverse the threshold of choice and subsequently get them to engage in exercise, at least just for that day. Better yet, they might even keep going back for more.

CHAPTER VI

References

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CHAPTER VII

Appendices

Appendix A: Demographic Information Questionnaire

Appendix B: Behavioural Regulation in Exercise Questionnaire-2

Appendix C: Your Feedback Questionnaire

Appendix D: BREQ-2 – Scoring Key

Appendix E: Informed Consent

Appendix F: IRB Approval Form

Appendix G: Histograms of the Six SDT Subscales

Appendix H: Practical Recommendations from Prior SDT Research

Appendix A

Demographic Information Questionnaire

PART I (8 questions)

DEMOGRAPHIC INFORMATION

Please answer questions 1 and 2 as accurately as you can.

1. Height: _____ ft. _____ in.

2. Weight: _____ lbs.

3. Gender: Male Female

4. Age: _____ years

Questions 5 and 6 below ask for race/ ethnicity but please note that they are asked for research purposes only. You may skip questions 5 and 6 if you are uncomfortable in answering them.

5. Are you Hispanic or Latino? (A person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race.)

Yes No

6. Please select the racial category or categories with which you most closely identify:

- | | |
|---|--|
| <input type="checkbox"/> American Indian or Alaska Native | <input type="checkbox"/> Asian |
| <input type="checkbox"/> Black or African American | <input type="checkbox"/> Native Hawaiian or Other Pacific Islander |
| <input type="checkbox"/> White | |

EXERCISE INFORMATION

1. Are you exercising for weight loss?

Yes No

2. How long have you been exercising consistently up until now, whether done at our YMCA or continued from a previous fitness facility? *[Exercising at 20-40 minutes of moderate intensity for a minimum of three days per week.]*

Less than six months Six months or longer

Appendix B

PART II (23 questions)

BEHAVIOURAL REGULATION IN EXERCISE 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.

	Not true for me		Sometimes true for me		Very true for me
1. I exercise because other people say I should	0	1	2	3	4
2. I feel guilty when I don't exercise	0	1	2	3	4
3. I value the benefits of exercise	0	1	2	3	4
4. I exercise because it's fun	0	1	2	3	4
5. I exercise because it is consistent with my life goals	0	1	2	3	4
6. I don't see why I should have to exercise	0	1	2	3	4
7. I take part in exercise because my friends/family/partner say I should	0	1	2	3	4
8. I feel ashamed when I miss an exercise session	0	1	2	3	4

	Not true for me		Sometimes true for me		Very true for me
9. It's important to me to exercise regularly	0	1	2	3	4
10. I consider exercise to be part of my identity	0	1	2	3	4
11. I can't see why I should bother exercising	0	1	2	3	4
12. I enjoy my exercise sessions	0	1	2	3	4
13. I exercise because others will not be pleased with me if I don't	0	1	2	3	4
14. I don't see the point in exercising	0	1	2	3	4
15. I consider exercise a fundamental part of who I am	0	1	2	3	4
16. I feel like a failure when I haven't exercised in a while	0	1	2	3	4
17. I think it is important to make the effort to exercise regularly	0	1	2	3	4
18. I find exercise a pleasurable activity	0	1	2	3	4
19. I feel under pressure from my friends/family to exercise	0	1	2	3	4
20. I consider exercise consistent with my values	0	1	2	3	4
21. I get restless if I don't exercise regularly	0	1	2	3	4
22. I get pleasure and satisfaction from participating in exercise	0	1	2	3	4
23. I think exercising is a waste of time	0	1	2	3	4

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Scime, G. (2006). "It's Who I Am...Really!"
The Importance of Integrated Regulation in
Exercise Contexts. *Journal of Applied
Biobehavioral Research*, 11, 79-104.

Appendix C

Your Feedback Questionnaire

YOUR FEEDBACK

Please let us know about your experience in taking this survey.

1. Compared to a paper survey, how difficult did you find taking an online survey?

- Online survey was *harder* to complete than paper survey
- Online survey was *easier* to complete than paper survey
- Online survey was about the same difficulty to complete as paper survey.

2. Did you experience any technical difficulties during this survey?

Yes No

a. If yes, please explain. _____

3. Were you confused about the wording in any of the questions?

Yes No

a. If yes, did the confusion happen in PART I and/or PART II? If you recall the question(s), you may include it/them here. _____

4. Approximately how many minutes did it take you to complete the survey? _____ min.

5. How do you feel about the *number* of questions that were asked in the survey?

- There were *too many* questions in this survey
- The number of questions in this survey are just right – but no more
- I would have been okay with answering additional questions.

