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# Exercise Behavior Patterns in Emerging Adulthood: An Exploration of Predictor Variables from Self-Determination Theory and Transtheoretical Model

Chad R. Johnson

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EXERCISE BEHAVIOR PATTERNS IN EMERGING ADULTHOOD: AN  
EXPLORATION OF PREDICTOR VARIABLES FROM SELF-  
DETERMINATION THEORY AND TRANSTHEORETICAL MODEL

by

CHAD JOHNSON

(Under the Direction of Jody Langdon)

ABSTRACT

During the transition from childhood to adulthood, young people establish patterns of behavior and make lifestyle choices that affect both their current and future health (NCHS, 2010). Emerging adulthood – a new conception of development for the period from the late teens through the twenties – focuses on individuals ages 18-25 who did not have a child, own a home, or have sufficient income to be fully independent (Arnett, 2000). Very little is known about parental influence, motivational mediators, and motivation on exercise behavior within this developmental period. Therefore, the purpose of this study was to determine the influence of constructs from self-determination theory (SDT) and transtheoretical model (TTM) on the development and maintenance of exercise behavior in emerging adulthood.

Using logistic regression techniques, this study investigated the influence of SDT and TTM constructs on meeting the 2008 Physical Activity Guidelines for American among emerging adults (USDHHS, 2008). As part of the analysis, indirect parental influences on exercise behavior were also explored. Four-hundred and thirty-five (N=435) emerging-adult participants from a southeastern university completed the study which assessed

their basic psychological needs in exercise, self-regulation motivation in exercise, stage-of-exercise adherence, and current activity level; indirect parental influences on exercise behavior were also explored using SDT and TTM constructs on meeting 2008 Guidelines.

Results indicated several factors that significantly predicted whether or not emerging adults were meeting 2008 Guidelines and obtaining substantial and/or extensive health benefits associated with meeting guidelines: (1) moderate levels of total perceived competence in exercise, (2) moderate-high levels of relatedness satisfaction in exercise, (3) moderate levels of intrinsic motivation to exercise, (4) being in the action stage of change for exercise adherence, and (5) having an influential parental figure/s currently meeting 2008 Guidelines. Significant probabilities emerged describing the likelihood of emerging adults meeting 2008 Guidelines and obtaining substantial and/or extensive health benefits associated with meeting guidelines.

**INDEX WORDS:** Emerging adulthood, exercise behavior, social factors, psychological mediators, motivational predictors

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## CHAPTER 1

### INTRODUCTION

Understanding why individuals participate in and adhere to exercise has attracted considerable attention in exercise science research (Wilson, Rogers, Rodgers, & Wild, 2006; Vlachopoulos & Michailidou, 2006; Gunnell, Crocker, Wilson, Mack, & Zumbo, 2013). Exercise is defined as physical activity that is planned, structured and repetitive, done to improve or maintain one or more components of physical fitness – that is aerobic endurance, muscular strength, muscular endurance, or flexibility (Marcus & Forsyth, 2009). Researchers find it anomalous that the benefits of regular exercise for reducing obesity and related chronic diseases are well known, yet many individuals interested in an exercise program do not follow through with their actions that lead to adherence (Ryan, Patrick, Deci & Williams, 2008). Evidence indicates while it is possible to address all of the components of physical fitness with a physically active lifestyle, most Americans do not exercise or do not exercise enough to achieve health benefits (NCHS, 2010). Yet, the physiological and psychological health benefits of exercise are irrefutable and have been well documented in recent years (USDHHS, 2010).

Comparable to many other developed nations, data from the Center for Disease Control and Prevention have shown that over fifty-percent of the American population is considered sedentary and only one in four adults in the U.S. is classified as active on a regular basis (NCHS, 2010). According to the 2008 Physical Activity Guidelines for Americans, adults need to engage in at least 150 minutes/week of moderate-intensity activity or its equivalent (defined as aerobically active) to obtain substantial health benefits and more than 300 minutes/week (defined as highly active) to obtain more extensive health benefits. In addition to aerobic activity, the

2008 Guidelines recommend that adults participate in muscle-strengthening activities on 2 or more days/week (USDHHS, 2010). Failing to meet Guidelines has implications for the increased prevalence of obesity and related chronic diseases, which have emerged as a considerable problem in the United States with more than one-third (35.7%) of U.S. adults obese and approximately 12.5 million (17%) adolescents likewise obese (NCHS, 2010).

Given this evidence, one would expect participation in exercise and physical activity to be the norm in young people. Unfortunately, the level of exercise and physical activity participation declines during late adolescence and early adulthood (Buckworth & Nigg, 2004; NCHS, 2010). Epidemiological evidence indicates that the level of physical activity (including exercise) declines from high school to college; to be specific, only 38% percent of college students participate in regular vigorous activity, and only 20% participate in regular moderate activity – a disturbing trend (USDHHS, 2010). During the transition from childhood to adulthood, individuals establish patterns of behavior and make lifestyle choices that affect both their current and future health; some also struggle to adopt behaviors that could decrease their risk of developing chronic diseases in adulthood, such as engaging in physical activity and exercise (Gray, 2011). Thus, there is particular concern regarding the fact that exercise and physical activity decreases during this transitional period, as many adult health behaviors are established during late adolescence and early adulthood – a time of great change when the effects of exercise and physical activity are needed the most (Buckworth & Nigg, 2004; Boyle & LaRose, 2008).

### *Emerging adulthood*

Related to these findings, there is a new conception of development for the transitional period from the late teens through the twenties, with a focus on ages 18-25 – known as emerging

adulthood. Coined by Jeffrey Jensen Arnett (2000), emerging adulthood is a distinct period of life demographically, subjectively, and in terms of identity exploration. The term primarily applies to young individuals who do not yet have children, own a home, or have sufficient income to become fully independent in their late teens to late twenties (Arnett, 2000; Aquilino, 2006). Encompassing both late adolescence and early adulthood, emerging adulthood is distinguished by relative independence from social roles and from normative expectations (Arnett, 2004). Evidence suggests it is no longer normative for the late teens and early twenties to be a time of entering and settling into long-term adult roles; many people over the age of eighteen still require financial support in order to further their education and career, despite an otherwise independent lifestyle (Kim, 2006). Many adult health behaviors are established during late adolescence and early adulthood, as emerging adults in this period are striving to become autonomous by fulfilling adult roles. Thus, adherence to structured exercise and physical activity is critical in emerging adulthood. Unfortunately, the influential factors promoting or thwarting frequent health behaviors are still unclear (Arnett, 2012).

Emerging adulthood is further characterized by a reevaluation of the parent-child relationship primarily in regard to autonomy, as a child switches from the role of a dependent to the role of a fellow adult (Arnett, 2000; Lim & Biddle, 2011). As a result, family dynamics change significantly as the current generation of parents has been found more likely to maintain their parental roles as they keep their children at home longer – where the number of emerging adults that are living at home is steadily increasing (Bradley, McRitchie, Houts, Nader & O'Brien, 2011). Theorists suggest the changing nature of the transition to adulthood may in fact be extending the length of time parents are influencing their children's health related behavior (Bell & Lee, 2005). Moreover, many parents still feel the need to motivate and influence their

emerging adult during this period of volatility, while at the same time allowing their emerging adult independence (Gray, 2011). Evidence indicates a pattern of gradually increasing parental influence on emerging adults' health behavior while living at home, and the persistence of that influence at least through the college years (Lau, Lee & Ransdell, 2007). As emerging adults are striving to become autonomous by fulfilling adult roles, theorists suggest the parent-child relationship may be entering a new stage of commonality where different styles of parental influence might emerge (Aquilino, 2006). Hence, parental influence may look different in emerging adulthood than in childhood or adolescence, but it may still play an important role (Nelson et al, 2007).

### *Literature Review*

Researchers have investigated factors contributing to the uptake and maintenance of regular physical activity (including exercise) in adolescents and young adults, and those that have been identified include social, environmental, cultural, and psychological factors (Markland & Ingledew, 2007; Nelson, Wright, Lowry, & Mutrie, 2007). Public health researchers have especially been interested in the psychological influences on exercise behavior in these populations because it is believed they can be manipulated through intervention to change behavior (Wilson & Rodgers, 2008; Daly & Duda, 2006). Moreover, evidence suggests that theories of motivation and behavior change, such as *self-determination theory* (SDT) and *transtheoretical model* (TTM), are at the forefront of research investigating the psychological antecedents and bases for intervention in exercise settings within these populations (Ryan, Williams, Patrick, & Deci, 2009; Wilson & Rodgers, 2008).

In the area of sport and exercise psychology, two theoretical models – *self-determination theory* (SDT) and *transtheoretical model* (TTM) have been used by researchers interested in



providing explanations for the development and maintenance of behavior over time (Deci & Ryan, 1985; Prochaska & DiClemente, 1983). SDT, a motivation-based model, proposes that successful behavior change occurs when one moves from being amotivated or extrinsically motivated to being intrinsically motivated to change behavior (Ryan & Deci, 1985). Behavior change is a result of social factors, psychological mediators and motivational predictors (Vallerand, 1997). TTM, another motivation-based model, predicts motivational readiness to change behavior using six stages-of-change and is useful in predicting levels of self-determined motivation for engagement in activity, including physical activity and exercise (Prochaska & Velicer, 1997).

### *Self-determination theory*

In the view of SDT, exercise can be an inherently rewarding activity, contributing to both happiness and subjective vitality (Ryan & Deci, 2000). A basic tenet of SDT is that in order to be optimally motivated to change behavior (i.e., exercise behavior) a person needs to experience satisfaction of basic psychological needs (Williams, Ryan, & Deci, 2009). In line with SDT, the fulfillment or satisfaction of these needs in an exercise setting leads to optimal behavior and results in higher levels of behavioral self-determination; that is, behavior emanating from the individuals' true self (Ryan & Deci, 2006; Gunnell et al., 2013). Specifically explained in *basic psychological needs theory* (BPNT), SDT posits three universal and cross-developmental psychological needs: competence, autonomy, and relatedness. The need for autonomy reflects the desire of individuals to be the origin or source of their own behavior (i.e., exercise behavior) and is experienced when individuals perceive their behavior as self-endorsed (Wilson, Rodgers, Blanchard, & Gessell, 2003). The need for competence refers to one's need to interact effectively with one's environment and to experience opportunities for expressing or developing one's

capacities (Deci & Ryan, 2000), and the need for relatedness refers to situations where individuals feel close, cared for, and connected with the people they are close with, and a sense one belongs (Ryan, Patrick, Deci & Williams, 2008).

SDT argues that developing a sense of autonomy and competence is critical in the process of internalization and integration through which a person comes to self-regulate and sustain behaviors conducive to health and well-being (Ryan & Deci, 2006). SDT-based research also advocates a sense of relatedness is equally important to internalization, as people are more likely to adopt values and behavior promoted by those to whom they feel connected and whom they trust (Markland & Ingledew, 2007). Nonetheless, among the many influential factors encouraging or thwarting regular exercise behavior, perceived competence has been shown to be a key factor (Weiss, 2000; McEloy, 2002). Competence is considered an important determinant of exercise adherence, as the perception of competence has been found to foster one of the most desirable and complete forms of motivation for engagement in activity (Ryan & Deci, 2000). Competence has further been shown to facilitate individuals' development and maintenance of exercise behavior, along with increased confidence and motivation to change behavior (Vlachopoulos, Ntoumanis, & Smith, 2010). Research suggests that individuals experiencing higher levels of competence are more likely to make and maintain healthy exercise behavior change and to demonstrate positive health outcomes (Wilson et al., 2006).

In the exercise domain, research has further demonstrated the positive relationship of psychological need fulfillment within life satisfaction among overweight and obese exercise participants (Sheldon & Filak, 2008). Researchers have in fact validated positive relationships between psychological needs and exercise behavior using cross sectional (Daly & Duda, 2006) and prospective designs (Vlachopoulos & Neikou, 2007). Within SDT based research,

investigators have measured psychological needs satisfaction by adapting a wide variety of scales developed for other domains (Wilson & Rogers, 2008). Efforts to study the effects of psychological needs fulfillment using scales specifically developed and validated in the exercise domain led to the development of instruments, such as the basic psychological needs in exercise scale (BPNS; Vlachopoulos & Michailidou, 2006) and the psychological need satisfaction in exercise scale (PNSE; Wilson et al., 2006). As a result, research on motivation to change exercise behavior from the perspective of SDT has grown considerably in recent years, where motivation is known to be a critical factor in supporting sustained levels of engagement in activity (i.e., exercise). Hence, exercise-based research using SDT has focused on the processes through which a person acquires the motivation for initiating exercise behavior and maintaining it over time (Marcus, Banspach, Lefebvre, Rossi, Carleton, & Abrams, 1992).

SDT differentiates the type of behavioral regulation by the degree to which they represent autonomous or self-determined (versus controlled) functioning (Ryan & Deci, 2000). The SDT continuum moves from more autonomous to more controlling regulations for engagement in health-related activity such as exercise; the most self-determined behavioral regulation fuelled by the feelings of fun, personal challenge, and satisfaction endemic to the activity (Daly & Duda, 2006). In an exercise setting, this type of regulation is entirely autonomous in that an individual participates in exercise for no other reason than what the activity provides itself. Greater self-determination is reflected by high levels of intrinsic motivation (e.g., finding exercise enjoyable), and identified regulation (e.g., considering exercise outcomes to be personally important), and lower levels of amotivation (e.g., absence of motivation to exercise), external regulation (e.g., exercising owing to external pressures or to obtain rewards), and introjected regulation (e.g., exercising to avoid internal pressure and negative feelings) (Vlachopoulos, & Neikou, 2007).

Thus, successful exercise behavior change is known to occur when one moves from being amotivated or extrinsically motivated to being intrinsically motivated to change behavior (Ryan, Patrick, Deci, & Williams, 2008).

### *Transtheoretical model*

In order to advance understanding of the motivational determinants of exercise behavior change, it is important to note that initiation and adherence to exercise have been conceptualized as multi-dimensional and dynamic (Farmanbar, Niknami, Heydarnia, Hajizadeh, Lubans, 2009). It is assumed that individuals can move through a series of stages-of-change for exercise behavior, beginning at living a sedentary lifestyle and to regularly maintaining an active lifestyle (Marcus & Forsyth, 2009). Researchers suggest the utility and potential contributions of stage conceptualizations of exercise behavior in the past have often used *transtheoretical model* (TTM), a motivation-based model that seeks to increase motivational readiness to change behavior using six stages of change (Prochaska & DiClemente, 1983) Operating within the confines of TTM, Prochaska, DiClemente & Norcross (1992) developed the *stages-of-change model* of behavior as a framework to describe the different phases involved in the acquisition and maintenance of behavior. They applied the theoretical model to exercise and suggested individuals' move in an orderly progression through different stages-of-change for exercise behavior: precontemplation (no intention to start exercising), contemplation (some intention to start exercising), preparation (currently exercising some, but not regularly), action (exercising regularly; voluntary physical activity three or more days a week for twenty minutes or longer, for less than six months), maintenance (exercising regularly for longer than six months) and termination (exercising regularly for 5 consecutive years or longer), representing exit from the cycle (Prochaska & Velicer, 1997). Movement is thought to be cyclical and individuals are said

to progress through the stages at varying rates, with some individuals staying longer in certain stages and others relapsing and sliding back to earlier stages (Marcus et al., 1992).

