

5-2013

Self-Regulation and Physical Activity in WKU Employees

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SELF-REGULATION AND PHYSICAL ACTIVITY IN WKU EMPLOYEES

A Thesis
Presented to
The Faculty of the Department of Psychology
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
Of the Requirements for the Degree
Master of Arts

By
Scott Perkins

May 2013

SELF-REGULATION AND PHYSICAL ACTIVITY IN WKU EMPLOYEES

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SELF-REGULATION AND PHYSICAL ACTIVITY IN WKU EMPLOYEES

Scott Perkins

May 2013

58 Pages

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Many Americans do not engage in the recommended amount of physical activity, and thus do not receive the potential physical and mental health benefits from physical activity. Stage of change is a model that categorizes individuals into one of five stages based on behavior and intentions for future behavior. This model is useful for promoting physical activity because it allows for tailoring of interventions to individuals with different physical activity levels and readiness for change. The main purpose of this research was to test if more adaptive scores for Essential Self-Regulation Model (ESRM) constructs are found for persons in higher stages of change. Analyses included 96 Western Kentucky University faculty and staff to test the hypothesis that as stage of change increases, the more adaptive the scores will be in regard to the ESRM constructs, including: self-determination (i.e., subtypes of motivation), self-efficacy, attributions, goal setting, strategy use, and self-monitoring. The results supported this hypothesis for intrinsic, integrated, and identified subtypes of motivation, cost, self-efficacy, and goal setting. Constructs that were not significant but had results in the hypothesized direction were introjected and amotivated subtypes of motivation, strategy use, and self-monitoring. Attribution scores resulted in the opposite of the hypothesized direction. Conclusions, limitations, implications, and suggestions for future research are discussed.

Introduction

It is well known that regular exercise results in many physical (e.g., decreased risk of heart disease, diabetes) and mental (e.g., improved mood, reduced stress) health benefits (Centers for Disease Control and Prevention [CDC], 2011). Although these mental and physical benefits are known facts in American society, there still exist a large majority who do not engage in exercise on a regular basis. According to the 2009 National Health Interview Survey (NHIS), only one-third of adults in America regularly engage in physical activity (PA) (Pleis, Ward, & Lucas, 2010). Regular PA is defined as, “At least three sessions per week of vigorous leisure-time PA lasting at least 20 minutes or at least five sessions per week of light to moderate PA lasting at least 30 minutes” (Pleis et al., 2010, p. 85).

Since many Americans do not exercise regularly, it is important to recognize the methods for facilitating and maintaining regular exercise. One way to do this is through the use of theory-based interventions supported by behavioral research that incorporates valid measures (Dunn, 1996). In 1996, two reviews were published that did not find any theory-based approaches for increasing PA (Dishman & Buckworth, 1996; Hillsdon & Thorogood, 1996). Dunn (1996) stressed the need for theory-based approaches in a review of PA adoption and maintenance studies. More recently, Kahn et al. (2002) reviewed theory-based interventions and found most to be below the level of “good execution” (see Zaza et al., 2000 for review procedure). Interventions based on a single theory are limited in that they only focus on changing one aspect of behavior, such as goal setting or self-monitoring. Incorporating several theories into an intervention model

may increase effectiveness by utilizing the strengths of many theory-based interventions simultaneously (Baranowski, Anderson, & Carmack, 1998).

Zimmerman (2000) developed a self-regulation model based on social cognitive theory that incorporated several theories and strategies for facilitating and adhering to behavior change. A more simplified, pragmatic model of self-regulation was developed from Zimmerman's model, called the Essential Self-Regulation Model (ESRM; Winger & Smith, 2012; See Table 1). The ESRM was developed for use in the contexts of education and exercise. It includes only the essential constructs of self-regulation in order to produce behavior change. Like Zimmerman's model, the ESRM has three phases of self-regulation which include planning, applying, and reflecting. The main constructs incorporated in this model are self-determination theory (SDT), expectancy-value theory, self-efficacy theory, attribution theory, goal theory, strategy identification and implementation, and self-monitoring. To this date research has not been found incorporating several theories into a model such as ESRM, let alone an examination of differences for model constructs across a stage-based intervention model. A stage-based intervention model with empirical support and intervention success is stages of change (also known as the transtheoretical model).

Several constructs within the ESRM have been examined using stages of change (e.g., SDT, Dacey, Baltzell, & Zaichkowsky, 2008; self-efficacy, Marcus, Selby, Niaura, & Rossi, 1992). Within stages of change, individuals can be categorized into one of five stages based on their current exercise behavior and intentions for future exercise behavior. These stages include precontemplation, contemplation, preparation, action, and maintenance. The main purpose of this research was to determine if more adaptive

Table 1

Essential Self-Regulation Model

Phase	Process	Course of Action	Relevant Constructs
Planning	Task Analysis	-Do I value the outcome? -Do I believe I can?	-SDT & ExV -SE & Attribution
	Goal Setting	-What goals do I want to achieve?	-Goal
	Strategy Identification	-What are the best strategies to help me achieve my goals?	-Contingent upon strategies
Applying	Strategy Implementation	- Use strategies.	
	Monitoring	- Check and re-check progress.	-Feedback (SDT competence & formative feedback lit.)
Reflecting	Evaluation	- Reflect on the outcome.	-Goal & Attribution

Note: SDT = Self-Determination Theory, ExV = Expectancy Value Theory, SE = Self-Efficacy.

scores for ESRM constructs are found for persons in higher stages of change. Adaptive scores refer to levels that make it more likely that an individual will engage in regular PA. For example, higher scores on intrinsic motivation indicate enjoyment of activity, whereas lower scores on cost indicate less perceived barriers to exercise, both of which would increase the likelihood of engaging in PA. The hypothesis for this research was that the higher the stage of change, the more adaptive the scores will be in regard to the self-regulation constructs. Exploring this hypothesis will help validate the inclusion of the current constructs within the ESRM. Future researchers and practitioners could use this information to help determine which constructs to focus on for interventions to facilitate engagement in regular PA. The current study examined a middle-aged adult population of university faculty and staff. This population is unique in that it differs from the typical psychological research population of university undergraduates (Sears, 1986). It is important to examine an older adult population, as older adults are less likely to engage in regular PA. According to the NHIS, nearly 39% of adults aged 18-44 engage in regular PA whereas only 32% of adults aged 45-64 engage in regular PA (Pleis, Ward, & Lucas, 2010). This literature review will provide an overview of each construct from the ESRM and discuss previous PA research within each construct.

Transtheoretical Model: Stages of Change

The transtheoretical model (TTM), also known as stages of change, was originally developed for use in psychotherapy (Prochaska, 1979) and has been used as an intervention for eliminating risky behaviors such as smoking (Prochaska & DiClemente, 1983). The TTM has also been used to increase positive behavior such as increasing PA levels (Marcus & Simkin, 1994). There are four dimensions to the TTM including:

stages of change, processes of change, decisional balance, and self-efficacy (Prochaska & Marcus, 1994). Stages of change is the main focus throughout this study.

Individuals are categorized into one of five different stages of change based on both their current behavior and their intentions for engaging in future behavior. The five stages are: precontemplation, contemplation, preparation, action, and maintenance (Marcus & Simkin, 1994). A person in the precontemplation stage is not currently engaging in PA and does not intend to begin PA in the next six months (Prochaska & Marcus, 1994). Contemplation is the stage where individuals are thinking about changing their level of PA, but are not engaging in PA. A person who engages in some PA, but not regularly, falls into the preparation stage. Next, is the action stage in which one engages in regular PA, the target behavior, but has not continued this behavior for more than six months. After six months of regular PA, a person has achieved the target behavior, and is in the maintenance stage. Research has shown differences in constructs such as SDT (Daley & Duda, 2006), self-efficacy for exercise (Marcus et al., 1992), and goal setting (Gladys et al., 2008) across stages of change. It is hypothesized that individuals within a higher stage of change will have more adaptive scores across all constructs within the ESRM.