Thank you for taking part in our research

Appendix D

BREQ-2 Scoring Key

As with other measures of the continuum of self-determination, the BREQ-2 can be used either as a multidimensional instrument giving separate scores for each subscale, or as a unidimensional index of the *degree* of self-determination, known as the relative autonomy index. The choice of method will depend upon the research question being asked or perhaps by the constraints imposed by sample size and the intended statistical analyses.

Multidimensional Scoring

In order to use the BREQ-2 as multidimensional scales, simply calculate the mean scores for each set of items as indicated below.

Amotivation	6	11	14	23
External Regulation	1	7	13	19
Introjected Regulation	2	8	16	
Identified Regulation	3	9	17	21
Integrated Regulation	5	10	15	20
Intrinsic Motivation *	4	12	18	22

* Intrinsic regulation and intrinsic motivation are synonymous terms; BREQ-2 uses intrinsic regulation and SDT uses intrinsic motivation. For consistency in this study, the BREQ-2 scoring key subscale was changed to intrinsic motivation.

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Appendix E

WEST CHESTER UNIVERSITY

******* INFORMED CONSENT *******

This project has been reviewed and approved by the West Chester Institutional Research Review Committee's Human Subjects Committee (HSC). The HSC believes that the research procedures adequately safeguard the subject's privacy, welfare, civil liberties, and rights. The HSC Chairperson may be reached through the Director of Sponsored Research, West Chester University, West Chester, PA 19380 or, by telephone, (610) 436-3310.

The investigator will explain to you in detail the purpose of the project, the procedures to be used, the expected duration or frequency of your participation, and the potential benefits and possible risks of participation. You may ask him any questions you have to help you understand the project by calling the phone number listed below. A basic explanation of the project follows.

Project Title: Are exercise behavioral regulations differentiated by BMI category? A self-determination theory perspective

Investigator: George Hartas
Department of Kinesiology
West Chester University
610-874-7032

You are being asked to participate in a research project conducted by **George Hartas** through West Chester University of PA in collaboration with the Community YMCA of Eastern Delaware County (CYEDC). This study constitutes the research aspect of my Master's research project. The University requires that you give your consent to participate in this project. You have been selected as a possible participant because you are a member of the CYEDC.

Nature and Purpose of the Project

- You are being requested to participate in an online survey that includes questions about your decisions to engage in exercise. There are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise.
- We will also ask demographic information (height, weight, gender, age, and race/ethnicity) so that we can accurately describe the general traits of the respondents in this study.
 - *Please note that race/ ethnicity are asked for research purposes only. You may skip these questions, or any others, if you are uncomfortable in answering them.*

Eligibility Requirements

- Do NOT take the survey if you are pregnant. (*Because BMI computation must be accurate*)
- Do NOT take the survey if you are a bodybuilder. (*Because BMI computation must be accurate*)
- Do NOT take the survey if you are under the age of 18 years old. (*We are only studying adults*)

Explanation of Procedures

- If you decide to participate, you will be asked to fill out an online questionnaire to assess various aspects of exercise motivations.
- This survey should take you less than five minutes to complete.
- The survey is taken using the Internet with technology provided from a company called SurveyMonkey.

Discomforts and Risks

- There are no discomforts or risks anticipated to you in taking part of this survey study.
- Participation in this survey will not affect you in any way.
- Your participation in this study is totally voluntary.
- You may choose not to participate.
- You may withdraw your participation at any time, whether at the beginning, in the middle, or near the end of the survey. To withdraw from the survey, you can:
 - Click the “Exit this survey” button at the top-right of the SurveyMonkey web page, or

- Close out of the web browser by clicking the Close button ('X') at the very top-right of the browser window frame.
- If you choose to participate in the survey, you may decline to answer any question that you are not comfortable in answering.
- If you decide to quit at any time before you finish the questionnaire, your answers will not be analyzed.
- If you decide not to participate in this survey or if you withdraw from participating at any time, you will not be penalized in any way.

Benefits

- You will be contributing to scientific knowledge about people's motivations to exercise.
- The results may help to increase people's exercise adherence and thereby improve their health status.
- Results from this study may be presented in educational settings and at professional conferences, and the findings may be published in a professional journal in the field of exercise psychology.
- Upon completion of the analysis phase, the study's conclusions may be posted on the YMCA's website. Your identity will not be known in any way because group statistics will be performed, such as averages, etc.
- The outcomes of this study will be used for scholarly purposes only.