Within TTM, the *stages-of-change model* for *regular exercise* has been used heavily in research to represent individual levels of exercise behavior and adherence (Marcus & Forsyth, 2009; Ryan, Patrick, Deci, & Williams, 2008). The practicality of this model is widespread and has been modified to describe stages-of-change for exercise behavior in various populations, as health professionals are beginning to recognize and individualize interventions based on stage-specific characteristics (Kim, 2006). Based on TTM constructs, it is hypothesized that individuals in different stages-of-change for exercise behavior have different perceptions regarding the benefits and barriers to exercise, and thus have different levels of confidence in their ability to maintain exercise behavior (Marcus & Forsyth, 2009). Thus, the strength of the *stage-of-change model* is its focus on the dynamic nature of exercise behavior change; because it is a dynamic model, the different transitions in adoption and maintenance of exercise behavior can be examined (Prochaska, DiClemente & Norcross, 1992). This model argues that different interventions and information need to be tailored to match the particular stage of an individual at any given time (Marcus et al., 1992; Marcus & Forsyth, 2009).

Researchers using TTM recommend the *stage-of-change model* be applied specifically to exercise, as the exercise field needs to shift more towards a process model (Fallon, Hausenblas & Nigg, 2005). TTM researchers also suggest that exercise behavior change is not an all-or-none phenomenon; individuals who stop performing a behavior (i.e. stop exercising) may intend to start again – referred to as relapse. Most individuals do not immediately sustain the new changes they are attempting to make, and return to prior stages; these experiences contribute information that can facilitate or hinder subsequent progression through the stages-of-change (Marcus et al.,

1992). Recurrence, often referred to as relapse, is the event that triggers the individual's return to earlier stages and recycling through the process (McEloy, 2002). After relapse, individuals usually revert to an earlier stage — not always to maintenance or action, but more often to some level of contemplation; they may even become precontemplators again, temporarily unwilling or unable to try to change (Kim, 2006). Individuals may learn that certain goals are unrealistic, certain strategies are ineffective, or certain environments are not conducive to successful change. Thus, most individuals will require several revolutions through the stages to achieve successful behavior change (Prochaska & DiClemente, 1983).

#### *Self-determination theory vs. transtheoretical model*

In distinguishing SDT from TTM, the former assumes a more quantitative perspective on motivation (Prochaska & DiClemente, 1983). The TTM framework holds that individuals in higher stages-of-change are more motivated than those at lower stages. SDT on the other hand, places emphasis on the quality of motivation (Daly & Duda, 2006). SDT suggests that engagement in exercise can be regulated by more or less autonomous and controlled reasons; the assumption is that only when autonomous regulations are emphasized will regular and frequent participation in activity (i.e., exercise) be maintained (Deci & Ryan, 2000). Thus, SDT places more emphasis on different processes of change than the TTM. Specifically, the process of integration, in which individuals' motivation for engaging in exercise become less controlled and more autonomous over time, would be considered central to progress along the stages-of-change continuum (Kim, 2006). With respect to empirical work addressing both theoretical models, Landry and Solomon (2004) and Daly and Duda (2006) explored the relationship between SDT in the regulation of exercise behavior and the stage-of-readiness to change. They found that individuals in stages-of-change displayed more self-determined exercise behavior than those in

the early stages-of-change (Landry & Solomon, 2004; Daly & Duda, 2006).

### *Predictors of exercise behavior*

Researchers have had some success in investigating psychological, social, environment, and cultural influences on exercise behavior, as they may provide further bases for intervention in exercise settings (Marcus & Forsyth, 2009). In accordance with SDT and TTM, social environments that afford autonomy and competence support are more likely to enhance health-behavioral outcomes (Scarpa & Nart, 2012). Thus, conditions supporting an individual's experience of autonomy, competence, and relatedness are argued to foster the most volitional and high quality forms of motivation and engagement in activity such as exercise (Nelson et al., 2007). However, research also suggests the degree to which any of these three psychological needs is unsupported or thwarted within a social context may have a detrimental impact on behavior in that setting (Ryan & Deci, 2000). A meta-analysis revealed that a climate in which parents are supportive may influence variables like basic psychological needs, motivation, and enjoyment in exercise (Edwardson & Gorley, 2010). For example, it was found that task climate positively predicted the three basic psychological needs (competence, autonomy, and relatedness) which in turn positively predicted self-determined motivation to exercise (Markland, 2010; Vlachopoulos & Neikou, 2007). Parents that afforded autonomy support were also shown to increase autonomy-related outcomes of exercise including self-esteem and self-regulation of behavior during the formative years (Lim & Biddle, 2011).

Additional evidence supports a strong association between indirect parental socialization influences on adolescents and young adults' involvement in exercise, where parents are considered fundamental agents of socialization that help shape important attitudes and perceptions towards exercise and physical activity (McEloy, 2002). Further research indicates

that high perceived parental autonomy support is associated with greater vitality and positive health behaviors, while low perceived parental autonomy support is associated with less vitality and negative health behaviors (Grolnick, Deci, & Ryan, 1997). Parents are known to have significant social influence through a variety of mechanisms which include parental encouragement, beliefs, attitudes and behaviors (Welk, Wood & Morss, 2003). Unfortunately, the majority of research on family socializations has not adequately considered developmental changes that occur within the emerging adult and parent relationship. Cognitive and physical developmental changes may greatly effect parent socialization and emerging adult's motivation where increases in their capacity to incorporate social comparative information might influence how they will interpret feedback from their parents (Gruber, 2008).

### *Problem*

Adherence to exercise is known to improve significantly when exercisers have strong parental encouragement and support; adherence is linked to the adoption and maintenance of behavior (i.e., exercise behavior) as part of one's lifestyle (Marcus & Forsyth, 2009). Thus, the need for more parent-based exercise interventions is frequently cited in literature (Welk, Wood & Morss, 2003; Edwardson & Gorley, 2010). Adult health behaviors are thought to be firmly established during late adolescence and early adulthood, therefore the adoption and maintenance of healthy behavior in this period is critical (Edwardson & Gorley, 2010). Yet research suggests because of the differences in measurement instruments and research designs, it has been difficult to determine the importance of various sources of psychological, social, environmental, and cultural influence in this population (Lim & Biddle, 2011). Despite emerging adults' increasing need to experience autonomy, theorists suggest there is a similar continuing need for encouragement and support from parents (Arnett, 2004). Previous reviews examining the



relationship between parental encouragement and involvement in exercise have produced mixed results; some have concluded that parental modeling, support, and encouragement of healthy behavior are positively related to exercise participation, some have reported indeterminate relationships or no association, whilst others have concluded that parental modeling, support, and encouragement of unhealthy behavior are negatively related to exercise participation (Landry & Solomon, 2004; Nelson et al., 2007). Conclusively, no such research has examined the relationship between parental behavior, encouragement and involvement in exercise in emerging adulthood – a time when the benefits of regular exercise and physical activity are needed the most.

### *Purpose*

Epidemiological evidence indicates a further understanding of health-related behaviors (i.e., exercise behavior) in emerging adulthood is necessary for the development of strategies that encourage lifetime adherence to exercise (Arnett, 2012). Although considerable progress has been made in understanding various avenues of influence in this transitional period, there are still many unresolved issues (Daly & Duda, 2006; Marcus & Forsyth, 2009; Markland, 2010). Thus, the purpose of the current study was to determine the influence of SDT and TTM based constructs contributing to the uptake and maintenance of regular exercise behavior in emerging adulthood.

Utilizing logistic regression techniques, this study investigated the influence of emerging adults': (a) basic psychological needs in exercise (autonomy, competence, relatedness), (b) self-regulation in exercise (intrinsic motivation, identified regulation, introjected regulation, external regulation), and (c) stage of exercise behavior change (precontemplation, contemplation, preparation, action, maintenance, termination) – on meeting 2008 Physical Activity Guidelines

for Americans – failing to meet Guidelines has implications for the increased prevalence of obesity and related chronic diseases (USDHHS, 2010). Furthermore, this study investigated any social influences (i.e., indirect parental influences) contributing to the uptake and maintenance of regular exercise behavior in emerging adults: (d) perceptions of parents (parental autonomy support, involvement and warmth), (e) parental stage of exercise adherence, and (f) parent activity level – on meeting 2008 Guidelines.

Factors contributing to the uptake and maintenance of regular exercise behavior in emerging adults were examined to test the hypotheses that: (1) high levels of autonomy, competence, and relatedness in exercise would predict emerging adults' meeting 2008 Guidelines, (2) high levels of intrinsic motivation and identified regulation, accompanied by low levels of amotivation, introjected regulation and external regulation, would predict emerging adults' meeting the 2008 Guidelines, and (3) being in action stage of exercise behavior change or above (i.e., action, maintenance, or termination) would predict emerging adults' meeting 2008 Guidelines – failing to meet Guidelines would have implications for the increased prevalence of obesity and related chronic diseases (USDHHS, 2010).

Social factors contributing to the uptake and maintenance of regular exercise behavior in emerging adults were also obtained to test the hypothesis that: (4) high levels of perceived parental autonomy, support, and warmth would predict emerging adults' meeting 2008 Guidelines, (5) having a parental figure in action stage of exercise behavior change or above (i.e., action, maintenance, or termination) would predict emerging adults' meeting 2008 Guidelines, and (6) having a parental figure currently meeting 2008 Guidelines would predict emerging adults' also meeting Guidelines – failing to meet Guidelines would have implications for the increased prevalence of obesity and related chronic diseases (USDHHS, 2010).

These hypotheses were developed in accordance with past research using linear discriminant function analysis: Vlachopoulos, Ntoumanis, & Smith (2010) revealed that individuals at the early stages-of-change are less self-determined in their regulation of exercise behavior than those at the later stages-of-change, Edwardson & Gorely (2010) suggested that encouraging and supportive parental figures are more likely to influence positive health-behavioral outcomes and self-determined motivation for health-related behavior, and Wilson et al. (2006) indicated that individuals are more likely to be active if an influential parental figure/s is also active. Lastly, According to the 2008 Physical Activity Guidelines for Americans, adults need to engage in at least 150 minutes/week of moderate-intensity activity or its equivalent (defined as aerobically active) to obtain substantial health benefits and more than 300 minutes/week (defined as highly active) to obtain more extensive health benefits.

## CHAPTER 2

### METHODS

#### *Participants*

Through cross-sectional design, this study utilized convenience sampling of approximately four-hundred and thirty-five (N=435) college students – classified as emerging adults. Participants were enrolled in a Healthful Living education course at a southeastern university; the course focuses upon the promotion of health and wellness within individuals, families, and communities through an understanding of healthful living, development of healthy lifestyles, and avoiding or overcoming harmful habits. This course is required of all undergraduate majors as part of their core curriculum program of study. As the course was offered in both online and face-to-face formats, approximately 95 participants completed the study online and 340 participants completed the study via paper format in class. Participants had been learning about planning a healthy lifestyle through exercise for health and fitness, along with nutrition and weight managements prior to administration of the survey. Both male and female emerging adults from a variety of backgrounds participated and shared their experiences within exercise and physical activity. The demographic profile of the sample that participated closely matched that of the southeastern university and the southeastern United States (GSU, 2013).

Participants were identified as emerging adults between the ages of 18-25; those who did not have a child, did not own a home, and did not have enough income to be fully independent (Arnett, 2000). Fifty-percent of participants were eighteen years of age, 30% were 19 years of age, 12% were 20 years of age, and the remaining 8% were in between the ages of 21-25. Of the

participants, 55% percent were female (n=240) and 45% percent were male (n=195). Concerning ethnicity, 65% percent of emerging adult participants were white, non-Hispanic (n=281), 26% percent Black, African-American (n=111), 2% Hispanic (n=9), 2% Asian/pacific highlander, and 6% multi-racial/other (n=25).

The majority of participants (n=410) identified a parental figure/s that was most influential on their health and well-being as either: mother, father, both mother and father equally, or other. This study found 54% percent of participants (n=233) considered their mothers to provide the most significant form of influence, 34% percent reported fathers (n=147), 7% reported both mother and father equally (n=11), and 5% reported no significant form of parental influence on current exercise behavior patterns (n=19). This study found the average age for a reported parental figure was 48 years of age (SD=7.53). Concerning ethnicity of parental figures, similarly 66% percent were reported as white, non-Hispanic (n=286), 26% percent Black, African American (n=115), 2% percent Hispanic (n=8), 2% Asian (n=10), and 3% multi-racial/other (n=13).

### *Procedures*

The study was administered to participants through two different mediums: online and face-to-face. Approximately 1500 students at the southeastern university were emailed about a potential opportunity to participate in a research study gathering statistics on college students' activity levels and exercise behavior (only 95 participated). The email briefly described the parameters of the study and why participation was needed, briefly noting the purpose and benefits of participation in the study. Participants were prompted with a link to the web-address necessary to complete the survey online using *surveymonkey.com*, where they were asked to passively consent to participate and complete the questionnaire online. In addition to the online

survey, the study was administered by the primary researcher and faculty advisor to five Healthful Living courses at the southeastern university using the face-to-face medium. The primary researcher and faculty advisor went into five live classrooms and handed out the survey to participants. Participants were instructed to read the informed consent form before they began, giving the researchers permission to use their information in the study. Total time taken to complete the survey was approximately 15-20 minutes. The questionnaire used in this study was adapted from a previously administered pilot study, to ensure reliability and validity in the study items and instructions.

### *Instrumentation*

#### Basic Psychological Needs

The *basic psychological needs satisfaction in exercise scale* (BPNES) developed by Vlachopoulos, Ntoumanis, & Smith (2006) was first used to assess the extent to which the psychological needs of participants were fulfilled in an exercise setting. The scale comprised twelve (12) items divided into three subscales, with four items per subscale, to assess: autonomy (e.g., “The way I exercise is in agreement with my choices and interests”), competence (e.g., “I feel I perform successfully the activities of my exercise program”), and relatedness (e.g. My relationships with the people I exercise with are close”). Responses were provided on a 5-point Likert scale ranging from 1 being *don't agree at all* to 5 being *completely agree*. Scores were calculated by finding the sum of responses for each subscale and dividing that number by the number of questions represented: autonomy – questions 2, 5, 8, 11 / 4; competence – questions 1, 3, 6, 9 / 4; relatedness - questions 4, 7, 10 / 3. The scale was used to refer to an individual's overall experiences in exercise as opposed to any particular situation. Wilson and colleagues (2006) have since offered additional evidence for the validity and reliability of the scale.

Participants completed a modified version of the Psychological Need Satisfaction in Exercise Scale (PNSE; Wilson et al., 2006) designed to capture feelings of competence, autonomy, and relatedness felt during exercise cross-culturally in Greek-speaking participants; the scale's internal reliability was investigated by examining whether, for each subscale, a Cronbach alpha was greater than .70, a composite reliability value greater than .60, and an average variance value greater than .50. In the present study, the three subscales returned a Chronbach's alpha of: autonomy, .78, competence, .86, and relatedness, .89.