Self-Determination Theory

SDT is a motivation theory that has been applied to the context of PA behavior (Deci & Ryan, 1985). SDT consists of five sub-theories including: Basic Psychological Needs Theory, Cognitive Evaluation Theory, Causality Orientations, Goal Contents Theory, and Organismic Integration Theory (OIT). The current study focuses on OIT, and the differentiation between the six subtypes of motivation including: amotivation,

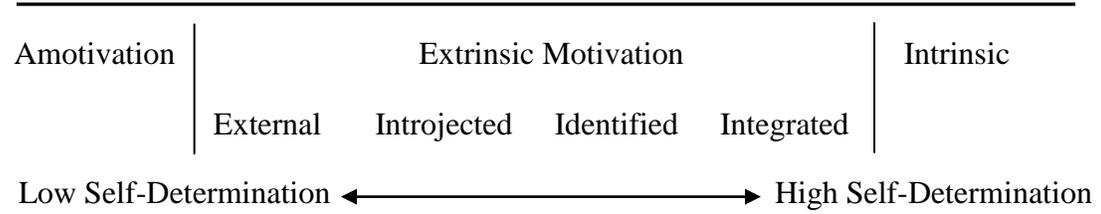
external regulation, introjected regulation, identified regulation, integrated regulation, and intrinsic regulation. The six subtypes make up a continuum from low (amotivation) to high (intrinsic) self-determination (See Table 2).

Amotivation is the category that includes individuals who have no self-determination and no self-efficacy for engagement in PA. Individuals who are amotivated place little value on PA participation. External, introjected, identified, and integrated regulation fall under the category of extrinsic motivation and include individuals who participate in PA in order to achieve some goal independent of the behavior (Ryan, Williams, Patrick, & Deci, 2009; Wininger, 2007). Individuals with external regulation participate in PA based on rewards and punishments from others. Introjected regulation involves engagement in PA to reduce guilt or to increase pride. Identified regulation occurs when a person begins to value exercise and uses it as a means to an end. For example, it is used in order to lower blood pressure. The last of the extrinsic motivation subtypes is integrated regulation, in which the person believes his or her participation in exercise is part of his or her personal identity. For example, when a person expresses his or her personal identity by stating, "I am a runner," and other self-identifying statements. The levels of extrinsic motivation differ in terms of the individual's autonomy, the least autonomous being external and the most being integrated. Intrinsic motivation is the highest level of self-determination in which individuals perform PA mainly because they find it challenging, satisfying, and enjoyable.

Studies have shown that more self-determined types of motivation are associated with higher levels of PA behavior (Edmunds, Ntoumanis, & Duda, 2006; Lewis &

Table 2

Continuum of Motivation Subtypes from Low to High Self-Determination



Sutton, 2011; Mullan & Markland, 1997). These results have also been shown in both younger (M age = 19.9; Daley & Duda, 2006) and older populations (M age = 63.8; Dacey, Baltzell, & Zaichkowsky, 2008). Therefore, identifying and increasing more autonomous types of self-determination is associated with increased engagement in PA.

The importance of SDT within the ESRM is to give individuals a reason to engage in PA. Facilitating several types of value for PA, specifically more self-determined types (i.e., identified regulation, integrated regulation, and intrinsic regulation) should increase the probability of engagement and maintenance of PA behavior. It should be noted that OIT is not a comprehensive theory and does not include an important component included in Expectancy Value Theory (ExV) called Cost (Wigfield & Eccles, 1992). Cost is a component that examines all the negative components of the target behavior (e.g., physical exertion, stress, time commitments) that are not addressed within SDT. It is hypothesized that individuals with higher stage of change will have more adaptive levels of the six self-determination subtypes, and cost. Higher scores on more self-determined types of motivation (i.e., intrinsic, integrated, identified, and to a lesser extent introjected), lower scores on the amotivated type of motivation and cost, and no difference for the external regulation are considered more adaptive. No difference is hypothesized for external regulation as there was no consistent finding within the literature to support higher or lower scores on external regulation to be adaptive.

Self-Efficacy Theory

Social Cognitive Theory has been widely utilized in identifying the factors that determine PA behavior (McAuley & Blissmer, 2000). The main construct within Social

Cognitive Theory is self-efficacy. Self-efficacy is an individual's belief that they can perform the necessary actions to achieve some target behavior, in this case regular PA engagement (Bandura, 1977).

Self-efficacy is an established predictor of exercise levels (McAuley & Jacobson, 1991; McAuley, Jerome, Elavsky, Marquez, & Ramsey, 2003; Rovniak, Anderson, Winett, & Stephens, 2002) and exercise adherence (Fontaine & Shaw, 1995; Garcia & King, 1991; McAuley & Blissmer, 2000; McAuley et al., 2003). These effects have been studied in a multitude of different populations including: community members (Garcia & King, 1991; Poag-DuCharme & Brawley, 1993), university students and employees (Fontaine & Shaw, 1995; McAuley & Jacobson, 1991), overweight (Weinberg, Hughes, Critelli, England, & Jackson, 1984), elderly (Garcia & King, 1991; McAuley & Blissmer, 2000; McAuley et al., 2003), sedentary (Garcia & King, 1991; McAuley & Jacobson, 1991), and young adults (Rovniak et al., 2002). High self-efficacy also leads to use of other theory based behaviors to enhance self-regulation such as goal setting, problem solving, and self-monitoring (Rovniak et al., 2002).

Self-efficacy is a belief in one's abilities in a specific task regardless of his or her actual ability level, and the research clearly shows that if a person believes they can, they are more likely to engage in and adhere to regular PA. To supplement this point, research has found self-efficacy levels to vary in relation to stage of change for PA (Marcus et al., 1992; McAuley & Blissmer, 2000; Poag-DuCharme & Brawley, 1993), so the higher self-efficacy an individual has, the more likely they will progress towards the maintenance stage of PA behavior. It is hypothesized that the higher the stage of change,

the more adaptive the self-efficacy an individual will have for engaging in regular PA. Higher self-efficacy scores are considered more adaptive.

Attribution Theory

Attribution theory is an important aspect of the motivation and self-regulation of behavior. Attributions refer to “beliefs concerning the causes of outcomes” (Schunk, 2008, p. 246; Weiner, 1992). There are three dimensions used to classify causal attributions including: locus of causality (internal or external), stability (stable or unstable), and controllability (controllable or uncontrollable). Locus of causality refers to a person’s attributions to something internal, such as personal effort, or something external, such as the weather. The second dimension, stability, refers to how stable or unstable factors are such as the individual’s athletic ability (stable) or luck (unstable). The last dimension, controllability, varies depending on whether the factor can be controlled or is uncontrolled. A personally controllable cause would be the time a person decides to exercise; whereas, an uncontrollable cause could be how crowded the gym is when the individual decides to exercise. Specific attributions do not need to be defined as they can easily be classified into one of eight categories based on these three dimensions (e.g., internal-stable-controllable, external-unstable-uncontrollable, etc.). Causal attributions are a person’s perceived reasons for successfully engaging in exercise, or failing to adhere to exercise. By classifying attributions, we can examine what types of attributions are associated with more adaptive motivation and adherence to PA.

Common findings have emerged from the limited research on attribution theory and PA adherence (Bar-Eli, 1996). More internal, stable, and personally controllable attributions (e.g., long term effort) lead to higher frequency and higher perceived success

of PA (Minifiee & McAuley, 1998; Nickel & Spink, 2010). Individuals with a lower frequency of PA behavior and individuals who failed to adhere to an exercise program make less internal, more unstable, and more personally uncontrollable attributions (Minifiee & McAuley, 1998). McAuley, Poag, Gleason, and Wraith (1990) also found that individuals who dropped out of structured exercise programs reported more unstable causal attributions.

More internal, stable, and personally controllable causal attributions for exercise lead to more successful participation in PA. For the current study, we hypothesized that individuals in a higher stage of change will have more adaptive causal attributions for PA. Adaptive scores include more internal, stable, and personally controllable and less external, unstable, and personally uncontrollable attributions.

Goal Setting

Goal setting is widely used to achieve a specific objective and has been studied and implemented in learning (Pintrich, 2000) and work performance (Erez & Kanfer, 1983). This research has examined short and long term goal setting (Manderlink & Harackiewicz, 1984), goal acceptance (Erez & Zidon, 1984), and goal feedback (Erez, 1977).

However, limited research has been conducted regarding goal setting and PA. One such study of varying types of goals showed that setting multiple types of goals (i.e., process and outcome goals) increased intrinsic interest, self-efficacy, and performance on a dart throwing task (Zimmerman & Kitsantas, 1997). Another study of goal types revealed that performance was greater on a sit-up task when goals were objective and of higher difficulty level as opposed to subjective goals (Smith, Hauenstein, & Buchanan,

1996). Cleary and Zimmerman (2001) studied free throw shooters and noted that setting specific goals may lead to choosing more appropriate, specific strategies for achieving those goals.