Confidentiality

- To help protect your confidentiality, the survey will not contain questions that will personally identify you.
- You will not provide your name on the survey and no other personal and identifiable information will be asked of you.
- All information you provide is anonymous.
- The IP address of the computer that you use to fill out the survey will not be recorded.
- There is no way to identify who you are.

Compensation and Cost

- You will not be compensated for participating in this survey.
- There are no costs to you for your participation in this survey.

If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Committee through the OSR, 610-436-3310.

I have read and understood the wording in this informed consent. I am aware that if at any time I become uncomfortable in completing this study, I am free to stop my participation by exiting the survey. I also understand that it is not possible to identify all potential risks in an online survey, and I believe that reasonable safeguards have been taken to minimize both the known and potentially unknown risks.

- By clicking the **TAKE SURVEY** button below, I understand and consent to all of the information stated above. Clicking the **TAKE SURVEY** button will constitute my voluntary consent to participate in this survey. A new browser window will open so I can take this survey on the SurveyMonkey website.
- By clicking the **EXIT SURVEY** button below, I will withdraw from this study. My browser window will close to exit from taking this survey. Alternatively, I can close out of this web page by clicking the Close button ('X') at the very top-right of the browser window frame.

TAKE SURVEY

EXIT SURVEY

Appendix F

IRB Approval Form



Protocol ID # 2012424
This Protocol ID number must be used in all communications about this project with the HSC.

TO: George Hartas, Dr. Craig Stevens

FROM: WCU Human Subjects Committee (HSC)

DATE: 4/24/12 *SLGK*

RE: Are exercise behavioral regulations differentiated by BMI category? A Self-determination theory perspective

Thank you for your timely resubmission of your protocol. The requested modifications have been reviewed and are accepted as submitted. Your approval category and terms of approval are included below.

- Expedited Approval
- Full Board Review Approval
- Exempt From Further Review

Date of Approval: 4/24/12

- This protocol has been approved as of 4/1/2010 for a period of one year. Approximately two months prior to the approval end date, you will receive a Continuing Review Request form. Please complete it and return it to Human Subjects Committee, even if the project has been completed or is discontinued.
- Attached to this memo is the approved version of the Informed Consent Form. You will be asked to provide copies of signed Informed Consent Forms to the HSC at a future date; please make sure that you use only the approved form.
- As long as the protocol remains unchanged, this protocol does not need Continuing Reviews.

Please remember that any changes to the protocol will require the submission of a revised protocol to the HSC. Any adverse reaction by a research subject is to be reported immediately to the Chair of the Institute Review Board (Michael E. Ayewoh, Ph.D., CALD) and Chair of HSC (Paul K. Smith, Ph.D). Dr. Smith can also be reached directly at 610-436-2764 or via e-mail at p.smith@wcupa.edu. Questions concerning the HSC decision or any concerns may be directed to the HSC Chair.