#### Perceived Competence

The *perceived competence scale* (PCS) for *regular exercise* developed by Williams, Ryan, and Deci (1999) was used to identify emerging adults' overall perceived competence to exercise (Deci & Ryan, 1985; Williams, Deci, & Ryan, 1999). The PCS for regular exercise is a short four-item questionnaire that was used to assess the degree to which emerging adults felt confident about being able to begin now a permanent regimen of exercising regularly or to permanently maintain a regular exercise regimen. This questionnaire asked participants to indicate the extent to which each statement was true for them using a 7-point Likert scale ranging from *1 not at all true* to *7 very true* (assuming they were intending either to begin now a permanent regimen of exercising regularly or to permanently maintain a regular exercise regimen). An individual's score was simply the average of his or her responses to the four items PCS items. The alpha reliability for the PCS items is about .90 and the scale has been used in numerous studies, sustaining consistency and reliability throughout (Buckwork, Granello, & Belmore, 2002). In the present study, the PCS measure returned a Chronbach's alpha of .95.

It is also important to note that perceived competence has been assessed in various studies and used along with perceived autonomy to predict maintained behavior change,

effective performance, and internalization of ambient values (Deci & Ryan, 1985). Because perceived competence is considered to be the more global construct of self-efficacy, it is considered to be people's overall perceptions of their general physical abilities on physical tasks (Wilson et al., 2006). Cross-cultural comparisons in psychological research have tested the applicability of various theories and models, as the PCS has often been adapted as needed for the studying of other behaviors, items may be worded slightly different for target behaviors in this model in comparison to the BPNES. For this reason, two separate perceived competence measures were utilized in this study.

### Self-Regulation Motivation

The *exercise self-regulation questionnaire* (SRQ-E) developed by Ryan and Deci (2000) addresses the reasons why a person exercises regularly. In the SRQ-E, participants are asked a total of twelve (12) statements/reasons for exercising that required a response using a 7-point Likert-scale with 1 being *not at all true* and 7 being *very true*. Participants provided responses that represented external regulation, introjected regulation, identified regulation, and intrinsic motivation. This questionnaire did not address amotivation and therefore did not account for a lack of motivation being indicative of regular exercise, a potential limitation to this particular measurement. However, the SRQ-E was used in this study to identify individual differences in the types of motivation or regulation. Each question asked why the respondent participates in a behavior (or class of behavior) and then provided several possible reasons that have been preselected to represent the different styles of regulation or motivation. Each participant received a score on each subscale by averaging responses to each of the items that make up that subscale – for example, the average of all items representing introjected regulation would represent the score for that subscale: external regulation: 5, 7, 12; introjected regulation: 3, 6, 9; identified



regulation: 2, 8, 10; intrinsic motivation: 1, 4, 11. The format for the questionnaire was introduced by Ryan and Connell (1989).

Although amotivation was not measured in this questionnaire, a validation article of the SRQ-E was published by Levesque, Williams, Elliot, Pickering, Bodenhamer, and Finley (2007), where confirmatory factor analysis supported the existence of high levels of skewness in the amotivation items, indicating amotivated regulation was not relevant a behavioral regulation in exercise. In the present study, the Chronbach's alpha levels for the ESRQ subscales were: external regulation, .76, introjected regulation, .60, identified regulation, .81, and intrinsic motivation, .86

#### Behavioral Stage of Change

The *stages-of-change* model adapted for *exercise behavior* by Prochaska & Velicer (1997) suggests progression through six stages-of-change: precontemplation (no intention to exercise), contemplation (some intention to exercise), preparation (exercise some, but not regularly), action (exercise regularly, but for less than six months) and maintenance (exercise regularly for longer than six months); termination (exercise regularly for longer than 5 years) representing the sixth stage and exit from the cycle. Regular exercise for this scale was defined as participating in voluntary physical activity three or more days a week for thirty minutes or longer each time, at a level that increases heart rate and/or breathing rate (ACSM, 2007). Participants were asked to place themselves into the stage corresponding to the one item they endorsed most strongly; participants were allowed only one response to represent their current stage-of-change for exercise behavior. Additionally, an item reflecting relapse was used in this measure. Although relapse was not conceptualized as a distinct stage, it was important to examine whether or not it occurred. The kappa index of reliability for the stage-of-change model

is .78, ensuring construct validity of the instrument (Prochaska, DiClemente, & Norcross, 1992; Marcus & Forsyth, 2009). The *stage-of-change model* was additionally utilized in this study by having participants categorize their reported influential parental figure into a stages-of-change for exercise behavior; participants also indicated whether or not their parental-figure had relapsed – having exercised in the past, but was currently not doing so.

### Perceptions of Parents

The *perceptions of parents scale* (POPS) developed by Grolnick, Deci, & Ryan (1997) was utilized to measure the extent to which parental-figures afford autonomy and relatedness satisfaction in college students. The college student version of the POPS is intended for use with participants who are late adolescents or older (Grolnick, Deci, & Ryann, 1997). Concerning the degree to which parental-figures provide what self-determination theory (SDT) considers an optimal parenting context, this scale had emerging adult participants indicate perceptions of their parental-figure that had the biggest impact or influence on their overall health and well-being. The scale had 21 items for the participants to describe their thoughts about their influential parental-figure using a 7-point Likert scale ranging from *1 not at all true* to *7 very true*. From these items, 3 subscale scores were calculated: autonomy support, involvement, and warmth. First, scores on the following items were reversed: 2, 6, 12, 13, 14, 15, 20, and 21. To do that, responses were subtracted from eight and the result gave an item score. Subscales were scored by averaging the scores of the items on each subscale, including reverse-coded items: involvement: 3, 6R, 9, 12R, 15R, 18; autonomy support: 1, 2R, 5, 8, 11, 14R, 17, 19, 21R; warmth: 4, 7, 10, 13R, 16, 20. Use of the scale by Robbins (1994) provided substantial evidence for the reliability and validity of the scale. Additionally, a recent longitudinal study adds further reliability and validity evidence for the scale (Deci & Ryan, 2006), suggesting the scale is useful in

understanding parental influence on satisfaction of autonomy and relatedness. The scale has since linked parental autonomy support to autonomy-related outcomes including self-esteem and self-regulation of behavior. In a more recent longitudinal study by Ryan, Williams, & Deci (2008), high perceived parental autonomy support was associated with greater vitality and positive health behaviors, while low perceived parental autonomy support was associated with less vitality and negative health behaviors. In the present study, the Chronbach's alpha levels for the three subscales were: involvement, .84, autonomy support, .87, and warmth, .88.

#### 2008 Physical Activity Guidelines for Americans

The Guidelines were derived from an evidence-based report on the health benefits of physical activity, written by the Physical Activity Guidelines Advisory Committee for the United States Department of Health and Human Services (2008). Within the Guidelines, intensity was defined relative to fitness, with the intensity expressed in terms of a percent of a person's (1) maximal heart rate, (2) heart rate reserve, or (3) aerobic capacity reserve. To determine whether they are doing enough activity to meet the Guidelines, there was a "rule of thumb" as to how vigorous-intensity minutes substitute for moderate-intensity ones. Because 150 minutes of moderate-intensity activity and 75 minutes of vigorous-intensity activity are the minimum amounts of activity necessary for substantial health benefits, the rule of thumb became that 1 minute of vigorous-intensity activity counts the same as 2 minutes of moderate-intensity activity. Therefore, 75 minutes of vigorous-intensity activity per week was roughly equivalent to 150 minutes of moderate-intensity activity per week. Meeting these moderate and/or vigorous activity requirements helped address the issue that some people do both moderate-intensity and vigorous-intensity activity in a week in order to satisfy Guidelines. For the purpose of the present study, participants were considered to meet Guidelines only if they reported 150 minutes of

moderate intensity activity per week or the equivalent.

### Pilot Study

A pilot study was conducted to ensure validity and reliability among this demographic. The average age of participants in the pilot study was 21 years of age; 66% percent of participants were female. Eighty-five percent of participants did not have children, own a home, or have enough income to become fully independent – a distinguishing characteristic of emerging adults. The majority of participants identified themselves as being influenced most by either: mother only, father only, mother and father, or other. The PCS measure returned a Chronbach's alpha of .91 in emerging adults. The POPS had three separate measures; the Chronbach's alpha for parental involvement was .93, parental autonomy support was .96, and parental warmth was .91. Of the emerging adults that participated, 48% percent identified their most influential parental-figure as being in the precontemplation stage-of-change for exercise behavior. Contrarily, 29% percent of emerging adults identified themselves as being in the preparation stage, with only 5% identified as being in precontemplation. The pilot study found correlations between emerging adults' perceived competence and their stage-of-change for exercise behavior at  $p < .01$  significance level. However, the relationship of parental encouragement and support with emerging adult's stage-of-change for exercise behavior was found not very significant (involvement= .27, autonomy support= .18, warmth= .24). In addition, parental stage-of-change and emerging-adult stage-of-change was found to have a low to moderate correlation. Due to the small sample size of the pilot study, results were found to be different with a larger sample size.

We learned through administration of the pilot study some changes had to be made to the survey. It was decided that processes of change model unreliably predicted certain processes of

change, adding a lot of superfluous questions and additional time constraints to the study. Thus, we dropped the processes of change model from our survey because it did not add any strength or validation to the study. We also decided to limit the number of reported parental figures each participant could have to only one. In the original pilot study, participants were allowed to report more than one parental figure (up to three), adding considerable time constraints to the survey. There was simply too much data when each participant answered questions for more than one parental figure, where recall biases may have been influenced by certain factor when describing more than one influential parental figure. Thus, participants only reported one influential parental figure in the current study.

After exploring further research using SDT and TTM, we decided to use the BPNES because of its ability to account for all three basic psychological needs in exercise in conjunction with the PCS measure. Where before we had only examined perceived competence in emerging adults; utilizing the BPNES measure allowed us to gain a greater understanding of each individual psychological need (autonomy, competence, and relatedness). In addition, motivational predictors of exercise behavior including self-regulation motivations were added to the study. Operating under the assumption that intrinsic motivation is basis for highly self-determined behavior, motivational regulations (external regulation, introjected regulation, identified regulation, and intrinsic motivation) were examined to further understand the development and maintenance of regular exercise behavior in emerging adults. As researchers, making these changes to the pilot study would increase our ability to generalize findings by achieving more statistically significant results in the present study.

### *Data Analysis*

Frequency counts, means, and standard deviations were used to gather statistics on

demographics such as age, gender, and ethnicity in both emerging adults and reported parental-figure. Correlations were run to determine potential relationships between variables to be loaded into a regression. A logistic regression was used to investigate the extent to which parental influence impacted emerging adults' overall exercise behavior and physical activity patterns because of its ability to predict a binary response from a binary predictor – as logistic regression is commonly used for predicting the outcome of a categorical dependent variable based on one or more predictor variables (Thomas, Nelson, and Silverman, 2011). A logistic regression was used in the present study to investigate how social factors (POPS;SOC; Activity level), psychological mediators (BPNES;PCS), and motivational predictors (SRQ-E) influence emerging adults exercise behavior (SOC) and likelihood of meeting physical activity recommendations set by the 2008 Physical Activity Guidelines for Americans (USDHSS, 2010). Data were obtained to test the hypotheses concerning the psychological and social factors contributing to the uptake and maintenance of regular exercise behavior in emerging adults using the Statistical Package for the Social Sciences (SPSS) software, version 21.

## CHAPTER 3

### RESULTS

#### *Frequencies*

Displayed in Table 1 in Appendix C, stage-of-change for exercise behavior in emerging adults was calculated using frequency counts. Using a self-report measure, this study found 5% of emerging adults considered themselves to be in precontemplation stage – having no intention to start exercising; 8% in contemplation stage – thinking about starting to exercise; 31% in preparation stage– exercising some, but not regularly; 25% in action stage – exercising regularly, but for less than 6 months; 15% in maintenance stage – exercising regularly for longer than 6 months; 17% in termination stage – representing exit from the stages-of-change.

Correspondingly, 30% of the emerging adults reported relapse – having exercised in the past, but were currently not doing so.

Shown in Table 2 in Appendix C, results indicated that 57% percent of emerging adults considered their mother (or mother-figure) to be the most influential on their health and well-being; 36% percent of emerging adults cited their father as being most influential; 3% indicated mother and father were equally influential (reported on only one); and 4% reported individuals other than an influential parental figure/s.

Presented in Table 3 in Appendix C, stage-of-change for exercise behavior in parental figures was calculated using frequency counts. Using emerging adults’ reports, this study found 16% of emerging adults perceived their parental figure to be in precontemplation stage – having no intention to start exercising; 8% in contemplation stage – thinking about starting to exercise; 28% in preparation stage – exercising some, but not regularly; 7% reported being in action

stage— exercising regularly, but for less than 6 months; 19% in maintenance stage – exercising regularly for longer than 6 months; 22% percent in termination – representing exit from the stages-of-change. Correspondingly, 30% of the emerging adults reported their parental figure having exercised more regularly in the past, but were currently not doing so.

Exhibited in Table 4 in Appendix C, a frequency count measure was used to understand how distance from a significant parental figure may influence exercise behavior patterns in emerging adults. This study found 40% of emerging adults lived more than two-hundred miles away from their influential parental figure, 24% lived within two-hundred miles , 23% lived within one-hundred miles, and 13% currently lived with the parental figure.

Displayed in Table 5 in Appendix C, frequency counts were utilized to understand how communication with the parental figure influenced exercise behavior. This study found 8% of emerging adults communicated with their influential parental-figure 1x/week, 6% communicated 2x/week, 14% communicated 3x/week, eight-percent communicated 4x/week, 7% communicated 5x/week, 10% communicated 6x/week, and an astonishing 41% percent of emerging adults reported communicating with their influential parental figure on 7x/week or more.

### *Means and Correlations*

Shown in Table 6 in Appendix C, responses to the BPNES were provided on a 5-point Likert scale ranging from *1 don't agree at all* to *5 completely agree*. Scores were calculated by finding the sum of responses for each subscale (autonomy, competence, and relatedness) and dividing that number by the number of questions for each subscale. The mean BPNES scores for emerging adult participants were: autonomy 3.66 (SD= .89), competence 3.43 (SD=.95), and relatedness 3.75 (SD=1.09).



Displayed in Table 7 in Appendix C, responses to the PCS were provided on a 7-point Likert scale ranging from *1 not at all true* to *7 very true* (assuming they were intending either to begin now a permanent regimen of exercising regularly or to permanently maintain a regular exercise regimen). An individual's score was simply the average of his or her responses to the four items question items. The mean PCS score for emerging adult participants was: total perceived competence 5.22 (SD=1.49).

Presented in Table 8 in Appendix C, responses to the SRQ-E were provided on a 7-point Likert scale ranging from *1 not at all true* and *7 very true*. Each participant received a score on each subscale by averaging their responses to each of the items making up the subscale – for example, the average of all items representing introjected regulation would represent the score for that subscale. The mean SRQ-E scores for emerging adult participants were: external regulation 4.41 (SD=1.53), introjected regulation 3.89 (SD=1.37), identified regulation 5.07 (SD= 1.14), and intrinsic motivation 3.76 (SD=1.63).

