

Salter, E.R.S., Sillice, M.A., Mitchell, K.S., Ramusson, A.M., Allsup, K., Biller, H., Rossi, J.S. / *Californian Journal of Health Promotion* 2014, Volume 12, Issue 1, 27-39.

## Predictors of Long-term Exercise Maintenance among College Aged Adults: Role of Body Image Anxiety

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### Abstract

**Background and Purpose:** Participation in regular exercise is low among young adults and is contributing to a rapid increase in obesity and chronic health conditions. Enhancing motivation is a key element in exercise initiation and maintenance. The current investigation considers factors relevant to the transtheoretical model (TTM), self-determination theory (SDT), self-efficacy (SE), and body image anxiety (BIA) in relation to college students' motivation to exercise. **Design and Main Outcome Measures:** In this cross sectional study, lower division college students (N=614, 64% female, 36% male) completed an online survey of exercise behavior, motivation, SE and BIA. **Results:** BIA was related to both controlled extrinsic (external and introjected regulations) and autonomous extrinsic (integrated regulation) SDT motivational variables, as well as intrinsic motivation. Exercise maintenance was most strongly associated with integrated regulation, a "self-determined" motivational state, and SE. **Conclusion:** The current study provides support for the central tenet of SDT indicating that intrinsic and extrinsic motivation are not mutually exclusive constructs. Helping individuals with BIA develop a *more intrinsic* approach to exercise is integral for fostering long-term exercise maintenance. Thus, future research should focus on developing interventions that enhance integrated regulation and SE in order to promote exercise maintenance and reduce associated BIA.

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*Keywords:* exercise, motivation, TTM, self-determination theory, body image

### Introduction

#### Prevalence of Exercise Behavior

Participation in regular exercise is remarkably low among adolescents and young adults. In fact, close to half of adolescents and young adults (ages 12-21) are not exercising vigorously at all (Centers for Disease Control and Prevention [CDC], 2010). Lack of physical activity, particularly when combined with a Westernized diet of high calories and saturated fat, is leading to a rapid increase in chronic health conditions among these age groups (CDC, 2010; Gores, 2008). Adolescents and young adults are experiencing sharp increases in rates of obesity, cancer, heart disease, and type II diabetes, as well as premature mortality (Reilly & Kelly, 2011; Manson, Skerrett, Greenland, & VanItaalie, 2004; Services, 2000).

Despite significant national efforts over the past twenty years for people of all ages to participate in

regular exercise (U.S. Department of Health and Human Services, 1997; 2000; 2003; 2010), the percentage of adolescents (ages 15-18) and young adults (ages 20-25), adhering to a regular pattern of physical activity is decreasing (Nelson, Gordon-Larsen, Adair, & Popkin, 2005; Wallace et al., 2000). Specifically, exercise rates worsen during the transition from high school to college. Although 65% of high school students engage in regular vigorous exercise and 26% are moderately active, these numbers decline to 38% and 20%, respectively, among college students (Kilpatrick, Hebert, & Bartholomew, 2005; Scioli, Biller, Rossi, & Riebe, 2010). This trend is a cause for concern given that many long-term lifestyle habits tend to be solidified during the young adult years (Ferrara, 2009; Scioli, Biller, Rossi, & Riebe, 2009). Thus, there is a need to investigate factors associated with initiation and maintenance of exercise among young adults.

### **Exercise Initiation vs. Maintenance**

It is imperative that health promotion efforts in young adults focus on establishing long-term exercise maintenance, which is most effective in maintaining health (Marcus et al., 2000). To date, the main focus of health professionals has been to help individuals initiate exercise. However, of those who initiate exercise, most stop prematurely and never achieve long-term exercise maintenance (i.e., six months or more of regular exercise). In fact, among persons who initiate exercise, approximately 50% stop exercising within the first six months (Scioli et al., 2009; Stetson et al., 2005).

### **Importance of Theoretical Integration**

One of the main barriers of health professionals to help individuals successfully achieve long-term exercise maintenance is a limited understanding of how multiple exercise determinants (e.g., motivational and other psychosocial variables) impact success (Nahas et al., 2003). In fact, since 1998, there has been a call for researchers to integrate multiple exercise behavior change theories in order to better understand the contributions and interactions of motivational, behavioral, and social factors that can help foster successful long-term exercise outcomes (Epstein, 1998).