Setting goals can vary depending on a few factors, (e.g., individual differences, ability) but some aspects of goal setting have found support and should be implemented in every goal setting situation. Goals should always be specific, difficult but attainable, and short term goals should be set to supplement long term goals (Seijts & Latham, 2012). Frequency of goal setting behaviors will be assessed, such as number of goals set and goal progress. It is hypothesized that the higher the stage of change, the more adaptive the goal setting behaviors. Higher frequency of goal setting behaviors is considered more adaptive.

Strategies

Strategies are used based on individual interests and the types of goals set. Individuals closer to the maintenance stage of change have identified barriers to exercise, (e.g., boredom, travel, inclement weather) and utilize multiple strategies to overcome these barriers (Lox, Martin Ginis, & Petruzello, 2006). Although a multitude of strategies exist for increasing engagement in PA, some commonly used strategies have been identified such as: imagery, self-talk, listening to music, using visual media (e.g., television), playing exergames (e.g., Wii Fit), or working out with a partner (Crews, Lochbaum, & Karoly, 2001; Perkins & Wininger, 2012). Analysis of strategy use is exploratory and therefore there is no hypothesis for strategy use across stage of change.

Self-Monitoring

An essential part of self-regulation of exercise is observation of the exercise behaviors. Self-monitoring of PA behavior allows for real-time, unbiased observations of target behaviors, even behaviors that occur outside of the public eye (Foster, Lavery-Finch, Gizzo, & Osantowski, 1999). Perceiving the behavior as it occurs and having a method available for recording of behavior are two additional important factors regarding self-monitoring. Foster and colleagues (1999) suggest that to increase accuracy of self-monitoring, individuals should be trained to identify the correct behavior, when to record the behavior, and how to record the behavior along with the circumstances surrounding the behavior. Many methodologies can be used for recording behaviors including electronic (e.g., website, mobile application), paper and pencil, or charting, and these methods may also be public or private depending on the needs and preference of the individual.

PA research incorporating self-monitoring varies in method of recording of behaviors, frequency of recording (e.g., daily, weekly, monthly), and exercise context. In a weight loss program, self-monitoring was associated with significant increase in weekly PA, decreased reported difficulties related to PA (e.g., increased: self-control, goal achievement, and confidence engaging in PA goal behavior), and increased weight loss (Carels et al., 2005). Self-monitoring used in clinical samples has found to increase self-efficacy for PA (Gleeson-Kreig, 2006; Izawa et al., 2005), maintenance of PA (Izawa et al., 2005), and increased short term PA (Furber et al., 2008). A meta-analysis of older adults using interventions to increase PA found that interventions with a self-monitoring component to increase PA had larger effect sizes ($d = .39$) than interventions without a self-monitoring component ($d = .30$; Conn, Valentine, & Cooper, 2002). Additionally, a

review of PA interventions incorporating techniques for self-regulation showed that self-monitoring and the combined use of self-monitoring and other self-regulation techniques were found to effectively increase PA compared to interventions without self-monitoring (Michie, Abraham, Whittington, McAteer, & Gupta, 2009). The studies cited above support the inclusion of self-monitoring in the ESRM to increase PA.

The current study measured important self-monitoring behaviors to determine the extent to which an individual self-monitors. Behaviors measured include: frequency, duration, performance (i.e., activity being recorded), and intensity. More regular recording of PA frequency, duration, performance, and intensity are considered more adaptive and it was hypothesized that individuals in higher stages of change will exhibit more adaptive (higher) self-monitoring scores.

The study examined a middle-aged adult population of Western Kentucky University faculty and staff. The main purpose of this research was to determine if persons in higher stages of change exhibit more adaptive scores for ESRM constructs compared to persons in lower stages. Again, the hypothesis for this research was that the higher the stage of change, the more adaptive the scores will be regarding the self-regulation constructs (See Table 3 for summary of hypotheses for each construct). Differences for the ESRM constructs in the expected direction across the stages helps validate the inclusion of each component of the model.

Method

Participants

Participants included 101 (63 female, 38 male) Western Kentucky University faculty and staff with a mean age of 41.61 ($SD = 11.93$, range = 23-68 years).

Table 3

Hypotheses

Construct	Predicted Finding
Self-Determination	The higher the stage of change, the higher the intrinsic, integrated, identified, and introjected an individual will report, and the lower amotivated an individual will report. External scores will show no difference with regards to stage of change.
Expectancy x Value Theory	The higher the stage of change, the lower the cost an individual will report.
Self-Efficacy	The higher the stage of change, the higher self-efficacy an individual will have for engaging in regular physical activity.
Attribution	The higher stage of change, the more internal, stable, and personally controllable attributions and less external, unstable, and personally uncontrollable attributions.
Goal Setting	The higher the stage of change, the more goal setting behaviors in which an individual will engage.
Self-Monitoring	The higher the stage of change, the more often an individual will engage in self-monitoring behaviors.

Participants were recruited through campus email and given \$10 cash along with entry into a drawing to win one of five \$100 incentives, as well as one of thirty-one \$25 incentives for their participation in the study. The target population of university faculty and staff allowed us to gather information from a unique population of less active, mostly middle-aged adults, rather than the usual population of university undergraduates.

Procedure

Participants were sent an email (See Appendix A) asking for their participation in the study. The email requested that the participant call or email and schedule a meeting in the Motivation Lab (room 3063 Gary Ransdell Hall). In the lab, participants began the process by reading and signing the informed consent document. A self-report assessment was conducted on a computer using Qualtrics with questions regarding constructs of the ESRM (See Appendix B) as well as age and gender. An interview portion followed the self-report portion, and consisted of the experimenter asking the participant about their behavior and intentions for exercise participation, as well as further questions about the constructs of the ESRM (See Appendix C). The purpose of the interview portion was to ensure clarity of instructions and accurate responses for some of the measures that are designed for verbal instruction (e.g., Stage of Change, CDSII). Upon completion of the study, the participants were informed of the purpose of the study and given \$10 cash for their participation. Then, they were given the option to be entered into a drawing to win one of 36 incentives. The duration of the self-report portion was approximately 15 minutes immediately followed by a 15 minute interview portion on the same computer.

Materials

Many materials and measures were adapted or abbreviated from full length versions to have a more pragmatic assessment. The most valid items from the full length measures have been used in this study.

Self-report assessments.

Self-determination. Levels of the types of motivation according to SDT and a cost component were assessed using a 14 item, six point Likert-type measure with responses ranging from zero, “Does not correspond at all” to five, “Corresponds exactly.” Items were taken or adapted from the Exercise Identity Scale (EIS; Anderson & Cychosz, 1994), Behavioural Regulation in Exercise Questionnaire-2 (BREQ-2; Markland & Tobin, 2004), Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1989), Behavioral Regulation in Exercise Questionnaire (BREQ; Wilson, Rodgers, & Fraser, 2002), Exercise Motivation Scale (EMS; Li, 1999), or achievement values/cost questionnaires (Wigfield & Cambria, 2010). Participants responded based on how much the item corresponded to them. There were two items for each of the six types of motivation, and cost. Responses indicated which types of motivation were important for exercise for that participant. Composite scores for each type of motivation and cost were calculated based on the average score of the two items with a range from zero through five. Cronbach’s alpha internal consistency estimates for this study based on the two items for each type were: intrinsic, .60; integrated, .93; identified, .70; cost, .57; introjected, .69; external, .78; and amotivated, .77.

Self-efficacy. The self-efficacy measure used in this study was developed by Marcus et al. (1992). The measure included five items in which the individual indicated on an 11 point scale how confident they are able to continue exercising regularly when

faced with barriers to exercise (e.g., lack of time, inclement weather). Anchors for the measure included one, “not at all confident,” and 11, “very confident.” A composite score was calculated based on the average score of all the items with range 1-11. In the Marcus et al. (1992) study, in terms of stage of change, the self-efficacy measure scores differentiated individuals between stages, and accounted for 28% of the variance. Cronbach’s alpha internal consistency estimate for the five item measure in the current study was .81.