Shown in Table 9 in Appendix C, responses to the POPS were provided on a 7-point Likert scale ranging from *1 not at all true* to *7 very true*. From the 21 scale items, three subscale scores were calculated by averaging the scores of the items on each subscale. The mean POPS scores for emerging adult participants were: involvement 5.21 (SD=.81), autonomy support 5.61 (SD=1.11), and warmth 6.14 (SD=1.06).

Displayed in Table 10 in Appendix C, spearman correlation tests were run between all SDT and TTM predictors of exercise behavior and meeting Guidelines. From the correlation, emerging adults' perceptions of parental involvement was the only variable found not to predict emerging adults meeting 2008 Guidelines.

### *Logistic Regression*

Revealed in Table 11 in Appendix C, this study found several factors that significantly predicted whether or not emerging adults were meeting 2008 Guidelines: (1) total perceived competence for regular exercise ( $p < .01$ ), (2) relatedness satisfaction in exercise ( $p < .05$ ), (3) intrinsic motivation to exercise ( $p < .05$ ), (4) action stage-of-change for exercise behavior ( $p < .05$ ), and (5) whether or not emerging adults reported a parental figure currently meeting physical activity guidelines ( $p < .001$ )

More specifically, significant probability estimations were formed describing the likelihood of emerging adults meeting 2008 Guidelines. When looking at the probabilities, this study found: (1) as emerging adults experience moderate to high levels of perceived competence to exercise regularly, they are 65% percent more likely to meet 2008 Guidelines, (2) as emerging adults experience moderate levels of relatedness satisfaction in exercise, they are 72% percent more likely to meet 2008 Guidelines, (3) as emerging adults experience moderate levels of intrinsic motivation to exercise, they are 40% more likely to 2008 Guidelines, (4) as emerging adults move into the action stage of exercise behavior change, they are 16% more likely to meet 2008 Guidelines, and (5) as influential parental figures move from not meeting physical activity guidelines to meeting guidelines (i.e., being inactive to active), emerging adults are 74% percent more likely to 2008 Guidelines – meeting Guidelines linked with substantial and or/extensive health benefits.

## CHAPTER 4

### DISCUSSION

Epidemiological evidence indicates a further understanding of health behaviors in emerging adulthood is necessary for the development of strategies that encourage lifetime adherence to exercise (Arnett, 2012). Previous research has robustly established that exercisers have higher levels of self-determined regulation for exercise and more self-determined regulations strongly associated with exercise persistence. Thus, the present study was designed to partially circumvent inconsistent practices and extend the current literature by determining the degree of association between SDT and TTM based constructs on factors contributing to the uptake and maintenance of regular exercise behavior in emerging adults. Although considerable progress has been made in understanding various avenues of influence on exercise behavior in this transitional period, there remain many unresolved issues (Daly & Duda, 2006; Aquilino, 2006). There have been a number of studies relating exercise behavior with self-determined motivation, and several findings have emerged that are directly relevant to the results of the current study (Marcus & Forsyth, 2009; Markland, 2010).

#### *Psychological factors*

Concerning the psychological factors contributing to the uptake and maintenance of regular exercise behavior in emerging adulthood, this study found that moderately-high levels of perceived competence and relatedness in exercise significantly predicted emerging adults' likelihood of meeting and adhering to 2008 Guidelines; yet, perceived autonomy did not significantly predict emerging adults' adherence. These findings were interesting because one of the central tenets of SDT is that the quality of social contexts influences the motivation,

performance, and well-being of individuals who operate within them (Ryan & Deci, 1985). In the case of emerging adults living both with and away from parental figures, situations that give autonomy as opposed to taking it away are positively linked to motivations (Lim & Biddle, 2011). However, this study did not find autonomy to be significantly linked with exercise behavior or meeting guidelines for activity. Thus, when considering emerging adults living at or away from home, it may be important to cogitate whether or not they have a “choice” in their daily activities – increasing emerging adult’s options and choices should increase their feelings of autonomy and intrinsic motivation for activity such as exercise. The present study indicates that autonomy may have not been a significant factor because autonomy does not mean to be independent of others. Emerging adults are in a life period associated with breaking free from constraints and resisting coercion by being independent, the very definition of autonomy. Therefore, results suggest autonomy may play a larger role in other areas of skill and life development and a lesser role in the development and maintenance of exercise behavior over time.

Perceived competence, on the contrary, was found to be a significant influential factor encouraging regular exercise behavior in emerging adults in the present study; competence referring to one’s need to interact effectively with one’s environment and to experience opportunities for expressing or developing one’s capacities (Ryan & Deci, 2006). In the past, individuals experiencing higher levels of competence have been more likely to make and maintain healthy exercise behavior change and to demonstrate positive health outcomes over time (Deci & Ryan 2000; Wilson et al., 2006). Results from the present study also support previous findings in that among the many influential factors encouraging or thwarting regular

exercise behavior in young adults, perceived competence was shown to be a key factor – fostering one of the most desirable and complete forms of motivation for engagement in exercise and physical activity.

Similarly, perceptions of relatedness satisfaction were found to significantly predict regular exercise behavior in emerging adults in this study. Previous investigations have advocated a sense of relatedness is critical in the process through which a person comes to self-regulate and sustain behaviors conducive to health and well-being, where ample evidence supports the link between relatedness satisfaction to both well-being and more self-determined motives for health-related behavior (Vlachopoulos & Michailidou, 2006; Markland, 2010). Hence, findings from the present study add further validation suggesting that motivation can improve if individuals feel their exercise setting is accompanied by a warm, accepting atmosphere. It may also be important to note that feelings or perceptions of relatedness influencing exercise behavior are related not only to a person's skills and history within the domain of behavior in focus, but also to other aspects of the social environment including peers, teachers, coaches, and significant others (Ryan, Williams, Patrick & Deci, 2009).

Regarding self-determined motivation for exercise regulation, this study found that moderate levels of intrinsic motivation in exercise significantly predicted emerging adults' self-regulation of exercise behavior and adherence to 2008 Guidelines. However, introjected regulation, identified regulation, extrinsic motivation and amotivation did not significantly predict emerging adults' adherence. This may have been because extrinsically motivated activity is often more controlled (i.e., less autonomous) than in intrinsically motivated activity; external and introjected regulations are considered relatively controlled forms of extrinsic motivation,

whereas identified and integrated regulation are considered relatively autonomous. Thus, self-regulated emerging adults are successful because they feel they control their exercise environment. They exert their control by directing and regulating their own actions towards their exercise and fitness goals. Past evidence indicates intrinsic motivation is one key element in promoting an active and healthy lifestyle, specifically the direct effects of intrinsic motivation on physical self-concept and of life-satisfaction (Williams, Ryan, & Deci, 2009). Thus, findings from the current study are significant because in order to sustain long-term benefits of exercise, adherence is needed. Adherence requires self-regulation, with intrinsic motivation being the prototype of autonomous activity – when people are intrinsically motivated, they are by definition self-determined (Deci & Ryan, 2000).

Regarding stages of exercise behavior change, this study found that being in action stage-of-change significantly predicted emerging adults' adherence to 2008 Guidelines. However, being in any other stage (i.e., maintenance or termination) did not significantly predict emerging adults' adherence. In past studies, increased levels of exercise have been noted within action and maintenance stages as compared with the earlier stages (Marcus et al., 1992). Past research suggests that not only is more exercise undertaken in the action and maintenance stages, but levels of physical activity associated with lifestyle choices are also increased, as seen with adolescent and young adult populations (Boyle & LaRose, 2008; Marcus & Forsyth, 2009). Yet, there remains a need to identify the mechanisms behind the observed relationship as and the relative importance of environment compared to other factors of influence. Therefore, it is currently difficult to say which characteristics of the environment have the strongest associations with the stages of change or how strong these associations are (Nelson et al., 2007). However,

the findings from the present study are substantial in that those individuals in the first stages of the model are at greater risk of developing lifestyle diseases such as cardiovascular disease and diabetes, and must thus be targeted for interventions. Outcomes from this research may also have implications for using a stage-based approach to initially increase levels of daily activity in emerging adults, followed by the introduction of structured exercise later in the cycle (Marcus & Forsyth, 2009).

### *Social factors*

Concerning social factors contributing to the uptake and maintenance of regular exercise behavior in emerging adulthood, data were obtained to test the hypothesis that high levels of perceived parental autonomy, support, and warmth would predict emerging adults' adherence to 2008 guidelines. However, this hypothesis was not supported in this study; parental autonomy support, involvement and warmth did not significantly predict emerging adults' adherence to 2008 guidelines. This may have been because despite emerging adults' increasing need to experience autonomy, there is a similar continuing need for encouragement and support from parents or significant others (Ryan, 2000). Thus, emerging adults were not reporting high levels autonomy, which could have negatively influenced perceptions of their continuing need for parental encouragement and support. Although Grolnick et al. (1997) have shown that high perceived parental autonomy support is associated with greater vitality and positive health behaviors, low perceived parental autonomy support is associated with less vitality and negative health behaviors. Unfortunately, physical activity and exercise frequency tend to decline during the adolescent years and reaches its lowest level as the adolescent nears adulthood (NCHS, 2010). Although parental support was not predictive of motivation for exercise in the present

study, study results did indicate that parental autonomy support remains highly influential in emerging adult self-determination during early college years. Findings suggest that parental autonomy support continues to influence adolescent internalization of attitudes and behaviors during emerging adulthood, but may play a lesser role in motivation for specific health-related behaviors such as exercise, as the emerging adult nears adulthood.

It was further hypothesized that having an influential parental figure in the action stage of exercise behavior change or above (i.e., action, maintenance, or termination) would predict emerging adults' adherence to 2008 guidelines; however, this hypothesis was not supported. Research suggests that in the past, because of the differences in measurement instruments and research designs, it has been difficult to determine the importance of various sources of parental influence on exercise behavior in young adults (Lim & Biddle, 2011). Thus, the current investigation indicates either: (a) the measurement instrument used in this study may not be useful in predicting exercise behavior or adherence in emerging adults or (b) individuals have an inability to report their parental figure's stage of change for current exercise behavior. In the future, other measurement instruments may be more appropriate, where other methods of data collection could warrant further consideration in this regard.

Lastly, this study found having a parental figure currently meeting 2008 guidelines significantly predicted emerging adults' also meeting guidelines. Results indicated as an influential parental figure/s moves from not meeting guidelines to meeting guidelines (i.e., inactive to active), emerging adults are 74% percent more likely to also meet guidelines – which are linked with substantial and/or extensive health benefits. In a past study, Wilson et al. (2006) indicated that individuals are more likely to be active if an influential parental figure/s is also



active. Thus, supporting the hypothesis, these findings have important implications for future research; by displaying positive health-related through regular exercise and physical activity, parents can help protect their emerging adult against obesity and other chronic diseases. Further, emerging adults with active parents received higher scores on the parental influence scale and physical activity measure, suggesting active parents are more likely to be supportive and involved in their emerging adult's efforts at being physically active or changing exercise behavior. In conclusion, there may be some tendency for parents to directly model their parent's behavior, but much of what may be going on reflects differences in encouragement and support provided by active and inactive parents. Active parents are also more likely to provide encouragement and support for active behavior (Boyle & LaRose, 2008). Thus, the present study could potentially enhance its findings by looking at the emerging adult participants who reported a parental figure currently meeting guidelines only, and seeing if parental encouragement and support was a significant predictor in those participants. Findings may be different and suggest parental encouragement and support are influential factors only when parental figures are active (i.e., meeting Guidelines).

### *Limitations*

Previous research examining TTM and SDT-based constructs in the exercise domain has been limited by use of self-report measures exclusively and inconsistent practices with regard to stage of exercise assessment. Past studies have been designed to partially circumvent these limitations and extend the current literature by determining the degree of association among stage of exercise and exercise behavior (Sheldon & Filak, 2008; Markland 2010; Landry & Solomon, 2004).

In addition, the ability to generalize the current findings is limited by the sample of emerging adult participants. Through cross-sectional design, this study utilized convenience sampling of participants to help gather useful data and information that would have not been possible using probability sampling techniques. In addition, participants were recruited from courses with health and kinesiology content (i.e., Healthful Living courses) which allowed this study to achieve the large sample size in a relatively fast and inexpensive way; it is possible that students enrolled in these courses did not adequately reflect the entire student population. Students in these courses had been learning about planning a healthy lifestyle through exercise for health and fitness prior to survey administration, potentially influencing perceptions of exercise and physical activity. In addition, students enrolled in such classes, whether they are required or elective, may have a greater interest in health and physical activity than students who pursue other coursework. As a result, it is unknown to what extent our findings represent the overall emerging adult population. The sample was not chosen at random and thus, the inherent bias of convenience sampling may undermine the ability of this study to make generalizations from the sample to the emerging adult population being studied.

Another potential limitation to this study is that emerging adults may not have been sufficiently interested in exercise, or value its outcomes enough to make it a priority in their lives (Ryan & Deci, 2000). For instance, many emerging adults may experience competing demands on their time from education, career, and family obligations, possibly at the expense of time and resources that could be invested in exercise (Arnett, 2012). In addition, some individuals may not have felt sufficiently competent at physical activities, feeling either not physically fit enough or skilled enough to perform exercise properly; or they may have had health limitations that

presented a barrier to exercise. Whether it be low interest or low perceived competence, research indicates many inactive individuals are either unmotivated (i.e., amotivated) to exercise, having no intention to exercise, or are insufficiently motivated in the face of other interests or demands on their time (Nelson et al., 2007). As the present study did not account for amotivation in the exercise self-regulation measurement, results may have not reflected those individuals associated with amotivation. Amotivation, or lack of motivation to exercise, may have influenced participant responses.

There were a number of other potential limitations to this study; it is possible that emerging adults' perceptions of their parents' exercise behavior may have had a greater influence on their own behavior than parents' themselves. Despite growing evidence that parents are an important influence on emerging adult health, few longitudinal studies have explored the causal relationship between parental influence and exercise (Lim & Biddle, 2011). Thus, there may have been design issues where the scales used in this study may have presented confusion regarding what each questionnaire was actually measuring; this may have increased interpretive errors for users who incorrectly perceive them as analogous. Another potential limitation concerned the questionnaires used; the questionnaires relied on the self-report format; the results, therefore, may have been subjected to self-report bias and unspecified amount of misclassification as to the participant's actual exercise behavior. Also, some of the wording used to depict certain exercise behaviors could have been inconsistent with the participant's corresponding descriptions, and thus may have been misrepresentative of the intended content or purpose of the item. Participant responses may have been dependent upon an individual's interpretation of test items, rather than the test stimuli alone. Therefore, inconsistencies in

responses may have been due to methodological differences making it difficult to compare results directly.