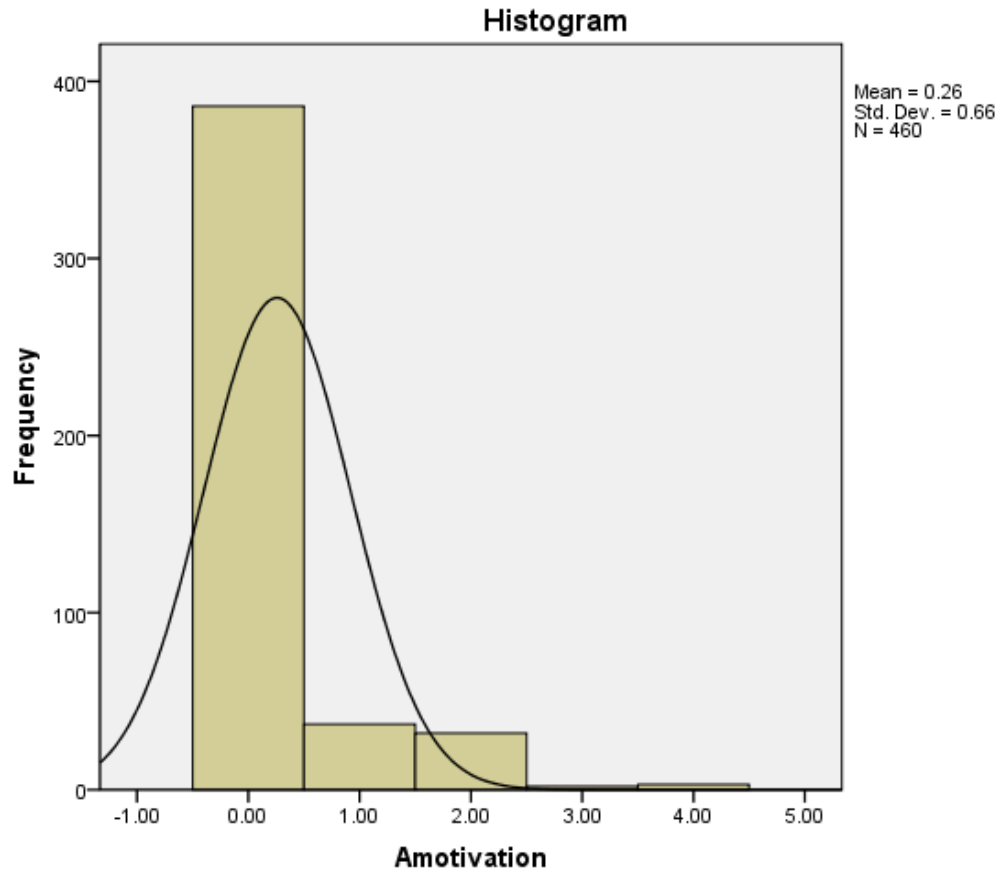
Attachments, if noted above

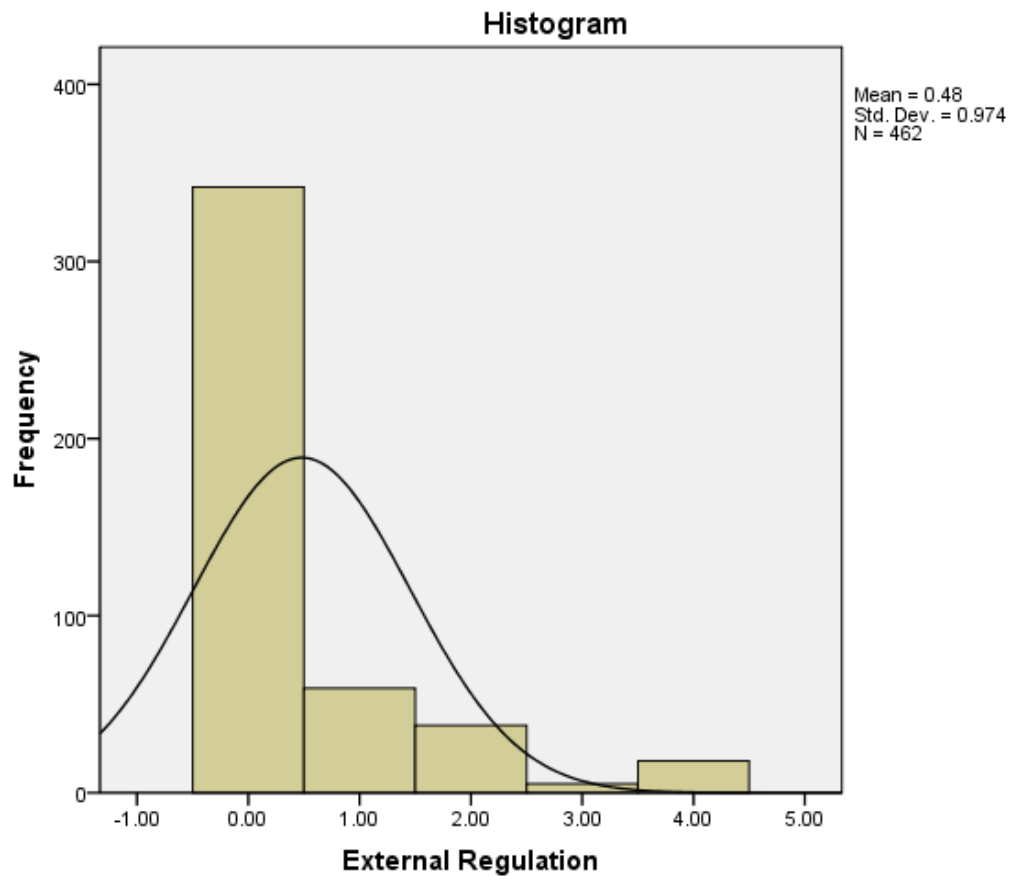
Permission to adapt the Policy and Procedures for the Protection of Human Subjects in Research & Related Activities was obtained from Ms. Stremke, Office of Research and Sponsored Programs, Florida Gulf Coast University on February 2, 2008.