Goal setting. The revised Exercise-Goal Setting Scale (EGSS; Elavsky, Doerksen, & Conroy, 2012) was used to assess participants’ different goal setting behaviors; including, number of goals, planning steps to reach goals, and keeping track of goal progress. The revised version took six of the original 10 items that were used from the EGSS. Item responses were on a five-point scale with anchors at one, “does not describe,” and five, “describes completely.” Item responses were averaged for a composite goal score with a range of one through five. Cronbach’s alpha internal consistency estimate for the EGSS in the current study was .85.

Self-monitoring. The exercise monitoring questions developed for this study were based on common self-monitoring behaviors including: how often an individual self-monitors, what type of behavior is monitored (i.e., performance), how often the behavior is engaged in (i.e., frequency), how long the individual engages in the behavior (i.e., duration), and the difficulty of the behavior (i.e., intensity). The goal of these questions was to measure the degree to which someone self-monitors their PA behavior. An initial item assessed whether the individual self-monitors, and at what frequency. This five point scale ranged from zero, “Never,” to four, “Multiple times per day.” If the

individual gave a response indicating they self-monitor (i.e., any response other than “Never”), then they proceed to respond to the last four items which refer to frequency of recording information about exercise behavior (e.g., duration, intensity). The last four questions had a response scale of, “Never,” “Rarely,” “Sometimes,” “Often,” and “Always.” The scores on the four follow up questions were averaged for a composite score ranging from zero through four. An indication of zero on the first monitoring question equated to a composite score of zero. Cronbach’s alpha internal consistency estimate for the self-monitoring measure created for the current study was .93.

Interview assessments.

Stages of change. The stages of change measure was developed by Marcus et al. (1992) to measure the stage of exercise behavior change (precontemplation, contemplation, preparation, action, maintenance). The scale was a forced choice response, in which the individual indicated which of the five stages best described their behavior or intentions. According to Marcus et al. (1992), the two week kappa index (i.e., test-retest) of reliability for this measure was .78.

Attributions. The attributions measurement used was the Causal Dimension Scale II (CDSII; McAuley, Duncan & Russell, 1992), with instructions modified to reflect causes of adherence to exercise. The CDSII was a 12 item test, each item with numbers one through nine with opposing descriptions as anchors which were unique to each item. Individuals indicated their opinions by circling the number between the anchors. Based on the numbers circled, a score was given for locus of causality, stability, personal control, and external control of the participant’s attributions. There were three items within the measure dedicated to each dimension (except the personal control

dimension, in which one item was mistakenly left out). Scores from the three items in each dimension were averaged to create a composite score with range one through nine. Cronbach's alpha internal consistency estimates for this study based on the three items for each attribution scale (except personal control, which only had two items) were: locus of causality, .75; stability, .70; personal control, .80; and external control, .83. It should be noted that the CDSII divided the controllability dimension as described previously (Weiner, 1992) into two dimensions: personal control and external control (McAuley, Duncan & Russell, 1992). Personal control refers to the ability of the person to control the primary cause (controllable or uncontrollable), while external control refers to the ability of others to control the primary cause (controllable or uncontrollable). The external control dimension has been excluded from previous research on attributions for PA and may not be useful here as these types of attributions cannot be self-regulated (Minifiee & McAuley, 1998; Nickel & Spink, 2010). Therefore, the external control dimension was measured, but there are no hypothesized results for this dimension.

Strategies. Strategies for increasing PA used in previous research have been identified and compiled into a list including: imagery, self-talk, listening to music, visual media, exergames, and working out with a partner (Crews, Lochbaum, & Karoly, 2001; Perkins & Wininger, 2012). The measure for assessing use of strategies was a checklist in which the participants indicated which strategies they currently used. Strategies used were examined individually with score range zero through one, one indicating that participants used the strategy currently and zero indicating that they did not currently use the strategy. The Cronbach's alpha internal consistency estimate for strategy items in this study was -.04. Low homogeneity of strategy items led to a low internal consistency

estimate. Therefore, a crosstabs analysis was used to test individual strategy items across stages of change.

Analyses

A multivariate analysis of variance (MANOVA) was used to examine differences for the levels of ESRM constructs across stages of change. Normality, independence, and homogeneity of variance assumptions were tested for the MANOVA. The normality assumption was violated; however, violations of the normality assumption have very little effect on error probabilities unless the data are highly skewed, n 's are very small (e.g., less than 15; lowest $n = 17$ for the current study), and one-tailed tests are used (Glass & Hopkins, 1996, p. 403). Independence is assumed with this sample because all participants were tested individually and each participant could only be assigned to one stage of change.

Homogeneity was violated for 5 of the 14 constructs. Consequently, we ran a nonparametric test, the Kruskal-Wallis test for those five, because this test does not assume equal variances among groups (Glass & Hopkins, 1996, p. 411). The results of the Kruskal-Wallis test showed a small difference in magnitude for some of the p values. However, the decision point was still the same as the results of the ANOVA, confirming significant differences across stages for three of the constructs and non-significance for the other two constructs. According to Monte Carlo studies (Glass & Hopkins, 1996, p. 294), alpha is inflated when the larger variance is paired with the smaller sample compared to when the larger variance is paired with the larger sample. Examination of the variances and samples across the five constructs revealed that the larger variances

never paired with the smaller sample. This means our estimated p values from the ANOVA should be more conservative estimates.

Due to the elevated family-wise error rate associated with multiple comparisons, we decided to use a more conservative alpha level of .01. With confusion as to what constitutes a “family” in determining the calculated alpha level, choosing a more conservative alpha allows for a consistent alpha level and clearer understanding of reported results. A Tukey’s HSD (Honestly Significant Difference) post hoc analysis was used to determine where the significant differences occurred between stages for constructs that had significant ANOVA results. Even though the Tukey’s HSD test already adjusts for multiple comparisons, a conservative alpha level of .01 was set to be consistent with previous analyses. A crosstabs analysis was used to test individual strategy use across stages of change as the strategy items had a low internal consistency reliability estimate (-.04), indicating low homogeneity of these items. Due to the individual nature of strategy use, it may be useful to determine which strategies are used by individuals in different stages.

Results

Participants were grouped based on their reported stage of change: precontemplation ($n = 1$), contemplation ($n = 4$), preparation ($n = 27$), action ($n = 17$), and maintenance ($n = 52$). Due to the limited number of participants in the precontemplation and contemplation stages, analysis of data included only participants in the preparation, action, and maintenance stages ($n = 96$). Descriptive statistics for preparation, action, maintenance, and totals for these three stages can be found in Table 4.

Table 4

Means, SDs, and ANOVA Statistics for ESRM Constructs Across Stages of Change

Construct	Sub-dimension	Preparation	Action	Maintenance
SDT	Intrinsic	3.06 (1.27)	4.15 (0.63)	4.36 (0.72)
	Integrated	1.61 (1.24)	2.97 (1.28)	3.89 (1.17)
	Identified	3.65 (1.07)	4.74 (0.44)	4.78 (0.42)
	Introjected	2.26 (1.46)	2.50 (1.16)	2.91 (1.33)
	External	0.63 (0.88)	0.35 (0.55)	0.58 (0.99)
	Amotivated	0.28 (0.67)	0.03 (0.12)	0.10 (0.26)
ExV	Cost	3.74 (0.75)	2.44 (1.06)	2.22 (1.02)
Self-Efficacy		4.88 (1.56)	7.49 (1.50)	8.18 (1.79)
Attribution	Locus of Causality	3.20 (1.54)	2.16 (1.10)	2.33 (1.33)
	Personal Control	3.07 (1.77)	1.94 (1.09)	1.85 (1.04)
	Stability	5.12 (1.81)	3.94 (1.85)	3.30 (1.48)
	External Control	6.51 (1.88)	7.39 (1.50)	6.81 (2.09)
Goal Setting		2.29 (0.83)	2.97 (0.86)	2.90 (0.94)
Self-Monitoring		0.60 (0.94)	1.32 (1.29)	1.38 (1.49)

Construct	Sub-dimension	Total	Range	<i>F</i>	<i>p</i>	η^2
SDT	Intrinsic	3.95 (1.05)	0-5	19.18	< 0.01*	0.29
	Integrated	3.09 (1.55)	0-5	31.76	< 0.01*	0.41
	Identified	4.45 (0.84)	0-5	26.87	< 0.01*	0.37
	Introjected	2.66 (1.36)	0-5	2.26	0.11	0.05
	External	0.55 (0.89)	0-5	0.54	0.59	0.01
	Amotivated	0.14 (0.41)	0-5	2.47	0.09	0.05
ExV	Cost	2.69 (1.16)	0-5	23.05	< 0.01*	0.33
Self-Efficacy		7.13 (2.20)	1-11	34.73	< 0.01*	0.43
Attribution	Locus of Causality	2.55 (1.41)	1-9	4.45	0.01*	0.09
	Personal Control	2.21 (1.39)	1-9	8.48	< 0.01*	0.15
	Stability	3.92 (1.81)	1-9	11.02	< 0.01*	0.19
	External Control	6.83 (1.94)	1-9	1.09	0.34	0.02
Goal Setting		2.74 (0.93)	1-5	4.85	0.01*	0.09
Self-Monitoring		1.15 (1.35)	0-4	3.26	0.04	0.07

Note: Means are presented with standard deviations in parentheses. $df = 2, 93$. $\eta^2 =$ eta-squared. * = Significant at the $p < 0.01$ level.