### *Conclusions*

One of the underlying foundations of this study is that behavioral maintenance and adherence is most likely to occur when motivations are intrinsic rather than extrinsic in nature. The findings from this study also suggest that emerging adults' perceived benefits and barriers of exercise are predictive of behavior, suggesting that exercise participation is linked to more desirable motivation strategies for a physically active lifestyle. Thus, it is likely that the direct relationship between parents' and emerging adults' exercise behavior constitutes only a first step in understanding how parents impact their emerging adult's exercise behavior and adherence. This could also suggest that other socializing agents, notably peers, siblings, teachers, and coaches are likely to be instrumental in shaping emerging adult's exercise behavior.

Findings further suggest that emerging adults may utilize many additional sources of information in assessing their own exercise behavior, particularly personal sources, such as the relative ease with which they learn new skills and perceive their rate of improvement in exercise and exercise-related activities. Consequently, future studies should address the influence of other socializing agents and varied sources of competence information in addressing emerging adult's behavioral perceptions on exercise – a time of great change when the effects of exercise and physical activity are needed the most (Buckworth & Nigg, 2004; Edwardson & Gorley, 2010).

Additional implications of this research relate to current recommendations by the United States Department of Health and Human Services (USDHHS, 2010) indicating the importance for college institutions to take action to address this public health problem, and understand that

the college setting can play a crucial role in the obesity epidemic by educating students and encouraging them to adopt life-long healthy behaviors. Opportunities and resources to regularly participate in exercise physical activity are all around, yet more than half of the student population does not take advantage of these resources (Markland & Ingledew, 2007). Therefore, our findings would support further examination of additional social factors, psychological mediators, and motivational predictors promoting or hindering physical activity and exercise participation in emerging adults.

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## APPENDIX A

### *Delimitations*

Using the indirect method of self-report, this investigation examined emerging adults' activity level and perceptions of parental activity level, rather than using the parents themselves. Studies that have used self-reported physical activity levels to objectively measure determinants of behavior have generally found significant associations (Welk, Wood & Morse, 2003; Boyle & LaRose, 2008). Several forms of parental influences on exercise behavior have been suggested in literature; the most frequently studied relating to parental role modeling practices (Gray, 2011). Role modeling, or young adults' vicarious identification with their parents, has been suggested as a form of influence whereby young adults' exemplify the behaviors of their parents through observational and social learning processes (Bandura, 1986). Researchers have found that parental modeling of behavior may provide positive feedback to an individual and fulfill their need for SDT-related constructs such as autonomy, competence, and relatedness; finding that positive feedback on a task greater fulfills an individual's psychological needs than negative feedback (Deci, 1971). Hence, this study used the self-report measure to assess any effect of parental modeling of behavior in emerging adulthood.

### *Assumptions*

This study assumed that because the impact of personal beliefs and environmental perceptions may differ for healthy-weight and overweight students, it would test the hypotheses separately for each group. Body mass index influences exercise behavior and thus, cognitive factors may be different in these subpopulations, necessitating different messaging approaches. Results from previous studies indicated that overweight and normal weight college students differ in their cognitive perceived facilitators to regular exercise (Gray, 2011). Furthermore, this

investigation assumed that participants put forth full effort in their responses and answered questions truthfully and to the best of their ability. Although existing findings have been contradictory in relation to gender differences in exercise participation, the investigators were also inclined to hypothesize that there would be no gender differences with respect to determinants of exercise behavior based on a large-scale study by Wilson et al. (2006).

### *Definitions*

Exercise was defined as physical activity that is planned, structured and repetitive, done to improve or maintain one or more components of physical fitness – that is aerobic endurance, muscular strength, muscular endurance, or flexibility (Marcus & Forsyth, 2009). The formula relating physical activity and exercise was:  $\text{kcal}_{\text{exercise}} + \text{kcal}_{\text{non-exercise}} = \text{kcal}_{\text{total physical activity}}$ . It was expressed as the total amount of energy expended by an individual as a continuous variable, ranging from low to high (Caspersen, Powell & Christenson, 1985). According to the 2008 Physical Activity Guidelines for Americans, adults need to engage in at least 150 minutes/week of moderate-intensity activity or its equivalent (defined as aerobically active) to obtain substantial health benefits and more than 300 minutes/week (defined as highly active) to obtain more extensive health benefits (USDHHS, 2010). In addition, the ACSM (2007) definition of regular exercise (voluntary exercise 3 or more times a week for 20 minutes or more) provided an estimate of those emerging adults/parental figures which regularly adhered to exercise and those who do not, using the *stage-of-change model* for regular exercise (Proscasca & Velicer, 1997).

APPENDIX B  
LITERATURE REVIEW

American Counsel of Sports Medicine (2007). Physical activity and public health in older adults: Recommendation from the American College of Sports Medicine and the American Heart Association. *Journal of the American Heart Association*.

The purpose of this study was to issue a recommendation on the types and amounts of physical activity needed to improve and maintain health in older adults. A panel of scientists with expertise in public health, behavioral science, epidemiology, exercise science, medicine, and gerontology conducted the study. The expert panel reviewed existing consensus statements and relevant evidence from primary research articles and reviews of the literature. The recommendation for older adults was similar to the updated ACSM/AHA recommendation for adults, but has several important differences including: the recommended intensity of aerobic activity takes into account the older adult's aerobic fitness; activities that maintain or increase flexibility are recommended; and balance exercises are recommended for older adults at risk of falls. The objectives of this article were to 1) provide a preventive recommendation on physical activity for older adults that consists of the updated ACSM/AHA recommendation for adults with additions and modifications appropriate for older adults; 2) explain and clarify the additions and modifications; and 3) discuss the promotion of physical activity in older adults so as to provide guidance about appropriate types and amounts of physical activity.



Arnett, J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*, 55(5), 469-480.

This article by J.J Arnett was the first to propose emerging adulthood as a new conception of development for the period from the late teens through the twenties, with a focus on ages 18–25. Within this study, a theoretical background was presented. Then evidence was provided to support the idea that emerging adulthood is a distinct period demographically, subjectively, and in terms of identity explorations. How emerging adulthood differs from adolescence and young adulthood was also explained. Finally, a cultural context for the idea of emerging adulthood was outlined, and it was specified that emerging adulthood exists only in cultures that allow young people a prolonged period of independent role exploration during the late teens and twenties. Arnett wanted to make the distinction that most people in this developmental stage believe they have not yet reached adulthood. Instead, they believe they are slowly progressing into adulthood. Instead of entering marriage and parenthood in their very early twenties, the author suggests most people now postpone these transitions until at least their late twenties, and spend their late teens through their mid-twenties in self-focused exploration as they try out different possibilities in love and work. Essentially, a new developmental stage has been created between adolescence and young adulthood. Scholarly attention to this period has boomed in recent years, and it is now widely referred to among scholars as emerging adulthood.

Arnett, J. (2004). *Emerging Adulthood: The winding road from the late teens through the twenties*. New York: Oxford University Press.

J.J. Arnett, the author of this book suggested that young people today wait longer than ever before to marry and become parents. What is going on in their lives from their late teens through their twenties, between the time they leave their parents' household and the time they settle into adult roles? Although there have been fictional and journalistic accounts of "Generation X" and "Generation Y," including claims that many of them suffer from a "quarter-life crisis," until now there has been little real evidence to describe what their lives are like. He described how this new stage of emerging adulthood has five key features: it is the age of identity explorations; the age of instability; the self-focused age; the age of feeling in-between; and the age of possibilities. Drawing on over 300 interviews, Dr. Arnett described diverse aspects of emerging adults' lives, including relationships with parents, love and sex, marriage hopes and fears, college experiences, the search for meaningful work, religious beliefs (or lack of them), and perceptions of what it means to be an adult.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory.  
193-209.

This article concerns the capacity to exercise control over the nature and quality of one's life is the essence of humanness. Bandura contends that human agency is characterized by a number of core features that operate through phenomenal and functional consciousness. These include the temporal extension of agency through intentionality and forethought, self-regulation by self-reactive influence, and self-reflectiveness about one's capabilities, quality of functioning, and the meaning and purpose of one's life pursuits. He also suggests that personal agency operates within a broad network of socio-structural influences. In these transactions, people are producers as well as products of social systems. Social cognitive theory distinguishes among three modes of agency: direct personal agency, proxy agency that relies on others to act on one's behalf to secure desired outcomes, and collective agency exercised through socially coordinative and interdependent effort. The author suggests that in this transactional view, personal factors in the form of cognitive, affective, and biological events; behavioral patterns; and environmental events all operate as interacting determinants that influence each other bi-directionally.

Bell, S. & Lee, C. (2005). Emerging adulthood and patterns of physical activity among young Australian women. *International Journal of Behavioral Medicine*, 12(4), 227-235.

This article describes the transition from adolescence to young adulthood as being associated with a sharp decline in physical activity, particularly for women. This article explores the relations between physical activity status and change and status and change in four life domains: residential independence, employment status, relationship status, and motherhood. Two waves of survey data from a representative sample of 8,545 Australian women, aged 18-23 were analyzed. This study found cross-sectionally, that physical inactivity was most strongly related to being a mother, married, and not being in the labor force. Longitudinally, decreases in physical activity were most strongly associated with moving into a live-in relationship, with getting married, and with becoming a mother. When considered in combination, women who were married with children and not employed outside the home were the most likely to be physically inactive. The data suggested that adoption of adult statuses, particularly traditional roles involving family relationships and motherhood, is associated with reductions in physical activity for these women, although it is possible that the effect is driven by socioeconomic factors associated with early transitions. The data also suggested a need for interventions to promote continued physical activity among young women who cohabit or marry and among those not in the workforce, in addition to those supporting young mothers to be physically active.

Boyle, J. R., & LaRose, N. R. (2008). Personal beliefs, the environment and college students' exercise and eating behaviors. *American Journal of Health Studies*, 23(4), 195-200.

This study hypothesized that better nutrition and physical activity would be related to healthy environmental perceptions and personal beliefs. They examined the relationships between physical activity/healthy dietary habits and perceptions of body weight, self-efficacy, perceived threat of health problems, awareness of and satisfaction with campus services (physical activity), and availability of healthy foods (nutrition), for overweight and healthy-weight students separately. They found that among healthy-weight students, greater self-efficacy was associated with more physical activity and healthier diets. Among overweight students, greater satisfaction with physical activity services was associated with more physical activity. Students who reported more positive personal beliefs and environmental perceptions engaged in more physical activity than students reporting less positive personal beliefs and environmental perceptions. They also found students who reported more positive personal beliefs and environmental perceptions will report healthier nutritional habits than students reporting less positive personal beliefs and environmental perceptions.

Bradley, R.H., McRitchie, S., Houts, R.M., Nader, P., & O'Brien, M. (2011) Parenting and the decline of physical activity from age 9 to 15. *International Journal of Behavioral Nutrition and Physical Activity*, 8, 1-10.

This study investigated the association between parental behaviors and the decline of physical activity in youth age 9 to age 15. Some parental influences examined included parental encouragement, transportation to physical activities, parental monitoring of physical activity, joint involvement of parents and children in physical activity, and parent's own physical activity levels. The research found that between the ages of 9 and 15 years old, both boys and girls showed a significant decline in physical activity levels. That decline in physical activity leveled off as children entered adolescence. In addition, they found boys and girls who experienced early puberty and received more parental encouragement to exercise showed slower declines in physical activity levels as they headed into adolescence. In general, although many parental variables were significant predictors of youth's physical activity levels, the magnitude of parental influences were generally small. The researchers concluded that decline in physical activity commonly seen from middle childhood to adolescence can be minimally enhanced through parenting practices. Further implications to this study should look deeper into parent's own physical activity levels and see if there are any correlations with their children's level of physical activity. Although the findings in this study support minimal parental influence on exercise, there is a possibility a stronger association could be found with detailed qualitative research.

Buckworth, J., & Nigg, C., (2004). Physical activity, exercise, and sedentary behavior in college students. *Journal of American College Health, 53*(1).

This study investigated the influence of personality traits on exercise adherence and exercise self-efficacy for undergraduate students. The researchers examined different levels of exercise adherence and amounts of exercise self-efficacy. Using the theory of planned behavior to guide their research, the authors suggest that a person's intention to perform a behavior is the central determinant of that behavior. They contended that a given person must have the opportunities and resources that are required to engage in the behavior and must perceive the behavior to be under his or her control. However, the mechanisms through which cognitions and beliefs affect exercise adherence remain poorly understood. Take the college realm for example, opportunities and resources to regularly participate in physical activity are all around, yet more than half of the student population does not take advantage of these resources. The authors of this research suggest that differences in the ways individuals attend to and process information may contribute to an individual's confidence regarding exercise behaviors. Relating this idea to TTM, people who are further along in the stages of change may have higher levels of self-efficacy.

Caspersen, C.J., Powell, K.E., & Christenson, G.M., (1985). Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public Health*, 100 (2): 126-131

This article describes how physical activity, exercise, and physical fitness are terms that describe different concepts. However, it also describes how they are often confused with one another, and the terms are sometimes used interchangeably. This paper proposed definitions to distinguish them. Physical activity was defined as any bodily movement produced by skeletal muscles that resulted in energy expenditure. The energy expenditure was measured in kilocalories. Physical activity in daily life was further categorized into occupational, sports, conditioning, household, or other activities. Exercise was found to be a subset of physical activity that is planned, structured, and repetitive and has as a final or an intermediate objective the improvement or maintenance of physical fitness. Physical fitness was considered to be a set of attributes that are either health or skill related. The degree to which people have these attributes can be measured with specific tests. The authors offered these definitions as an interpretational framework for comparing studies that relate physical activity, exercise, and physical fitness to health.



Daly, A., & Duda, J. L. (2006). Self-determination, stage of readiness to change for exercise, and frequency of physical activity in young people. *European Journal of Sport Science*, 6, 231-243.

Grounded in SDT and TTM, this study examined the relationship between exercise regulations varying in self-determination with stage of readiness to change for exercise and physical activity patterns in university students. Using a cross-sectional survey design, participants completed questionnaires relating their behavioral regulations to stage of change for exercise behavior. Linear discriminant function analyses revealed that men and women at the early stages were less self-determined in the regulation of their exercise behavior than those at the later stages of change. Additionally, men and women who were more self-determined reported being more physically active over the previous three months. Results from this study revealed that self-determination may have an important role to play in the adoption and maintenance of health-promoting behaviors in young adults.

Deci, E. L. (1971). Effects of externally mediated rewards on intrinsic motivation.

*Journal of Personality and Social Psychology, 18, 105–115.*

This was one of the earliest studies to look at the effects of motivational psychology. For this study, two laboratory experiments and one field experiment were conducted to investigate the effects of external rewards on intrinsic motivation to perform an activity. In each experiment, subjects were performing an activity during three different periods, and observations relevant to their motivation were made. The results indicated that when money was used as an external reward, intrinsic motivation tended to decrease; when verbal reinforcement and positive feedback were used, intrinsic motivation tended to increase.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11, 227-268.