While there are many established theoretical approaches to modeling health behavior change, meta-analyses reveal that a significant amount of variance in outcomes remains unexplained (Hagger, 2009). Furthermore, rather than integrating such theories, researchers typically pit one theoretical model against another in order to see which accounts for the most variance in outcomes. Although this is important research, Hagger (2009) argues that a critical next step is to design studies that integrate established theories that may *complement* one another. This way, redundancies can be eliminated and the most salient set of variables that predict behavioral change can be identified for translation into effective clinical practice guidelines.

### **Exercise Motivational Theories and Constructs**

It has long been established that exercise motivation predicts exercise adoption, and is highly likely to help an individual transition to long-term exercise maintenance (Ploczynski, 2000; Sherwood &

Jeffrey, 2000). The current investigation considers motivational factors from both the transtheoretical model (TTM) and self-determination theory (SDT) frameworks in an effort to define *complementary* theoretical predictors of behavioral change. Indeed, the SDT model may complement the TTM since it captures how intentional behavior originates and focuses on the internal change process, while the TTM captures the external change process (Scioli, et al., 2009). For example, Rothman (2000) states that it is the degree of satisfaction that individuals experience from exercise adoption that determines long-term exercise maintenance. Since Self-Determination Theory (SDT) is rooted in the importance of intrinsic motivation, such as exercising for its “inherent” value or pleasure (Deci & Ryan, 1985; Ryan & Deci, 2000), application of this theory may help individuals transition from exercise initiation to exercise maintenance by calling attention to the importance of experiencing direct pleasure in whatever form of exercise has been adopted.

In the following integrative investigation, we hope to gain an in-depth understanding of how environmentally driven, psychosocial factors such as body image anxiety (BIA) and self-efficacy (SE) are associated with behavioral and motivational factors within the TTM and SDT frameworks to predict the establishment of healthy levels of long-term exercise. These theories and constructs are described in greater detail below.

**Transtheoretical Model (TTM).** The TTM was developed from a comparative analysis of leading theories of psychotherapy and behavior change, and has been used in a multitude of investigations across a wide range of health behaviors (Blissmer et al., 2010; Hall & Rossi, 2008; Nigg et al., 1999; Prochaska et al., 2004). The TTM provides a structural framework for determining an individual’s readiness to begin an exercise program and progress through the five stages of change: precontemplation (no intention to begin to exercise within the next six months), contemplation (intending to begin to exercise at some point within the next six months), preparation (intending to begin to exercise within the next 30 days), action (the person has begun exercising but for less than six months), and maintenance (the person has been exercising for six months or more) (See Prochaska and Velicer, 1997).

**Self-determination Theory (SDT).** SDT offers a theoretically driven motivational framework that conceptualizes different types of extrinsic motivation ranging from pure extrinsic to more *intrinsic-like* psychological states along a motivational continuum (Deci & Ryan, 1980). This theoretical continuum has gained increasing attention and research support by scholars throughout the world (Marcus et al., 2000; Biddle & Nigg, 2000). More specifically, *external regulation* comprises behavior intended to avoid immediate negative consequences (e.g., exercising to please the doctor, caregiver or significant other). It is the most basic form of extrinsic motivation. *Introjected regulation* is internalized external regulation. Rather than pressures coming from an external source, they are now self-administered. Thus, the external regulation has become introjected. Introjected regulation is more stable than external regulation because it no longer requires the presence of external influences; they are now internalized. *Identified regulation* is action undertaken because of its intrinsic value (i.e., for fun and enjoyment). *Integrated regulation*, then, is a natural outcome of internalization and is the result of the integration of identified regulation as it becomes unified with one's sense of self. With integrated regulation, the individual now accepts the internalized external values as being consistent with his or her own values. Thus, integrated regulation represents the achievement of full self-determination and yields behaviors that are engaged in for more intrinsic reasons (i.e., fun and enjoyment).

Integrated regulation is the most autonomous or *intrinsic-like* form of extrinsic motivation. As the individual moves along the SDT continuum, he or she can experience any of these psychological conditions that are either more controlled by or independent from external influences (i.e., inaccurate sociocultural messages or recommendations from a doctor, coach, parent or caregiver). Thus, SDT differs from other motivational theories because it does not consider extrinsic and intrinsic motivation as mutually exclusive constructs (Deci & Ryan, 1985; Ryan & Deci, 2000).