A multivariate analysis of variance (MANOVA) was run to examine the hypotheses that more adaptive levels of ESRM constructs would be present in individuals with higher stages of change. The separate ANOVA output found within a MANOVA output was used to assess differences in composite scores for each construct (except strategies) across stages of change and results can be seen in Table 4.

Post hoc analyses identified where significant differences occurred between the three stages and these results can be found in Table 5. Graphs showing estimated marginal means for each measured construct can be found in Figures 1, 2, and 3. The data supported the hypotheses that persons in higher stages would exhibit more adaptive levels of each construct for the following ESRM constructs: SDT (intrinsic, integrated, identified), cost, self-efficacy, and goal setting. Locus of causality, personal control, and stability attributions dimensions showed significant differences across stages of change, but these differences were not in the hypothesized direction (i.e., persons in higher stages exhibited less adaptive scores). Constructs that showed scores in the hypothesized direction but were not significant were introjected and amotivated types of motivation, and self-monitoring.

A crosstabs analysis was used to test individual strategy use across stages of change due to a low internal consistency estimate (coefficient alpha, -.04) for the strategy items. Observed frequencies for all strategies across stages of change can be found in Table 6. The only strategy that came close to significance was self-talk ($p = .05$), but it did not meet the .01 significance level. The differences between expected and observed values for preparation, action, and maintenance stages were: -5.2, 2.4, and 2.8,

Table 5

Cohen's d for Each Significant Post Hoc Pairwise Difference Between Stages of Change

		P v. A	P v. M	A v. M
SDT	Intrinsic	1.04	1.24	n.s.
	Integrated	0.88	1.47	n.s.
	Identified	1.29	1.35	n.s.
	Introjected	n.s.	n.s.	n.s.
	External	n.s.	n.s.	n.s.
	Amotivated	n.s.	n.s.	n.s.
ExV	Cost	-1.12	-1.31	n.s.
Self-Efficacy		1.19	1.50	n.s.
Attribution	Locus of Causality	n.s.	n.s.	n.s.
	Personal Control	-0.82	-0.88	n.s.
	Stability	n.s.	-1.01	n.s.
	External Control	n.s.	n.s.	n.s.
Goal Setting		n.s.	0.66	n.s.
Self-Monitoring		n.s.	n.s.	n.s.

Note: SDT = Self-Determination Theory. ExV = Expectancy Value Theory. P v. A = Preparation versus Action Stages. P v. M = Preparation versus Maintenance Stages. A v. M = Action versus Maintenance Stages. n.s. = No significant difference found. Cohen's d = mean difference divided by the total standard deviation for the construct (SD from Total column in Table 4). Positive d values indicate the first mean is lower (e.g., for P v. A, P is lower than A if d is positive). Negative d values indicate the first mean is higher. The Locus of Causality dimension was significant overall (Table 4) but power was lost due to the conservative alpha level and therefore no post hoc comparisons were significant once pairwise comparisons were made.

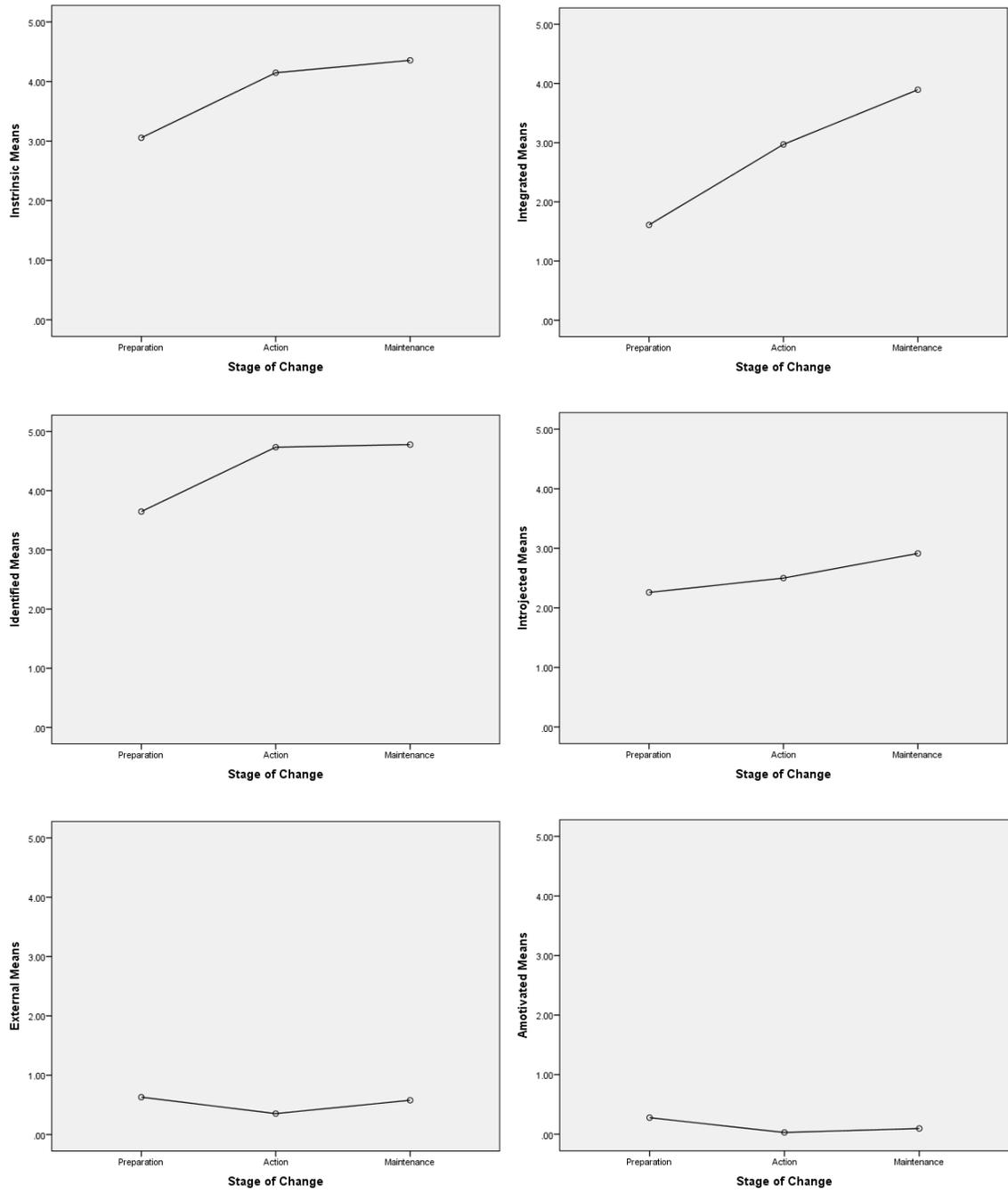


Figure 1. Estimated marginal means for Self-Determination Theory constructs across stages of change.