*Self-determination theory* (SDT) maintains that an understanding of human motivation requires a consideration of innate psychological needs for competence, autonomy, and relatedness. This study discussed the SDT concept of needs as it relates to previous need theories, emphasizing that needs specify the necessary conditions for psychological growth, integrity, and well-being. This concept of needs lead to the hypotheses that different regulatory processes underlying goal pursuits are differentially associated with effective functioning and well-being and also that different goal contents have different relations to the quality of behavior and mental health, specifically because different regulatory processes and different goal contents are associated with differing degrees of need satisfaction. Social contexts and individual differences that support satisfaction of the basic needs facilitate natural growth processes including intrinsically motivated behavior and integration of extrinsic motivations, whereas those that forestall autonomy, competence, or relatedness are associated with poorer motivation, performance, and well-being. This study also discussed the relation of the psychological needs to cultural values, evolutionary processes, and other contemporary motivation theories.

Fallon, E. Hausenblas, H., & Nigg, C. (2005). The transtheoretical model of exercise adherence: Examining construct associations in later stages of change. *Sport and Exercise Psychology Journal*, 6. 629-641.

This study found that over 40% of Americans are sedentary and of those beginning an exercise program, 50% will drop out within 6 months. They used *transtheoretical model* TTM to describe exercise behavior and develop interventions for the initiation of exercise behavior. They suggested that less is known, however, about maintenance of exercise behavior and the construct associations for the action, maintenance, and termination stages of change. Thus, the purpose of this study was to examine which of the TTM constructs (i.e. decisional balance, processes of change, barriers-efficacy, and temptation) best distinguishes between the action, maintenance, and termination stages of change for men and women. Questionnaires measuring each of the TTM constructs were collected. Data were examined for sex differences and subsequently, two forward logistic regressions were conducted for each sex such that the dependent variables for the regressions were action/maintenance and maintenance/termination. Compared to men, women reported significantly less barriers-efficacy, greater pros of exercise, and greater use of behavioral and processes of change. For the men, affect temptation was the only significant correlate of action/maintenance, while barriers efficacy, environmental evaluation, and affect temptation were associated with maintenance/termination. For the women, environmental reevaluation and social liberation were associated with action/maintenance, while barriers-efficacy was the only construct correlated with maintenance/termination. Stage and gender specific considerations are warranted when designing stage-matched exercise interventions for long-term maintenance of exercise behavior.

Farmanbar, R., Niknami, S., Heydarnia, A., Hajizadeh, E., & Lubans, D. (2009). Predicting exercise behavior among Iranian college students using the transtheoretical model and structural equation modeling. *European Journal of Scientific Research*, 31(3), 355-365.

This study embraced the idea that while most universities appear to provide a physical environment conducive to physical activity, reports from national surveys and reviews indicate that more than 50% of college students are insufficiently active. The researchers believed factors that influence adherence to an exercise regimen is a research priority, as approximately 50% of individuals who initiate an exercise program will drop out in the first three to six months. The author's contended that few studies have examined the predictors of physical activity behavior in college students and less have addressed the issue of physical activity maintenance in this subsample. Considering that the majority of university students are not sufficiently active, it was important for the researchers to investigate factors that influence college students' decisions about choosing to be active. Gaining a clearer understanding of these factors can provide insight into strategies that can be used to encourage college students to be regularly active. The theory employed in this study was TTM which has been used successfully to explain a variety of health behaviors, including physical activity and exercise. The authors concluded that self-efficacy was the strongest predictor of exercise behavior in the study sample. Similarly, they found that self-efficacy was also the strongest predictor of physical activity behavior in a sample of university students. The findings from this study suggest that the perceived benefits and negatives of exercise behavior are predictive of behavior.

Gray, J. B. (2011). Theory guiding communication campaign praxis: A qualitative elicitation study comparing exercise beliefs of overweight and healthy weight college students. *Qualitative Research Reports in Communication*, 12(1), 34-42.

The investigators of this study examined the attitudes and control beliefs of college students regarding exercise behavior. They also questioned whether these attitudes and control beliefs regarding exercise differed for overweight vs. normal weight college students. The researchers articulated that college students are at great risk of obesity and overweight and campaigns encouraging exercise may mitigate associated health risks. They also indicated that few have studied differences between overweight and normal weight students. What they found is that body mass index influences exercise behavior and thus, cognitive factors may be different in these subpopulations, necessitating different messaging approaches. Results from this study indicated that overweight and normal weight college students differ in their cognitive perceived facilitators to regular exercise. The authors employed the Theory of Planned Behavior to predict behavior. As applied to exercise, the TPB predicts intention to exercise is formed by attitude toward the behavior, as well as the subjective norm. The intention leads to exercise behavior, and is modified by beliefs in how much power one has over exercising. This perceived control directly affects exercise behavior or modifies exercise intention. The researchers concluded that to study a population's particular beliefs, elicitation research should be advocated to discern its cognitive factors. They expressed how cognitive factors may aid health professionals in understanding a population and employing targeted variables in an exercise intervention. Work like this that is done qualitatively yields rich data based in free recall.

Grolnick, W. S., Deci, E. L., & Ryan, R. M. (1997). Internalization within the family: The self-determination theory perspective. In J. E. Grusec & L. Kuczynski (Eds.), *Parenting and children's internalization of values: A handbook of contemporary theory* (pp. 135-161). New York: Wiley.

This study linked parental autonomy support to autonomy-related child outcomes, including self-esteem, self-regulation, mental health, and causality orientations. It also showed that high perceived parental autonomy support was associated with greater vitality and self-actualization, while low perceived parental autonomy support was associated with greater separation-individuation difficulty. A more recent longitudinal study by Niemiec, Lynch, Vansteenkiste, Bernstein, Deci, & Ryan (2006), adds further reliability and validity evidence for the scale. Data collected from the parents of the college-student participants revealed that student perceptions of paternal autonomy support were positively associated with fathers' self-reported self-esteem and mental health, and that student perceptions of maternal autonomy support were positively associated with the degree of autonomous causality orientation in mothers.

Gruber, K. J. (2008). Social support for exercise and dietary habits among college students. *Adolescence*, 43(171), 557-575.

K.J. Gruber, the sole investigator of this study, formulated that support and influence of diet and exercise behavior is likely to be very different for an individual who is trying to diet or exercise to address a weight issue, than for someone who is not. Gruber believes that friend/peer communications may be more or less accepting and viewed as supporting/non-supporting depending on an individual's weight status and exercise involvement patterns. This study measured social influence patterns of college student physical activity and food consumption habit, measuring encouragement to exercise, avoidance of high fat/salty foods, support for dieting and/or exercise to lose weight, and criticism about exercise behavior. The author noted that weight gain in the first few years of college is becoming an important concern affecting the likelihood that more young adults are, or will become, obese. Reasons for this were varied, but there was clear evidence of changes in behavior patterns including lower rates of physical activity. Gruber in fact suggested with respect to weight loss and exercise that the views of close friends are more powerful motivators than those of family, claiming it is likely due to the "objectivity" friends wield and the difference between friend and family bonds that require "mutual positive exchanges between friends that are not demanded of family members".



Gunnell, K. E., Wilson, P. M., Zumbo, B. D., Mack, D. E., & Crocker, P. R. E. (2013).

Assessing psychological need satisfaction in exercise contexts: issues of score invariance, item modification and context. *Measurement in Physical Education & Exercise Science*, 16(3), 219-236.

The researchers examined if scores from the original Psychological Need Satisfaction in Exercise Scale (Wilson, Rogers, Rodgers, & Wild, 2006) were invariant from a modified version specific to physical activity and then examined measurement invariance of scores across groups on the modified scale. Three groups were examined: (a) Students/staff from a university, (b) a sample drawn from the general population, and (c) individuals living with osteoporosis. Measurement invariance was tested with four nested models using increased equality constraints per model. Results of invariance tests between two versions of the Psychological Need Satisfaction in Exercise Scale and between groups that completed the Psychological Need Satisfaction in Exercise Scale modified to physical activity supported configural and weak invariance of scores (i.e., equivalent factor structure and loadings). As such, the constructs of competence, autonomy, and relatedness were construed similarly across versions of the instrument and across two groups. Strong invariance (i.e., equivalent intercepts) was not supported, and therefore, direct score comparisons should be made with caution.

Landry, J.B., & Solomon, M.A., (2004). African American women's self-determination across the stages of change for exercise. *Journal of Sport & Exercise Psychology*, 26, 457-469.

This study acknowledged that little longitudinal research exists on the relationship between exercise self-determination and stage of change. This study investigated how self-determined motivation changes in patients with type 2 Diabetes as they moved through the stages of change over a six-month exercise trial. Hierarchical linear modelling revealed that patients who progressed through the stages of exercise change had an overall increase in self-determined motivation, while non-progressors experienced a reduction in self-determined motivation from three to six months. These results indicated that individuals engaging in regular exercise at six months maintain initial increases in self-determined motivation. Findings were discussed in light of self-determination theory.

Lau, W.C., Lee, A., Ransdell, L. (2007). Parenting style and cultural influences on overweight children's attraction to physical activity. *Obesity, 15*(9), 2293-2302.

This study investigated the associations among parenting style, gender, culture, and overweight children's attraction to physical activity. Only overweight children in grades 3 through 6 (8 to 12 years of age) were invited to participate. Overweight children were defined and identified using the international cut-off points stratified by sex and age. Questionnaires were used to assess children's attraction to physical activity, perceived competence, and parental socialization influences. Results indicated that parental influence, especially father's role modeling, was significantly related to attraction to physical activity in overweight children. Perceived physical competence was also an important correlate of an overweight child's attraction to physical activity. Gender differences in attraction to physical activity were not significant among the overweight children. However, gender differences were observed in the relationship between parent physical activity orientation and attraction to physical activity. In addition to a child's perceived competence, father's role modeling was found to provide additional and significant influence with regard to overweight children's attraction to physical activity.

Markland, D., & Ingledew, D.K., (2008). The role of motives in exercise participation.  
*Psychology and Health*, 23(7), 807-828.

The aim of this study was to better understand the role of motives in exercise participation. It was hypothesised that motives influence exercise participation by influencing behavioral regulation, and that motives are themselves influenced by personality traits. Data were from a cross-sectional questionnaire survey of office workers, mean age 40 years. Analysis was by structural equation modelling. According to the final model, appearance/weight motive increased external regulation, thereby reducing participation, and also increased introjected regulation. Health/fitness motive increased identified regulation, thereby increasing participation. Social engagement motive increased intrinsic regulation. Neuroticism increased appearance/weight motive, openness increased health/fitness motive, and conscientiousness, without affecting motives, reduced external and introjected regulation. It is inferred that exercise promotion programmes, without denigrating appearance/weight motive, should encourage other motives more conducive to autonomous motivation.

Markland, David (2010). Self-determination moderates the effects of perceived competence on intrinsic motivation in an exercise setting. *Journal of Sport and Exercise Psychology*, 21, 4.

According to Deci and Ryan's (1985) self-determination theory, perceptions of self-determination moderate the effects of perceived competence on intrinsic motivation, with perceived competence only positively influencing intrinsic motivation under conditions of some self-determination. Vallerand's (1997) hierarchical model of intrinsic and extrinsic motivation suggests that self-determination and competence have only independent effects on intrinsic motivation. The aim of this study was to test these competing models. Women aerobics participants completed measures of self-determination, perceived competence, and intrinsic motivation for exercise. Moderated hierarchical regression revealed a significant interactive effect of self-determination and perceived competence. A plot of the regression of intrinsic motivation on perceived competence under conditions of high and low self-determination, however, showed that the interaction did not take the expected form. Variations in perceived competence positively influenced intrinsic motivation only under conditions of low self-determination. This suggests that it is particularly important to foster perceptions of competence among individuals low in self-determination.

McEloy, M. (2002). Resistance to exercise. A social analysis of inactivity. *Human Kinetics, 4*.

This book examined the current epidemic of sedentary living that has beset contemporary American society. The author discussed the reasons why people who know they should be more physically active still fail to do, noting some of the obstacles to achieving a more physically active lifestyle and the implications of a possible transition from contemporary America into a more physically active society. An in-depth exploration of these occurrences was the principal focus of this book, drawing information from a wide variety of sources. From the author's personal standpoint, the most meaningful objective of this book was to stimulate others to view physical activity as a meaningful commentary on the American experience. He suggested that enhancing the legitimacy of physical activity as a topic of sociological inquiry would indeed be very gratifying.

Nelson, N.M., Wright, A., Lowry, R., & Mutrie, N. (2007). Where is the theoretical basis for understanding and measuring the environment for physical activity? *Environmental Health Insights*, 2, 111-116.

This study explored environmental correlates for understanding and measuring the environment for physical activity. The researchers suggested that before interventions and experimental investigations could be undertaken, it would be necessary to identify specific environmental features that are consistent correlates of physical activity. They noted a plethora of research measuring such cross-sectional associations since this field came to the fore in 2003. This study posited that it is time for researchers to evaluate the state of knowledge, and suggests that future developments in this field focus on the theoretical bases for (a) measurement of the environment and (b) understanding the links between perceptions of the environment and behavior through psychological theories of cognition. Key theories considered included social ecology and the theory of planned behavior. It was suggested that with a continued absence of a common conceptual framework, vocabulary and measurement tools the majority of studies may remain at a correlates stage. In highlighting issues with current methodologies, this commentary encouraged more grounded theoretical approaches to the study of the environment and physical activity.

Prochaska, J.O., & DiClemente, C.C., (1983). Stages and processes of change of self-change of smoking: toward an integrative model of change. *Journal of Consulting Clinical Psychology*, 51, (3), 390-395.

In this study, an integrative model of change was applied to the study of individuals who were changing their smoking habits on their own. Participants in this study were represented by the following five stages of change: precontemplation, contemplation, action, maintenance, and relapse. In addition, ten processes of change were expected to receive differential emphases during particular stages of change. Results indicated that participants (a) used the fewest processes of change during precontemplation; (b) emphasized consciousness raising during the contemplation stage; (c) emphasized self-reevaluation in both contemplation and action stages; (d) emphasized self-liberation, a helping relationship, and reinforcement management during the action stage; and (e) used counterconditioning and stimulus control the most in both action and maintenance stages. Those who were considered to have relapsed responded as a combination of contemplaters and people in action would. Results were discussed in terms of developing a model of self-change of smoking and enhancing a more integrative general model of change.



Prochaska, J.O., & DiClemente, C.C., (1983). Stages and processes of change of self-change of smoking: toward an integrative model of change. *Journal of Consulting Clinical Psychology*, 51, (3), 390-395.

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Prochaska, J.O., DiClemente, C.C., & Norcross, J.C. (1992). In search of how people change. *American Psychologist*, 47, 1102-1114.

This article emphasized that how people intentionally change addictive behaviors with and without treatment is not well understood by behavioral scientists. This article summarized research on self-initiated and professionally facilitated change of addictive behaviors using the key transtheoretical constructs of stages and processes of change. Modification of addictive behaviors involved progression through 5 stages: precontemplation, contemplation, preparation, action, and maintenance; and individuals typically recycled through these stages several times before termination of the addiction. This study further provided strong support for these stages as well as for a finite and common set of change processes used to progress through the stages. This investigation supported a transtheoretical model of change that systematically integrates the stages with processes of change from diverse theories of psychotherapy

Prochaska, J.O & Velicer, W.F (1997). The transtheoretical model of health behavior change. *American Journal of Health Promotion*, 12, 38–48.