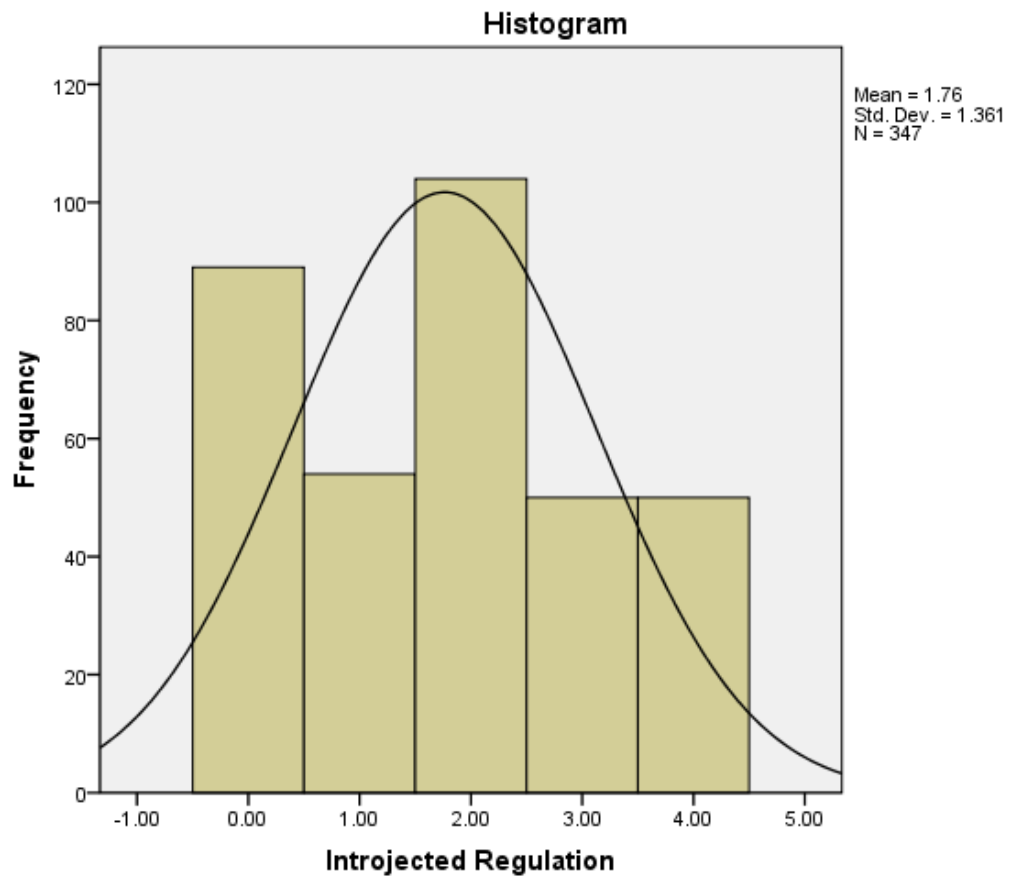
Approved April 23, 2009

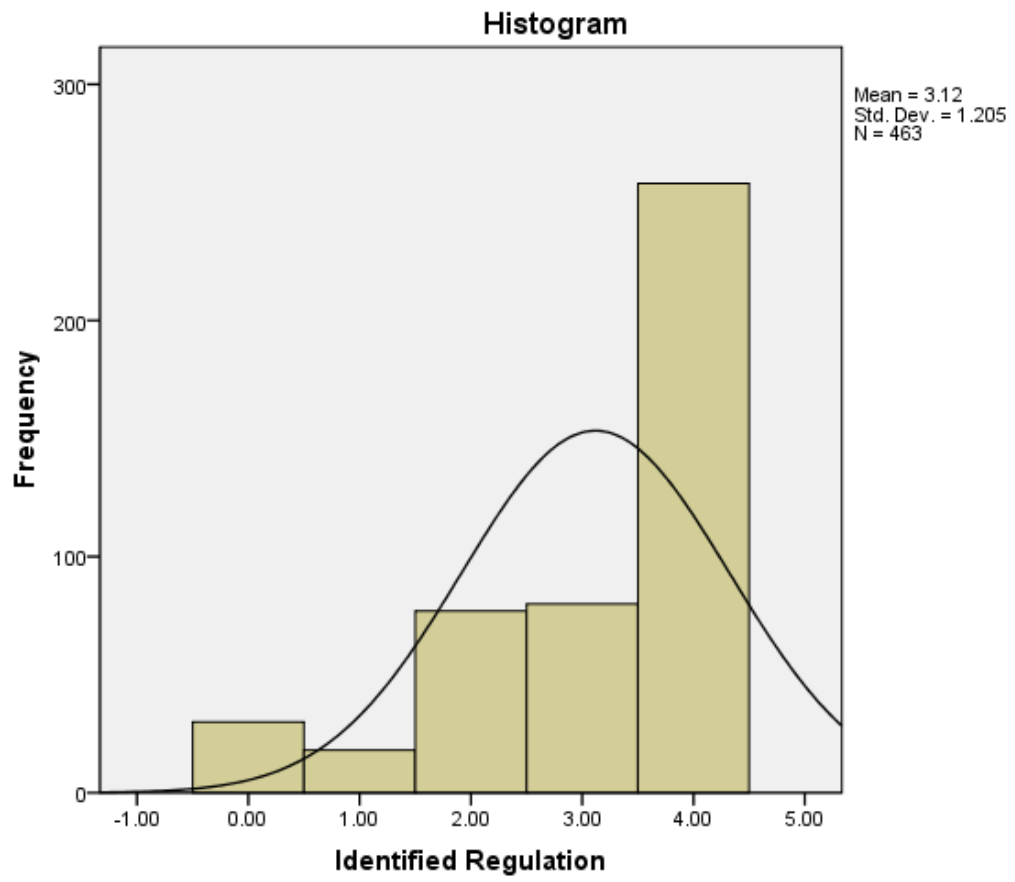
Appendix G

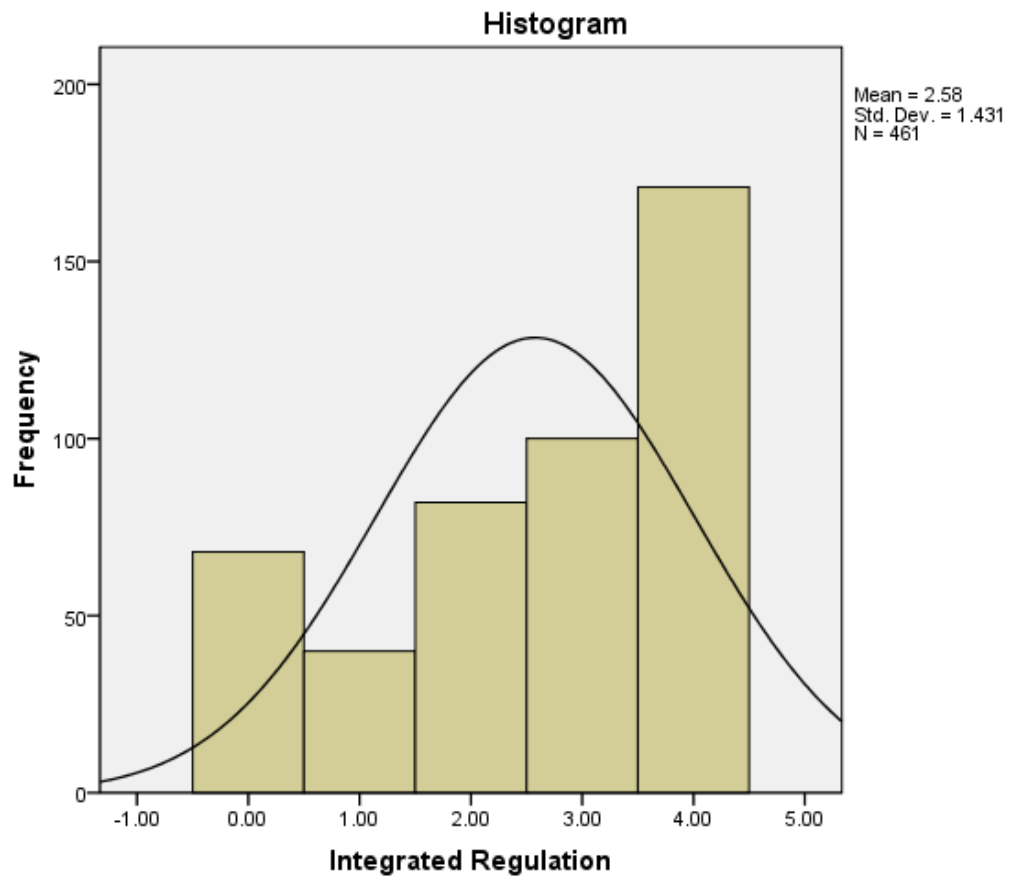
Histograms of the Six SDT Subscales

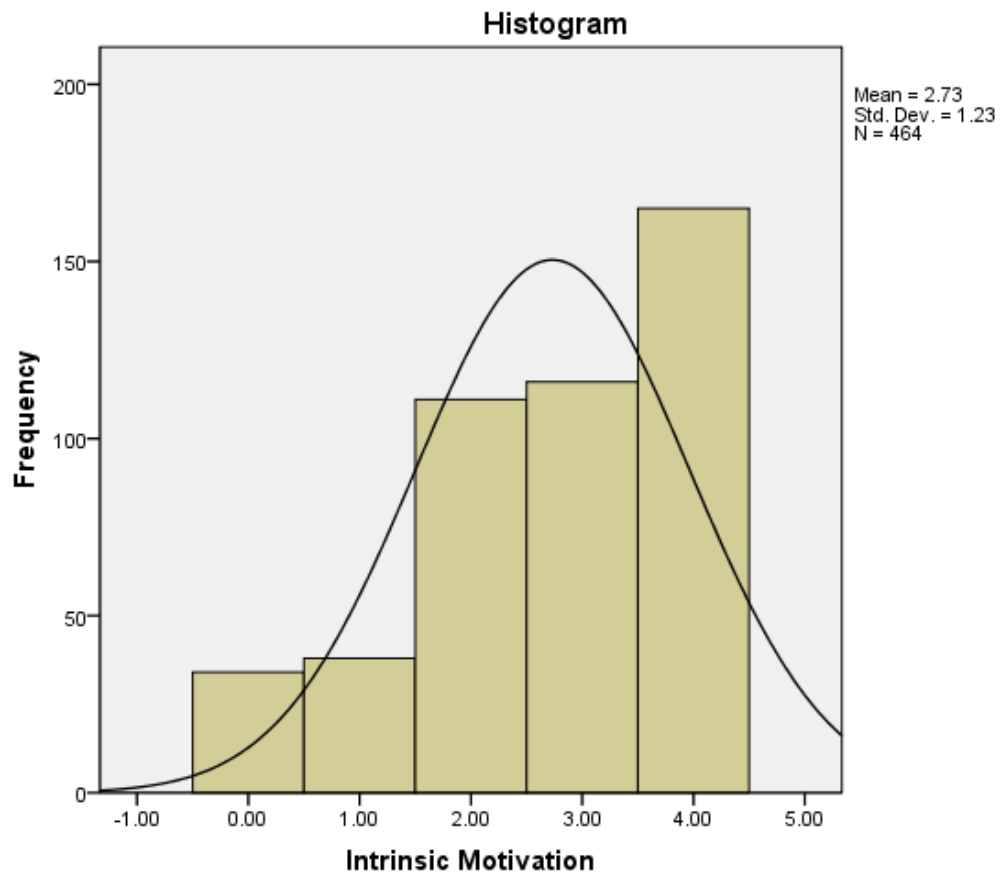












Appendix H

Practical Recommendations from Prior SDT Research

The present report was written in the American Psychological Association (APA; 6th edition) style, which is typically used for a research study and satisfied the academic requirements of West Chester University of Pennsylvania. The APA style of presentation along with the elaborate theories and constructs of the self-determination theory (SDT) can make this a challenging topic to discern. This Appendix applies more of a colloquial style of presentation to explain exercise motivation guidelines aimed at exercise professionals. Although there are numerous practical guidelines presented in the research listed in the References section, due to obvious space limitations it was decided to curtail the listing of practical recommendations. The following guidelines do not originate from the present study but are cited from previous SDT research from the compilation, *Intrinsic Motivation and Self-Determination in Exercise and Sport*, edited by Hagger and Chatzisarantis (2007). See the listing Chatzisarantis and Hagger (2007) in the References section for more information.

Practical recommendations from Markland and Ingledew (2007):

- Trying to develop intrinsic motivation by emphasizing fun and enjoyment of exercise will likely fail for those who are not yet ready for physical activity. Instead, attempt to understand why individuals are engaging in exercise and encourage them to list specific reasons as to why they would want to participate.