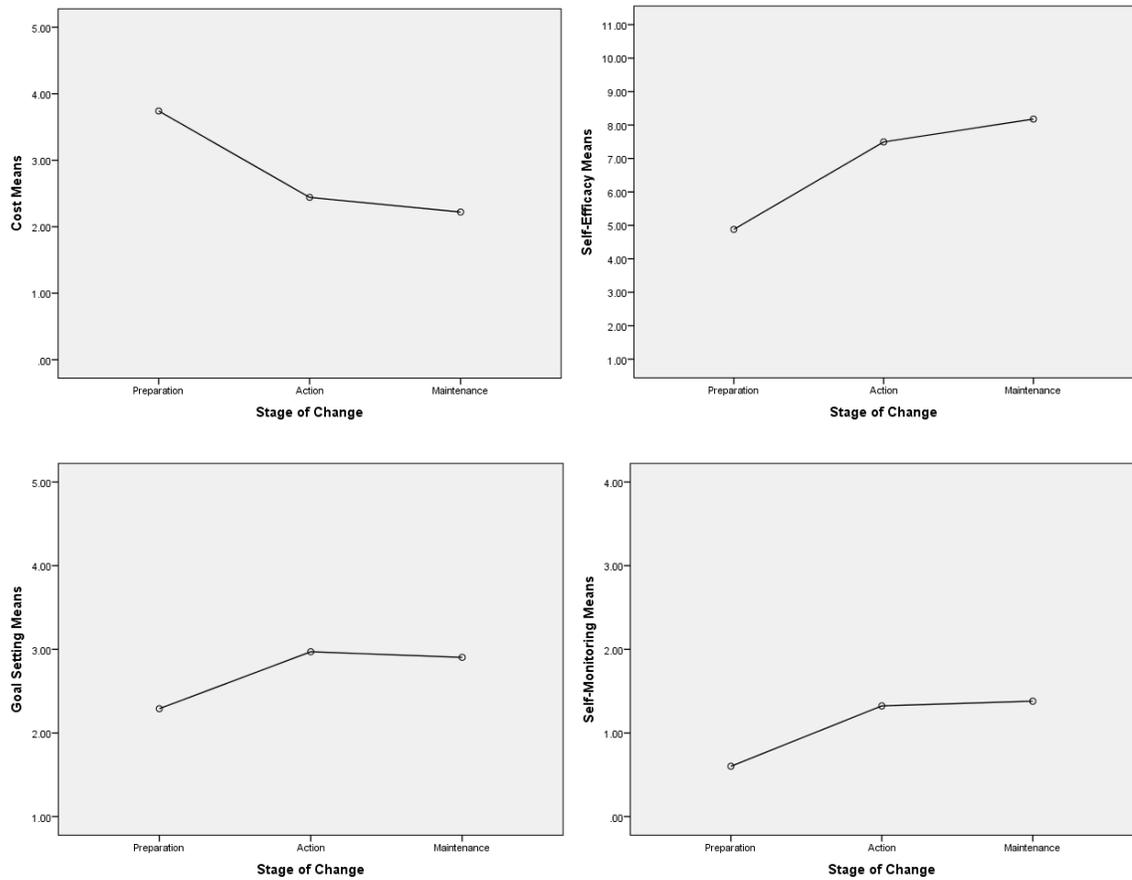


Figure 2. Estimated marginal means for cost, self-efficacy, goal setting, and self-monitoring across stages of change. Scales are equal to the range of scores possible for each measure.

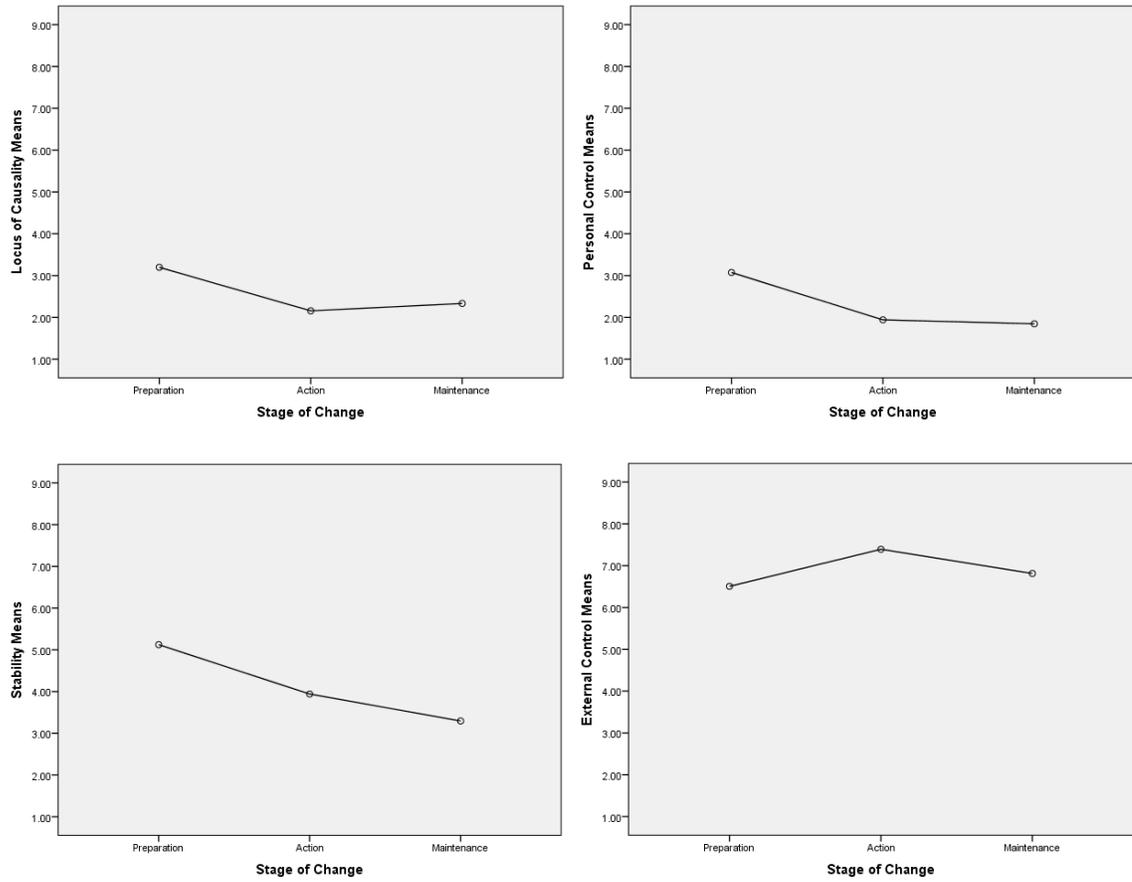


Figure 3. Estimated marginal means for attributions across stages of change.

Table 6

Observed Frequency Values for Each Strategy Across Stages of Change

		Preparation	Action	Maintenance	Total
Strategy	Imagery	21	14	44	79
	Self-Talk	10	12	32	54
	Music	18	14	37	69
	Visual Media	9	7	14	30
	Exergames	4	1	2	7
	Workout Partner	15	7	32	54

Note: Frequency values indicate total number of “yes” responses for each strategy.

respectively. Observed and expected frequency values with percentages for self-talk in each stage can be seen in Table 7.

Discussion

The results supported the hypotheses that individuals who were in a higher stage of change had more adaptive types of motivation, self-efficacy levels, and goal setting behaviors for PA. Hypotheses for introjected and amotivated types of motivation, and self-monitoring behaviors were not supported, but scores were in the expected direction. Attributions hypotheses were not supported and scores were not in the expected direction.