Applying TTM to health behavior change, this study posited that health behavior change involved progress through six stages of change: precontemplation, contemplation, preparation, action, maintenance, and termination. Ten processes of change were identified for producing progress along with decisional balance, self-efficacy, and temptations. This study further generated a rule of thumb for at-risk populations: 40% in precontemplation, 40% in contemplation, and 20% in preparation. Across 12 health behaviors, consistent patterns were found between the pros and cons of changing and the stages of change. The researchers demonstrated dramatic improvements in recruitment, retention, and progress using stage-matched interventions and proactive recruitment procedures. They found the most promising outcomes to date were with computer-based individualized and interactive interventions, where the most promising enhancement to the computer-based programs was personalized counselors. This study suggested that if results with stage-matched interventions continue to be replicated, health promotion programs will be able to produce unprecedented impacts on entire at-risk populations.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55, 68–78.

This article posited that human beings can be proactive and engaged or, alternatively, passive and alienated, largely as a function of the social conditions in which they develop and function. Accordingly, this study was guided by SDT that has focused on the social–contextual conditions that facilitate versus forestall the natural processes of self-motivation and healthy psychological development. Specifically, factors were examined in this study that enhanced versus undermined intrinsic motivation, self-regulation, and well-being. The findings of this study led to the postulate of three innate psychological needs—competence, autonomy, and relatedness—which when satisfied yield enhanced self-motivation and mental health and when thwarted lead to diminished motivation and well-being. Also considered was the significance of these psychological needs and processes within domains such as health care, education, work, sport, religion, and psychotherapy. (PsycINFO Database Record (c) 2013 APA, all rights reserved)

Ryan, R. M., & Deci, E. L. (2006). Self-regulation and the problem of human autonomy: Does psychology need choice, self-determination, and will? *Journal of Personality*, 74, 1557-1586.

This study used the term autonomy literally to refer to the regulation by the self. Using the framework of SDT, this study reviewed research concerning the benefits of autonomous versus controlled regulation for goal performance, persistence, affective experience, quality of relationships, and well-being across domains and cultures. Furthermore, the researchers addressed some of the controversies and terminological issues surrounding the construct of autonomy, including critiques of autonomy. This study suggested that there is a universal and cross-developmental value to autonomous regulation when the construct is understood in an exacting way, where findings indicated that applying SDT and the empirical evidence it yields fosters healthy self-regulation and positive mental health. It was concluded from this program of research that autonomy is a salient issue across development, life domains, and cultures and is of central importance for personality functioning and wellness.

Ryan, R.M., Patrick, H., Deci, E.L., & Williams, G.C., (2008). Facilitating health behavior change and its maintenance: Interventions based on self-determination theory. *The European Health Psychologist*, 10, 2-5.

This study related SDT to health behaviors supporting a consistent and interesting pattern of findings. They found that if patients have their psychological needs for autonomy, competence, and relatedness supported in the process of their health care, they experience more volitional engagement in treatment and maintain outcomes better over time. This pattern of findings appeared to hold for broad lifestyle changes such as smoking cessation or exercise regulation, as well as discrete behaviors such as the adherent use of medications. These findings call for additional research to more clearly elucidate the active components of autonomy, competence, and relatedness supports, the types of practitioner care that facilitate effective change. This study suggested that health behavior change research should move forward based on the premise that human behavior plays a critical role in health outcomes and in the efficacy of most treatments. Given this, evidence based on SDT suggested that health care professionals can enhance their efficacy through support of patients' psychological needs for autonomy, competence, and relatedness. This study found doing so not only enhances important patient outcomes but also approximates the ethical ideals of promoting patient autonomy and responsibility in health care decision-making and intervention.

Ryan, R. M., Williams, G. C., Patrick, H., & Deci, E. L., (2009). Self-determination theory and physical activity: The dynamics of motivation in development and wellness. *Hellenic Journal of Psychology*, 6, 107-124.

To introduce the issue, this article overviewed SDT as it was applied to physical activity, sport, and health. This study distinguished intrinsic and extrinsic motivations for physical activities and specified separate mini-theories addressing the nature, determinants, and consequences of each. Cognitive evaluation was found to detail the central role of intrinsic motivation in both sport and physical activity, while the impact of autonomy and competence supports was found to promote people's intrinsic motivation. This study further reviewed basic psychological need theory (BPNT), which specified the role of autonomy, competence, and relatedness satisfaction in facilitating and sustaining motivation, and the impact of intrinsic (e.g., health) and extrinsic (e.g., attractiveness) goals in physical activity. The researchers then outlined a SDT perspective on vitality and its depletion, including new research on how contact with nature can enhance subjective energy. The study concluded by discussing field research, including controlled clinical trials, testing the efficacy of SDT-based interventions in the promotion of physical activity and other health-related outcomes.

Scarpa, S., & Nart, A. (2012). Influences of perceived sport competence on physical activity enjoyment in early adolescents. *Social Behavior & Personality: An International Journal*, 40(2), 203-204.

This study concerned the importance of physical education as a time to develop physical activity habits and good physical fitness, as well as to enhance interest in sports and activities. This study proposed that children can establish regular exercise habits from the process of participating in physical education class, as explored the degree of sports enjoyment and learning satisfaction when children were involved in physical education class, as well as the prediction of learning satisfaction using sports enjoyment. Adolescent students took part in the questionnaire that was taken. Results showed that gender did not reach significance in sports enjoyment and learning satisfaction; different grade levels reached significance in sport enjoyment but not in learning satisfaction. Population variables did not reach significance in the prediction of learning satisfaction. However, competition process, sports ability, and social support of sports enjoyment did reach significance in the prediction of learning satisfaction. This study concluded that physical education teachers can adjust teaching strategies to enhance the sports enjoyment and learning satisfaction of students and encouraged future researchers to add physical fitness, parental support, exercise time, and other variables to explore in more detail.



Sheldon, K. M., & Filak, V. (2008). Manipulating autonomy, competence and relatedness support in a game-learning context: New evidence that all three needs matter. *British Journal of Social Psychology*, 47, 267-283.

Self-report correlational data found in this study supported SDT's postulate that there are three basic psychological needs, for autonomy, competence, and relatedness, which combine additively to predict well-being and thriving. This study described that experimental research in the SDT tradition has focused only on autonomy support, not relatedness and competence support. To fill this gap, this study employed a 2x2x2 factorial design within a game-learning experience to predict rated need satisfaction, mood, and motivation, and also objective game performance. Manipulated competence and relatedness support had main effects on most outcomes; rated competence, relatedness, and autonomy need satisfaction also predicted the outcomes, and the significant experimental main effects were all mediated by the corresponding rated variables. Neutral control group data showed that thwarting participants' needs was more impactful than enhancing them, offering new support for key postulates of SDT, while integrating the correlational and experimental traditions in this area.

Vlachopoulos, S. P., & Michailidou, S. (2006). Development and initial validation of a measure of autonomy, competence, and relatedness in exercise: The Basic Psychological Needs in Exercise Scale. *Measurement in Physical Education and Exercise Science*, 10, 179-201.

This article demonstrated the development process and initial validation of the Basic Psychological Needs in Exercise Scale (BPNES) are presented in the study. The BPNES was a domain-specific self-report instrument designed to assess perceptions of the extent to which the innate needs for autonomy, competence, and relatedness (Deci & Ryan, 2000) are satisfied in exercise. The results of this study demonstrated an adequate factor structure, internal consistency, generalizability across samples, and discriminant/predictive validity. The stability of the BPNES scores was found over a four week period, with scores largely unaffected by socially desirable responding and specifically the tendency for impression management. As far as the relationship with the motivational outcome, all were found to be more strongly correlated with autonomy and competence rather than relatedness. In addition, it was found that enjoyment and interest in exercise was more strongly correlated with autonomy and competence compared to the remaining outcomes.

Vlachopoulos, S. P., & Neikou, E. (2007). A prospective study of the relationships of autonomy, competence, and relatedness with exercise attendance, adherence, and dropout. *Journal of Sports Medicine and Physical Fitness*, 47, 475-482.

This study examined the mediating role of the psychological needs for autonomy, competence, and relatedness in the relationship between perceived autonomy support and levels of subjective vitality among exercise participants at the situational level of generality. In addition, this study examined the validity of the needs universality hypothesis across gender in exercise. Participants completed scales assessing situational exercise-instructor perceived autonomy support, psychological needs satisfaction, and levels of subjective vitality at the end of a single exercise class. Multiple sample latent variable structural equation modeling supported both partial mediation of the psychological needs in the relationship between perceived autonomy support and subjective vitality across gender, providing support for the needs universality hypothesis. These findings opened new research avenues to test the relative effectiveness of various exercise instructing styles on improving psychological health and well-being.

Vlachopoulos, S. P., Ntoumanis, N., & Smith, A. L. (2010). The basic psychological needs in exercise scale: translation and evidence for cross-cultural validity. *International Journal of Sport and Exercise Psychology*, 8, 394-412.

This study reported on the psychometric evaluation and cross-cultural validity of the Basic Psychological Needs in Exercise Scale (BPNES; Vlachopoulos & Michailidou, 2006) translated from Greek into English. The data obtained from British exercise participants supported the hypothesized 3-factor structure, showed satisfactory internal reliability coefficients, and offered evidence for the factor concurrent, discriminant, and nomological validity of the translated scale. Cross-cultural validity analyses across British and Greek participants supported configural invariance and partial metric, partial strong, and partial strict factorial invariance of the BPNES responses. The findings of this study provided promising evidence for the validity and reliability of the translated BPNES and support the use of the scale in single-culture and cross-culture exercise-related motivational research within the self-determination theory framework.

Weiss, M. (2000). Motivating kids in physical activity. *Presidents' Council on Physical Fitness and Sports Research Digest, Series 3, IV, 11.*

In this article, Weiss introduced his 'ten commandments' for maximizing motivation in physical activity. He described the number of physiological and psychological health benefits of physical activity suggesting that people know they should exercise, but staying motivated is another story. Weiss suggested that because active children may lead to active adolescents and adults, researchers should focus their efforts on the youngest members of society. Weiss described his ten commandments suggesting that one should: focus on teaching and practicing skills, modify skills and activities, set realistic expectations for each child, become an excellent demonstrator, catch kids doing things correctly, reduce kids' fears of trying skills, keep instructions short and simple, be enthusiastic, build character, and let children make some of their own choices. Weiss suggested that in turn, these perceptions and emotions are the keys to solving the mystery of motivating kids in physical activity.

Welk, G.J.; Wood, K. & Morss, G. (2003). Parental influences on physical activity in children: An exploration of potential mechanisms. *Pediatric Exercise Science*, 15, 19-33.

This study examined the utility of a model to explain parental influence on children's physical activity. Children completed a survey with scales assessing physical activity, attraction to activity, perceived competence, and perceived parental influence. Self-report data on the physical activity levels of parents were also obtained to test the hypothesis that active parents may provide more encouragement and support for their children. This study found that correlations between parent and child levels of activity levels were low, but children of active parents had higher scores on the parental influences measures and psychosocial correlates than inactive parents. This study further provided confirmation of the important influence that parents exert on their child's physical activity behavior by testing the predictive and discriminant validity of the a proposed battery of parental influence measures.

Wilson, P. M., Rogers, W. T., Rodgers, W. M., & Wild, T. C., (2006). The Psychological Need Satisfaction in Exercise Scale. *Journal of Sport and Exercise Psychology*, 28, 231-251.

This study provided initial construct validity evidence for scores derived from the Psychological Need Satisfaction in Exercise (PNSE) scale, a multidimensional instrument designed to measure perceived psychological need satisfaction in line with Deci and Ryan's (1985, 2002) self-determination theory (SDT). Participants completed the PNSE along with proxy measures of need satisfaction. The results of an exploratory factor analysis supported the retention of a 3-factor measurement model underpinning PNSE responses; confirmatory factor analysis conducted in this study corroborated the tenability of the 3-factor measurement model in males and females and indicated partial support for invariance of PNSE scores across gender. Additionally, the scores on both the PNSE-Competence and PNSE-Relatedness subscales displayed a pattern of convergence with proxy measures. High internal consistency estimates returned a Cronbach  $\alpha > 0.90$  for all PNSE subscale scores, and participants reported high levels of need satisfaction in exercise contexts. Overall, the findings suggested that the PNSE displayed a number of psychometric characteristics that rendered the instrument useful for examining psychological need satisfaction in exercise contexts.

Wilson, P. M., & Rogers, W. T. (2008). Examining relationships between perceived psychological need satisfaction and behavioural regulations in exercise. *Journal of Applied Biobehavioral Research*, 13, 119-142.

The purpose of this study was to examine the proposition that psychological need satisfaction plays a role in the motives regulating exercise behavior. Participants completed self-report instruments assessing perceived psychological need satisfaction and exercise regulation at the outset and end of a 12-week structured exercise class. This study found greater perceived psychological need satisfaction predicted endorsement of more self-determined exercise regulations in the structural equation modeling analysis. In addition, change score analyses revealed that increased perceived need fulfillment was positively correlated with more self-determined exercise regulations, although this pattern was most prominent for competence and autonomy. Collectively, these findings indicated perceptions of competence and autonomy, and to a lesser extent relatedness, represent important factors shaping exercise motivation. The researchers suggested continued investigation of basic psychological need fulfillment via exercise appears justified.