- Being extrinsically motivated is not necessarily bad because it can spark adoption of exercise in the early stages.
- The exercise professional can enhance the process of exercise internalization by providing an environment that supports a person's autonomy, competence, and relatedness.

Practical recommendations from Edmunds et al. (2007a):

- Do not pressure exercisers into engaging in only specific type of activity and avoid the use of “should” and “must.”
- Allow people to have a choice in selecting the type of exercise they will perform.
- Explain to people how they will benefit from the activity selected.
- Ask the exerciser for feedback on a frequent basis.
- Help exercisers attain a feeling of competence in their physical activities.
- Set realistic and achievable goals and tailor any feedback so that it is related to people's level of effort (intensity or duration) and persistence (how long they have been exercising in terms of weeks or months).
- Introduce new exercisers to other members because that interaction (relatedness) will likely help them to achieve their goals, especially if they share their experiences with those of similar ability.

Practical recommendations from Markland and Vansteenkiste (2007):

- Exercise professionals and facility management are advised to pursue training in the techniques of “motivational interviewing” to elicit client

behavioral change. This method attempts to facilitate intrinsic motivation within an individual by using a client-centered and goal-directed approach.

- Members have various and conflicting reasons for engaging in exercise. When using the technique of motivational interviewing, you need to determine if the member has any conflicts as they relate to exercise and then you have to help that member arrive at a self-directed rationale for exercise engagement.
- When interviewing clients, use autonomy-supportive strategies and avoid controlling language, such as imposing “should” and “must” conditions to change their exercise behavior.
- Allow members to arrive at their own motives for participating in exercise. Let them decide the type of activity to engage in to promote choice.
- It is best to “negotiate” behavioral change rather than to “prescribe” it so that the member does not feel controlled by interviewer tactics.

Practical recommendations from Wilson and Rodgers (2007):

- Encourage people to feel competent in improving themselves rather than pressuring them with social comparisons of outcomes with unrealistic external “norms.”
- Allow members to discuss their experiences of activity and to explore motives for why they would want to continue exercising.
- Create opportunities for members to be autonomous in their exercise program by providing choice in physical activities.

- Let people choose where, when, and how to engage in their self-selected type of physical activity to make them feel they have ownership over their behaviors.
- Facilitate interaction opportunities for members to connect with others in the facility to create a sense of belongingness.
- Give equal focus to all three basic psychological needs (competence, autonomy, and relatedness) instead of overemphasizing one over the other.
- Assist people in self-selecting exercises that feel right for them (autonomy), choose activities where they can see progress (competence), and introduce them to other exercisers in the facility (relatedness).

Practical recommendations from Fortier and Kowal (2007):

- Help people arrive at a sentiment of competence by collaborating with them to set attainable goals using self-chosen activities and highlighting their progress with informational feedback.
- Create feelings of relatedness by interacting in a caring and warm way. Try to identify an “exercise buddy” for a member or help that individual join an exercise group.

Practical recommendations from Hein and Koka (2007):

- When providing feedback, use positive phrases like “well done” or “excellent effort.” You can also reference goals people find relevant or goals related to the activity such as “You performed the skill exactly as we discussed.”

- For people trying to learn a new skill, the positive feedback should include statements about competence which has a powerful effect on motivation.

Practical recommendations from Vansteenkiste et al. (2007):

- Emphasize that exercise will enable people to achieve the goals that they value, such as self-development and health.
- Do not make references to goals that are extrinsic, such as physical attractiveness.
- Discuss intrinsic goals in a believable, empathic manner that supports the person's autonomy. Avoid language that is controlling or that alienates the person.

Practical recommendations from Conroy et al. (2007):

- Enhance people's competence by offering a variety of exercise activities. Emphasize skill development and effort from their activities. If possible, group people with similar abilities to diminish individual differences and to avoid social comparisons.
- There are two methods to increase people's feeling of competence:
 - Have exercisers concentrate on improving their feeling of competence rather than trying to avoid incompetence.
 - Use task- or self-referenced standards by asking questions such as "How well did you do in completing the task?" or "How did you compare to your previous attempts?" Do not ask questions like "How well did you do compared to others?"

- If rewards will be used, highlight competencies of the activity and people's level of effort rather than trying to reward the avoidance of failure.

Practical recommendations from Wang and Biddle (2007):

- Guide young people toward self-determined type of physical activities instead of extrinsic ones. However, do realize that exercise consisting of "pure" intrinsic motivation is not very common.

The reader may contact the present researcher if there is an interest in obtaining sources for additional practical recommendations that are based on the SDT.