More self-determined types of motivation according to the self-determination continuum of Organismic Integration Theory were found to be associated with higher stage of change for three of the motivation subtypes. Significant differences occurred between preparation and action stages as well as between preparation and maintenance stages for intrinsic, integrated, and identified motivation types. The scores on intrinsic ($M = 3.95$), integrated ($M = 3.05$), and identified ($M = 4.45$) were very high (of a possible 0-5), which is to be expected for more adaptive levels in more active stages of change preparation, action, and maintenance. These results suggest people who engage in regular PA find PA more enjoyable, identify PA as a part of their self-concept, and value the benefits of PA. These findings have been supported in previous research (Dacey, Baltzell, & Zaichowksy, 2008; Daley & Duda, 2006). Similar effect sizes were found by Wininger and DeSena (2012) for intrinsic (ranged $\eta^2 = .16$ to $\eta^2 = .29$), integrated ($\eta^2 = .32$), and identified ($\eta^2 = .22$). In other studies looking at all types of motivation, less self-determined types of motivation including external (Mullan & Markland, 1997) and

Table 7

Observed and Expected Frequency Values with Percentages for Self-Talk Across Stages of Change

			No	Yes	Total
Stage of Change	Preparation	Observed	17 (18%)	10 (10%)	27 (28%)
		Expected	11.8 (12%)	15.2 (16%)	27.0 (28%)
	Action	Observed	5 (5%)	12 (13%)	17 (18%)
		Expected	7.4 (8%)	9.6 (10%)	17.0 (18%)
	Maintenance	Observed	20 (21%)	32 (33%)	52 (54%)
		Expected	22.8 (24%)	29.2 (30%)	52.0 (54%)
Total		Observed	42 (44%)	54 (56%)	96 (100%)
		Expected	42.0 (44%)	54.0 (56%)	96.0 (100%)

Note: No = “No” response in use of self-talk. Yes = “Yes” response for use of self-talk.

amotivated ($\eta^2 = .16$; Wininger & DeSena, 2012) have been negatively associated with stage of change, but the current study did not replicate these findings. Scores on external ($M = .55$) and amotivated ($M = .14$) were very low (of a possible 0-5), a finding expected for individuals in more active stages, where high scores on these less self-determined motivation types would be maladaptive. There was no difference between introjected motivation across stages of change in the current study. Scores on introjected were consistently around the midline of the scale for this measure. However, introjected motivation has been found to distinguish higher stage of change in one study ($\eta^2 = .35$; Rose, Parfitt, & Williams, 2005).

Another essential part of motivation stemming from Expectancy Value Theory is cost. Perceived cost, as hypothesized, decreased significantly between preparation and action and between preparation and maintenance stages. This finding suggests less perceived barriers for people who regularly exercise. Marcus and Owen (1992) also found a decrease in cost as stage of change increased in a workplace intervention.

As expected, exercise self-efficacy scores were progressively higher as stage of change increased. A significant increase in self-efficacy was found between preparation and action and between preparation and maintenance stages of change. Scores indicate that individuals in a higher stage of change had more confidence that they could continue exercising when confronted with possible barriers. This outcome was supported by Marcus et al. (1992) using the same self-efficacy measure as the current study in which self-efficacy scores were differentiated by stage of change ($\eta^2 = .28$). Another study examining self-efficacy and stage of change also showed increased self-efficacy scores as stage of change increased ($\eta^2 = .22$; Cardinal et al., 2009).

Attributions were less internal, stable, and personally controllable as stage of change increased, contradictory to the expected hypotheses. Personal control was found to decrease significantly between preparation and action stages as well as preparation and maintenance stages. Stability decreased significantly between preparation and maintenance stages only. As seen in Figure 3, means were low (below the midline response on the scale) for all dimensions except external control, in which scores were high across all stages (above the midline response on the scale). There are a few reasons for why the data did not support the hypotheses. The attribution measure used (CDSII) does not specify whether the attributions related to “performance in sticking to regular exercise” were related to positive performance (i.e., sticking to regular exercise) or negative performance (i.e., lack of sticking to regular exercise). A quick coding of the responses for primary attribution identified three main attributions: perceived results (e.g., health behaviors, emotions, performance goals), social support (e.g., workout partner, emotional support, social group), and scheduling (e.g., time availability, work/family schedule). However, the primary attributions did not indicate whether the participant was successful or unsuccessful with sticking to regular exercise. Choosing one primary attribution and focusing on this attribution throughout the measures was difficult for many participants, limiting their ability to assess all the possible attributions for their behavior. Also, the directions seemed to be an issue, as many participants were confused as to what some of the anchors were referring to, adding to the possible inaccuracy of responses. These methodological issues may have led to inconsistent, inaccurate responses and limited measurement of all attributions for PA behavior. A

more accurate and all-inclusive attributions measure would be more useful in future research.

Individuals with higher stages of change tended to engage in more goal setting behaviors than individuals in a lower stage of change. A significant increase in goal setting was found between preparation and maintenance stages of change. Scores on the goal setting measure were below the midline for preparation and increased towards the midline in action and maintenance stages (See Figure 2), suggesting that individuals in higher stages of change more effectively use goal setting to progress to and maintain a higher stage of change. An intervention tailoring physical activity goals to individuals found similar results, in which individuals in the intervention group had a greater change towards a higher stage compared to the control group (Gladys et al., 2008). A study using the same goal setting measure (Exercise Goal-Setting Scale) found that increased goal setting behaviors successfully predicted increased PA behavior (Rovniak, Anderson, Winett, & Stephens, 2002).

A crosstabs analysis of strategies indicated that only self-talk differed across stages of change, but not at the .01 level. The frequencies and percentages (See Table 6) indicate self-talk increased in action and maintenance stages compared to the preparation stage. One study by Cousins and Gillis (2005) found that 88% of people surveyed about their PA behaviors and intentions reported using self-talk. Cousins and Gillis revealed self-talk was used in different ways by individuals depending on their levels of PA, with more highly active individuals using positive and more adaptive forms of self-talk as opposed to negative and detrimental self-talk used by less active individuals. It is possible that the individuals in the current study who were engaged in some form of

exercise (i.e., preparation, action, and maintenance stages of change) were using more adaptive self-talk to increase their exercise behavior. More detailed assessment of self-talk as a strategy in the future could be useful for determining if individuals in the precontemplation and contemplation stages of change also use self-talk but in a detrimental way. The strategy use checklist may have been an over-simplification of some strategies, mainly self-talk and imagery. Using self-talk and imagery occurs more than just during exercise and further research should use a wider scope to examine all the uses for these types of strategies. Results from the checklist also raise the question that it may not be the quantity or quality of strategies used, but the frequency of use of the strategies employed. Future research should examine how often strategies are used to increase PA behavior.

Self-monitoring levels did increase as stage of change increased, however, the scores for each stage were very low (M preparation = .60, M action = 1.32, M maintenance = 1.38 of a possible zero through four) and differences were not statistically significant at the .01 level. Internal consistency was very high for these items (coefficient alpha, .94), which suggests homogeneity of the items. Previous research on self-monitoring and stage of change has shown an increase in stage of change as self-monitoring behavior increases. A popular form of self-monitoring, pedometer use, has been used in walking interventions where pedometer users successfully reached a higher stage of change from pre to post intervention (Faghri et al., 2008; Myers, Ronero, Anzaldúa, & Trinidad, 2011). Another possibility is that self-monitoring is useful for people in earlier stages of change (i.e., precontemplation and contemplation) and less

useful as activity increases. Again, examining a more evenly distributed population across all stages of change could help explain self-monitoring use.

There are several possible limitations of the current study that may have led to unsupported hypotheses. For instance, self-monitoring and strategy measures were new and created exclusively for this study. Revising the measures or creating alternative measures for each one of these ESRM constructs could provide more valid assessment of potential differences across stage of change. Other measures that were shortened for this study may have lower coefficient alpha levels than the original measures as some dimensions have only two items. Also, the attributions measure seemed to be methodologically problematic. The directions did not clarify if responses distinguish between successful and unsuccessful performance with sticking to regular exercise. The anchors for some items were confusing to many participants, and participants admitted to having difficulty focusing on one primary attribution for their performance.

As with a lot of research in physical activity, participants are self-selected leading to a higher percentage of exercisers than non-exercisers. This trend is evident in this study, limiting the analyses to preparation, action, and maintenance stages of change. The lack of variability in the sample and subsequent removal of precontemplation and contemplation participants in the data analyses may have influenced our ability to assess differences for constructs, such as the amotivated type of motivation, for which scores were very low for the active participants. Lack of participants in precontemplation and contemplation stages also left us with a more active population of middle-aged adults compared to the national average (Pleis, Ward, & Lucas, 2010).

Strengths of this study set it apart from other research. New measures for common strategy use and self-monitoring of exercise behaviors may spark others to pursue further research of these constructs and development of these measures. Unlike traditional exercise psychology research, the sample used here was a non-undergraduate, employee population of middle-aged (M age = 41.61, SD = 11.93) men and women which provided information from a typically less physically active population. Also, examining a model for self-regulation provided a variety of useful information on multiple constructs of self-regulation of exercise behavior in just one study.