APPENDIX C

TABLES AND FIGURES

(Table 1)

SOC – exercise behavior (EA)	(n) Frequency	(%) Percent
Precontemplation	n=22	5%
Contemplation	n=33	8%
Preparation	n=135	31%
Action	n=110	25%
Maintenance	n=64	15%
Termination	n=71	16%
Total	N= 435	100%
*Relapse (yes)	n= 128	30%

(Table 2)

Influential Parental Figure (PF) (health and well-being)	(n) Frequency	(%) Percent
Mother	n=233	57%
Father	n=147	36%
Mother & Father	n=11	3%
Other	n=19	4%
Total	N= 410	100

(Table 3)

SOC – exercise behavior (PF)	(n) Frequency	(%) Percent
Precontemplation	n=68	16%
Contemplation	n=33	8%
Preparation	n=122	28%
Action	n=29	7%
Maintenance	n=82	19%
Termination	n=97	22%
Total	N= 431	100%
*Relapse (yes)	n=148	35%

(Table 4)

Distance – (from PF)	(n) Frequency	(%) Percent
Live with Parental Figure	n=55	13%
<20 miles	n=14	3%
<50 miles	n=24	6%
<100	n=59	14%
<200	n=103	24%
200+	n=174	40%
Total	N=429	100%

(Table 5)

Communication – Days/Week (PF)	(n) Frequency	(%) Percent
0	n=15	4%
1	n=34	8%
2	n=28	6%
3	n=60	15%
4	n=37	9%
5	n=33	8%
6	n=36	8%
7	n=179	42%
Total	N= 422	100%

(Table 6)

Basic Psychological Needs in Exercise (BPNES)	Mean (M)	Standard Deviation (SD)
Autonomy	3.66	.89
Competence	3.43	.95
Relatedness	3.75	1.09

(Table 7)

Perceived Competence (PCS)	Mean (M)	Standard Deviation (SD)
Total perceived competence	5.22	1.49

(Table 8)

Self-Regulation in Exercise (SRQ-E)	Mean (M)	Standard Deviation (SD)
External regulation	4.41	1.53
Introjected regulation	3.89	1.37
Identified regulation	5.07	1.14
Intrinsic motivation	3.76	1.63

(Table 9)

Perceptions of Parents (POPS)	Mean (M)	Standard Deviation (SD)
Involvement	5.21	.81
Autonomy Support	5.61	1.11
Warmth	6.14	1.06

(Table 10)

SDT/TTM Predictor Variables	Pearson Correlation	Sig. (2-tailed)
Perceived competence	.445**	.000
External regulation	.194**	.000
Introjected regulation	.253**	.000
Identified regulation	.393**	.000
Intrinsic motivation	.429**	.000
Autonomy	.251**	.000
Competence	.383**	.000
Relatedness	.252**	.000
Involvement	.078	.107
Autonomy Support	.169**	.000
Warmth	.118*	.014
SOC – EA	.477**	.000
Relapse	.327**	.000

\*p<.05, \*\*p<.01, \*\*\*p<.001

(Table 11)

Significant Predictors of Meeting 2008 PA Guidelines for Americans – (EA)	B value	Odds Ratio
Total Perceived Competence	.625	1.869**

Relatedness satisfaction	.540	1.716*
Intrinsic Motivation	.334	1.397*
Action SOC – exercise behavior (EA)	-1.841	.159***
Parental figure currently meeting 2008 physical activity guidelines	-1.326	.265***

\*p<.05, \*\*p<.01, \*\*\*p<.001

(Figure 1)

## BPNE

### The Basic Psychological Needs in Exercise Scale (BPNES)

Instructions: The following sentences refer to your overall experiences in exercise as opposed to any particular situation. Using the 1-5 scale below, please indicate the extent to which you agree with these statements by circling one number for each statement:

1	2	3	4	5
Don't agree at all	Agree a little bit	Somewhat agree	Agree a lot	Completely agree

1. I feel I have made a lot of progress in relation to the goal I want to achieve \_\_\_\_\_
2. The way I exercise is in agreement with my choices and interests \_\_\_\_\_
3. I feel I perform successfully the activities of my exercise program \_\_\_\_\_
4. My relationships with the people I exercise with are very friendly \_\_\_\_\_
5. I feel that the way I exercise is the way I want to \_\_\_\_\_
6. I feel exercise is an activity which I do very well \_\_\_\_\_
7. I feel I have excellent communication with the people I exercise with \_\_\_\_\_
8. I feel that the way I exercise is a true expression of who I am \_\_\_\_\_
9. I am able to meet the requirements of my exercise program \_\_\_\_\_
10. My relationships with the people I exercise with are close \_\_\_\_\_
11. I feel that I have the opportunity to make choices with regard to the way I exercise \_\_\_\_\_

---

Key. Autonomy: 2, 5, 8, 11; Competence: 1, 3, 6, 9; Relatedness: 4, 7, 10

(Figure 2)

## PCS

### Perceived Competence Scale (regular exercise)

Instructions: Please indicate the extent to which each statement is TRUE for YOU, assuming that you were to either begin now a permanent regimen of exercising regularly or to permanently maintain your regular exercise regimen.

Use the following scale:

1	2	3	4	5	6	7
Not at all true			Somewhat true			Very true

1. I feel confident in my ability to exercise regularly. \_\_\_\_\_
2. I now feel capable of exercising regularly. \_\_\_\_\_
3. I am able to exercise regularly over the long term. \_\_\_\_\_
4. I am able to meet the challenge of exercising regularly. \_\_\_\_\_

---

Key. Total PC = sum of responses /4

(Figure 3)

## SRQ-E

### Exercise Self-Regulation Questionnaire (exercise motivation)

Instructions: There are a variety of reasons why people exercise. Please indicate how true each of these reasons is for you and why you exercise.

Use the following scale:

1	2	3	4	5	6	7
Not at all true			Somewhat true			Very true

Why do you exercise?

1. Because I simply enjoy exercise.
2. Because exercise is important and beneficial for my health and lifestyle.
3. Because I would feel bad about myself if I didn't do it.
4. Because it is fun and interesting.
5. Because others like me better when I am in shape.
6. Because I'd be afraid of falling too far out of shape.
7. Because it helps my image.
8. Because it is personally important to me to exercise.
9. Because I feel pressured to exercise.
10. Because I have a strong value for being active and healthy.
11. For the pleasure of discovering and mastering new training techniques.
12. Because I want others to see me as physically fit.

---

Key. External regulation: 5, 7, 12; Introjected regulation: 3, 6, 9; Identified regulation: 2, 8, 10; Intrinsic motivation: 1, 4, 11.

(Figure 4)

## SOC

### Stage of Change Model (regular exercise)

Instructions: Please be sure to read the question carefully. Also, please indicate whether or not you have exercised in the past, but are not currently doing so:

\*(Regular exercise is any planned, repetitive voluntary activity performed to increase physical fitness 3 or more times per week, for 20 minutes or more each time at a level that increases breathing and/or heart rate)

Please choose ONE:

1. I currently do not exercise. \_\_\_\_\_
2. I currently do not exercise, but intend to exercise more in the next 6 months. \_\_\_\_\_
3. I currently exercise some, but not regularly \_\_\_\_\_
4. I currently exercise regularly, but have only begun doing so in the past 6 months. \_\_\_\_\_
5. I currently exercise regularly, and have done so for longer than 6 months. \_\_\_\_\_
6. I currently exercise regularly, and have done so for longer than 5 years. \_\_\_\_\_
  
7. I have exercised regularly in the past, but am not doing so currently.\* \_\_\_\_\_

---

Key. 1: precontemplation, 2: contemplation, 3: preparation, 4: action, 5: maintenance, 6: termination

\*All subjects who endorse relapse will also endorse another item.

\*Relapse is not conceptualized as a distinct stage



(Figure 5)

## SOC

### Stages-of-Change Model (parental figure)

Instructions: Please choose ONE item that most closely matches your parental figure's exercise habits:

Stage	Item
Precontemplation	My parental figure currently does not exercise, and does not intent to start exercising within the next 6 months.
Contemplation	My parental figure currently does not exercise, but is thinking about starting to exercise within the next 6 months.
Preparation	My parental figure currently exercises some, but not regularly <sup>a</sup> .
Action	My parent currently exercises regularly, but has only begun doing so within the last 6 months.
Maintenance	My parent currently exercises regularly, and has done so for longer than 6 months.
Termination	My parent currently exercises regularly, and has done so for longer than 5 years.
Relapse <sup>b</sup>	My parent has exercised regularly in the past, but is not doing so currently.

---

<sup>a</sup> Regular exercise = 3 or more times per week for 20 min or more at each time.

<sup>b</sup> All subjects who endorse parent relapse will also endorse another item.

Relapse is not conceptualized as a distinct stage

(Figure 6)

## POPS

### Perception of Parents Scale (POPS)

Please answer the following questions about your PARENTAL FIGURE. If you do not have any contact with your parental figure, leave the questions about that parent blank.

Please use the following scale:

1	2	3	4	5	6	7
Not at all true			Somewhat true			Very true
1. My parent seems to know how I feel about things.						_____
2. My parent tries to tell me how to run my life						_____
3. My parent finds time to talk with me.						_____
4. My parent accepts me and likes me as I am.						_____
5. My parent, whenever possible, allows me to choose what to do.						_____
6. My parent doesn't seem to think of me often.						_____
7. My parent clearly conveys her love for me.						_____
8. My parent listens to my opinion or perspective when I've got a problem.						_____
9. My parent spends a lot of time with me.						_____
10. My parent makes me feel very special.						_____
11. My parent allows me to decide things for myself.						_____
12. My parent often seems too busy to attend to me.						_____
13. My parent is often disapproving and unaccepting of me.						_____
14. My parent insists upon my doing things her way.						_____
15. My parent is not very involved with my concerns.						_____
16. My parent is typically happy to see me.						_____
17. My parent is usually willing to consider things from my point of view.						_____
18. My parent puts time and energy into helping me.						_____
19. My parent helps me to choose my own direction.						_____
20. My parent seems to be disappointed in me a lot.						_____
21. My parent isn't very sensitive to many of my needs.						_____

---

Key. Involvement: 3, 6®, 9, 12®, 15®, 18; Autonomy support: 1, 2®, 5, 8, 11, 14®, 17, 19, 21®; Warmth: 4, 7, 10, 13®, 16, 20®

## APPENDIX D

### IRB APPROVAL

Completion Report

Page 1 of 1

#### CITI Collaborative Institutional Training Initiative

##### Human Subjects-Social & Behavioral Research - Basic/Refresher Curriculum

Completion Report  
Printed on 9/24/2012

**Learner:** Chad Johnson (username: cj01681)

**Institution:** Georgia Southern University

**Contact Information**  
Georgia Southern University  
1332 Southern Drive Statesboro, GA 30458  
Department: Health and Kinesiology  
Phone: (912) 478-1990  
Email: cj01681@georgiasouthern.edu

**Human Subjects-Social & Behavioral Research - Basic/Refresher:** Choose this group to satisfy CITI training requirements for Investigators and staff involved primarily in Social/Behavioral Research with human subjects.

##### Stage 1. Basic Course Passed on 09/24/12 (Ref # 8832360)

Required Modules	Date Completed	
Belmont Report and CITI Course Introduction	09/24/12	3/3 (100%)
Students in Research	09/24/12	10/10 (100%)
History and Ethical Principles - SBR	09/24/12	5/5 (100%)
Defining Research with Human Subjects - SBR	09/24/12	5/5 (100%)
The Regulations and The Social and Behavioral Sciences - SBR	09/24/12	5/5 (100%)
Assessing Risk in Social and Behavioral Sciences - SBR	09/24/12	5/5 (100%)
Informed Consent - SBR	09/24/12	5/5 (100%)
Privacy and Confidentiality - SBR	09/24/12	5/5 (100%)
Conflicts of Interest in Research Involving Human Subjects	09/24/12	5/5 (100%)
Elective Modules	Date Completed	
Unanticipated Problems and Reporting Requirements in Biomedical Research	09/24/12	6/6 (100%)
Cultural Competence in Research	09/24/12	5/5 (100%)
Records-Based Research	09/24/12	2/2 (100%)
Research with Prisoners - SBR	09/24/12	1/4 (25%)

**For this Completion Report to be valid, the learner listed above must be affiliated with a CITI participating institution. Falsified information and unauthorized use of the CITI course site is unethical, and may be considered scientific misconduct by your institution.**

Paul Braunschweiger Ph.D.  
Professor, University of Miami  
Director Office of Research Education  
CITI Course Coordinator

[Return](#)

file://C:\Users\cj01681\Downloads\CITI Basic Refresher - Chad Johnson.htm

2/5/2013

Georgia Southern University  
Office of Research Services & Sponsored Programs  
**Institutional Review Board (IRB)**

Phone: 912-478-0843		Venzey Hall 2021
Fax: 912-478-0719	IRB@GeorgiaSouthern.edu	P.O. Box 8005 Statesboro, GA 30460

**To:** Chad Johnson  
Dr. Jody Langdon

**cc:** Charles E. Patterson  
Vice President for Research and Dean of the Graduate College

**From:** Office of Research Services and Sponsored Programs  
Administrative Support Office for Research Oversight Committees  
(IACUC/IBC/IRB)

**Date:** 10/3/13

**Initial Approval Date:** 7/24/13

**Expiration Date:** 6/30/14

**Subject:** Status of Amendment Request for Approval to Utilize Human Subjects in Research – Amendment 1

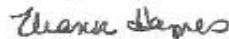
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After a review of your Amendment Request for research project numbered **H14007** and titled **"Parental Influences on Exercise Behavior in Emerging-Adult Children: An Exploration of Potential Mechanisms,"** it appears that (1) the research subjects are at minimal risk, (2) appropriate safeguards are planned, and (3) the research activities involve only procedures which are allowable. You are authorized to enroll up to a maximum of 3000 subjects.

*Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that the Institutional Review Board has approved your amendment.*

If you wish to continue the project after 3 years you must reapply to the IRB as a new project. In the interim, please provide the IRB with any information concerning any significant adverse event, **whether or not it is believed to be related to the study**, within five working days of the event. In addition, if a change or modification of the approved methodology becomes necessary, you must notify the IRB Coordinator prior to initiating any such changes or modifications. At that time, an amended application for IRB approval may be submitted. Upon completion of your data collection, you are required to complete a *Research Study Termination* form to notify the IRB Coordinator, so your file may be closed.

Sincerely,



Eleanor Haynes  
Compliance Officer

Jack N. Averitt College of Graduate Studies

**Application for Approval of Thesis Topic and Committee Membership  
(Thesis Prospectus)**

Master's candidates in a thesis program should file this form as soon as they can get approval from their committee. Graduation is based on the date by which a student defends the thesis and completes all remaining degree requirements (including, but not limited to, courses, payment of tuition and fees, and submission of the final approved thesis). If you must graduate with a specific semester, it is important that you review the filing dates and contact the College of Graduate Studies if you have any questions.

Minor changes in the thesis title can be made after this form has been submitted. However, major title changes, a new thesis title or committee membership changes will require the submission of a new application form.

Student Name: Johnson Chad R Eagle ID #: 

9	0	0	2	1	3	1	2	6
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Last Name      First Name      Middle Initial

Address: 202 Wildwood Dr. Statesboro Georgia 30458

Street Address      City      State      Zip

E-mail: cj01681@georgiasouthern.edu

E-mail Address

Degree: MS  Major: Kinesiology  Dept: Health & Kinesiology

*RG* *Sp1 PSY*

Proposed Thesis Title: Exercise Behavior in Emerging Adulthood: An Exploration of Parental Influences

**THESIS COMMITTEE (ALL MEMBERS OF THE THESIS COMMITTEE MUST SIGN THIS FORM)**

Chair: [Signature] Member: [Signature]

Print Name: Jody Leigdon Date: 08/09/2013 Print Name: Daniel Czech Date: 08/09/2013

Member: [Signature] Member: \_\_\_\_\_

Print Name: Brigget Melton Date: 08/09/2013 Print Name: \_\_\_\_\_ Date: \_\_\_\_\_

Non-GSU Faculty Member: \_\_\_\_\_

Print Name: \_\_\_\_\_ Date: \_\_\_\_\_

Address: \_\_\_\_\_ Email (required): \_\_\_\_\_

Dept Chair/Program Director Signature Required: [Signature]

Print Name: Jim McMillen Date: 08/09/2013

Completed form must be submitted to the College of Graduate Studies for Final Approval

Approved       Denied      [Signature]      8/12/13

Dean, College of Graduate Studies      Date



Veazey Hall Room 2000 Phone (912) 478-0578 Fax: (912) 478-0605  
http://cogs.georgiasouthern.edu/

Thesis Title Approval (Thesis Prospectus) 09/2009