The main purpose of this research was to determine if more adaptive levels of the ESRM constructs are found for persons in higher stages of change. Some of the constructs support the overall hypothesis that the higher the stage of change, the more adaptive the scores will be regarding the self-regulation constructs. Constructs with more adaptive scores for higher stages of change help validate the inclusion of these constructs within the ESRM. Constructs that failed to support this hypothesis may still be useful. Prior to removing unsupported constructs from the model, future research should focus on refining or trying new measures for attributions, strategy use, and self-monitoring constructs for exercise, as well as recruiting a more representative sample of participants for each stage of change.

Findings here have implications for further research in self-regulation of behavior as well as applications for self-regulation interventions. All the measures used were purposefully shortened or simplified in order for quick and easy administration. These measures can be used in other research and in applied settings as they include the questions with highest validity. The measures gather information without adding

unnecessary length and administration time to questionnaires. More research is necessary to determine if all the constructs currently included within the ESRM are necessary or essential. Examining differences in ESRM constructs across stages of change is useful information concerning the act of determining what construct levels are common for different stages. Future interventions based on the stage of change model should examine the ESRM constructs identified as most adaptive in this study to determine if they facilitate movement to higher stages of change.

APPENDIX A

Participant Recruitment E-Mail

Subject: \$10 CASH and chance to WIN up to \$100 in gift cards! Research participation

Dear WKU Faculty and Staff,

I am requesting your help a research project on self-regulation of exercise behavior. For your participation in this brief 30 minute study, you will receive \$10 CASH and will be entered into a drawing to receive one of FIVE \$100 or one of THIRTY-ONE \$25 gift cards.

For this study you will be asked to answer some questions regarding your exercise behaviors. You will NOT be exercising for this study. If you are interested in participating, please e-mail or call the number below to set up an appointment.

Scott Perkins

scott.perkins667@topper.wku.edu

(419) 304-1228

This project has been reviewed and approved by the
Western Kentucky University Institutional Review Board
Paul Mooney, Human Protections Administrator
TELEPHONE: (270) 745-6733

APPENDIX B

Self-Report Assessments

Exercise is planned, structured, and repetitive bodily movement done to improve or maintain one or more components of physical fitness.

Regularly is defined as exercising 3 or more times per week for at least 30 minutes per session.

SDT OIT theory (* Indicates additional question adapted from or taken from other measures)

Please indicate how much you agree or disagree with the following statements.

Strongly Disagree Disagree Unsure Agree Strongly Agree

Intrinsic-I enjoy exercising (IMI question & BREQ, McAuley et al., 1989).

*Intrinsic-I do not find exercising to be fun (IMI, McAuley et al., 1989)

Integrated/Attainment-Exercising is a central part of who I am (Exercise Identity Scale – Anderson & Cychosz, 1994).

*Integrated/Attainment-I consider myself an exerciser (EIS-Anderson & Cychosz, 1994)

Identified/Utility-Exercising helps me to achieve some of my personal goals (e.g., appearance, health, weight management, athletic conditioning) (Adapted from EIS-Anderson & Cychosz, 1994)

*Identified/Utility-I value the benefits of exercise (BREQ-Wilson et al., 2002)

Cost-When push comes to shove, there are many other things that I will prioritize over exercising (e.g., school, work, spending time with friends, chilling out, having fun). (Wigfield & Cambria, 2010)

*Cost-I will take time away from other everyday activities in order to exercise (e.g., school, work, friends, having fun). (Wigfield & Cambria, 2010)

Introjected-I feel guilty when I don't exercise (BREQ, Wilson et al., 2002).

*Introjected-I feel ashamed when I miss an exercise session (BREQ, Wilson et al., 2002).

External-I exercise because of rewards or punishments put forth by other people (BREQ, Wilson et al., 2002)

*External- To satisfy people who want me to exercise (EMS, Li, 1999).

Amotivated – I don't see why I should have to exercise (BREQ-2, Markland & Tobin, 2004)

Amotivated – I think that exercising is a waste of time (BREQ-2, Markland & Tobin, 2004)

Self-efficacy theory (Self-Efficacy Scale by Marcus et al., 1992)

I am confident I can participate in regular exercise when:

	Not at all confident										Very confident
	1	2	3	4	5	6	7	8	9	10	11
1. I am tired.											
2. I am in a bad mood.											
3. I feel I don't have the time.											
4. I am on vacation.											
5. It is raining or snowing.											

Goal theory

Exercise Goals

The following questions refer to how you set exercise goals. Please indicate the extent to which each of the statements below describes you:

	Does not describe		Describes moderately		Describes completely
1. I usually have more than one exercise goal.	1	2	3	4	5
2. I usually set dates for achieving my exercise goals.	1	2	3	4	5
3. I tend to break more difficult exercise goals down into a series of smaller goals.	1	2	3	4	5
4. I usually keep track of my progress in meeting my goals.	1	2	3	4	5
5. I have developed a series of steps for reaching my exercise goals.	1	2	3	4	5
6. I make my exercise goals public by telling other people about them.	1	2	3	4	5

Self-Monitoring

Exercise Monitoring Questions

How frequently do you record information about your exercise behavior.

1	2	3	4	5
Never	Monthly	Weekly	Daily	Multiple times per day

If you answered “Never” DO NOT answer the last four questions.

The following questions address the degree to which you monitor your exercise behavior using a notebook, journal, calendar, electronic medium (e.g., website or app), etc. Please indicate how frequently you record each of the following aspects of your exercise behavior.

1. Frequency (i.e. number times I exercise)
2. Duration (i.e. hours/minutes completed)
3. Performance (i.e. distance or pace for aerobic activities; amount of weight lifted for anaerobic activities)
4. Intensity (e.g., heart rate, rate of perceived exertion)

Never	Rarely	Sometimes	Often	Always
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APPENDIX C

Interview Assessments

Exercise is planned, structured, and repetitive bodily movement done to improve or maintain one or more components of physical fitness.

Regularly is defined as exercising 3 or more times per week for at least 30 minutes per session.

Stage of Change

Which of the following statements best describes you? Please read all 5 statements and then circle your response.

- a. I currently do not exercise and do not intend to start exercising in the next 6 months.
- b. I currently do not exercise, but I am thinking about starting to exercise in the next 6 months.
- c. I currently exercise some, but not regularly (**regularly** is defined as exercising 3 or more times per week for at least 30 minutes per session).
- d. I currently exercise regularly.
- e. I have been exercising regularly for the past six months or longer.

If you selected “e” for the question about how many continuous years have you been exercising?

Attributions CDSII

Think about the reasons for your performance regarding your success in sticking to regular exercise.

In the space below, please write your answer to the following question: What do you think is the primary cause for your performance in sticking to regular exercise?

The items below concern your impressions or opinions of your primary cause of your performance that you listed above. Circle one number for each of the following questions.

Is this cause(s) something:

- | | | |
|--|-------------------|-------------------------------------|
| 1. That reflects an aspect of yourself | 9 8 7 6 5 4 3 2 1 | reflects an aspect of the situation |
| 2. Manageable by you | 9 8 7 6 5 4 3 2 1 | not manageable by you |
| 3. Permanent | 9 8 7 6 5 4 3 2 1 | temporary |
| 4. You can regulate | 9 8 7 6 5 4 3 2 1 | you cannot regulate |
| 5. Over which others have control | 9 8 7 6 5 4 3 2 1 | over which others have no control |
| 6. Inside of you | 9 8 7 6 5 4 3 2 1 | outside of you |
| 7. Stable over time | 9 8 7 6 5 4 3 2 1 | variable over time |
| 8. Under the power of other people | 9 8 7 6 5 4 3 2 1 | not under the power of other people |

9. Something about you

9 8 7 6 5 4 3 2 1
something about others

10. Unchangeable

9 8 7 6 5 4 3 2 1
changeable

11. Other people can regulate

9 8 7 6 5 4 3 2 1
other people cannot regulate

Strategies

Here are some strategies, techniques, or methods you might use to help you stick to an exercise routine. Please indicate which of the following strategies you use.

_____ **Imagery** (Visualizing success, proper form, looking or feeling better after a workout, achieving goals, etc.)

_____ **Self-talk** (“You can do it!”, “Just one more”)

_____ **Listening to Music** (Fun, Motivation, Pace, etc.)

_____ **Visual Media** (Watching TV, Movies, Videos on mobile devices, etc.)

_____ **Exergames** (Wii, Playstation Move, KINECT Xbox 360, etc.)

_____ **Workout Partner** (Friend, Family, Significant other, etc)

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