### **Intrinsic Motivation vs. Integrated Regulation**

Most health professionals agree that intrinsic motivation (i.e., exercising for its pure enjoyment) is critical to exercise maintenance. However, it is unlikely that many people will achieve a state of *pure* intrinsic motivation because most people begin exercise for extrinsic reasons (e.g., the improvement of personal appearance, being able to walk five miles, winning a sports competition, or being able to stay active with children or grandchildren; Ryan & Deci, 2000). Although extrinsic motivation is helpful for initiating exercise, relying solely on such motivations can cause stress and become a barrier in the establishment of long-term exercise maintenance (Maltby & Day, 2001). Proponents of SDT argue that it is important to help extrinsically motivated individuals develop a greater degree of *intrinsic-like* motivation (Marcus et al., 2000; Biddle & Nigg, 2000). Furthermore, the closer the person moves towards self-determination, also known as integrated regulation, the greater the likelihood he or she will achieve long-term exercise maintenance (Williams, Grow, Freedman, Ryan, & Deci, 2000; Wilson & Rodgers, 2002).

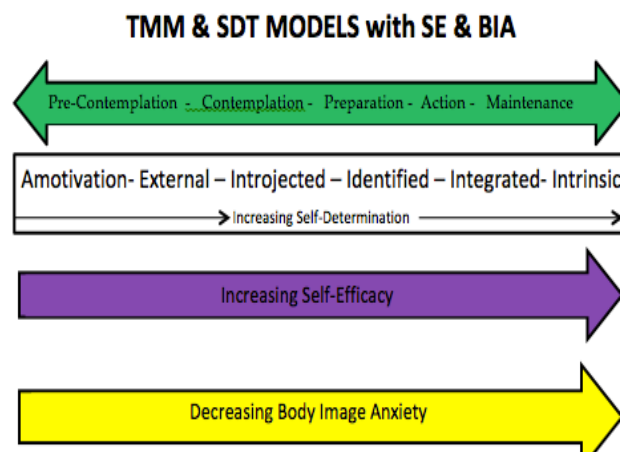
**Self-efficacy (SE).** SE is a construct based on social cognitive theory that represents the degree of confidence felt when anticipating engagement in a particular behavior (Bandura, 1997). SE is considered a primary factor in the initiation of a new behavior such as exercise (Clark & Houle, 2009) and is positively correlated with progression towards active stages of change (i.e., action and maintenance; see Prochaska & Marcus, 1994).

**Body Image Anxiety (BIA).** It is well known that body image concerns play a role in exercise motivation. For example, Markland and Hardy (1993) found that the desire to achieve a "thin" body type for women and a muscular body type for men in line with media-driven sociocultural ideals is a frequent motivation for starting to exercise, despite a potential compromise in overall health and well-being since these expectations are unrealistic for most people (Hausenblaus & Fallon, 2006; Davison & McCabe, 2005). In fact, body image dysfunction in women and men has been linked to highly-controlled, extrinsic motivation, which is likely to prevent achievement of long term exercise maintenance (Durkin & Paxton, 2002; Ingledew & Sullivan, 2002). In contrast, a study by Johnson et al.

(2013) found that body image satisfaction was positively associated with the action and maintenance TTM stages of change. Women have higher levels of BIA and body dissatisfaction than men (Davison & McCabe, 2005). Therefore women may be more susceptible to quitting exercise in the absence of internalized intrinsic motives for exercise. The investigation of the relationship of BIA to the salience of controlled versus autonomous extrinsic (*intrinsic like*) motivation, across all TTM stages of exercise, may allow us to learn how to best transition individuals with high BIA to long-term exercise maintenance.

To our knowledge, no previous studies have assessed the impact of BIA on exercise motivation using an integrated theoretical framework that considers the entire continuum of extrinsic to *intrinsic like* SDT motivational factors across the TTM stages of change. To bridge this knowledge gap, the current study assesses whether BIA, an environmentally determined and potentially malleable variable, is related to exercise motivation, and SE, and whether particular SDT motivational states (e.g., external regulation, introjected regulation, integrated regulation) predicts TTM stage of change in exercise. Please refer to Figure 1 below for a detailed schematic of the models and variables included in this investigation.

**Figure 1**



**Hypotheses**

The hypotheses for this study were the following:

- 1a. Consistent with Ingledew and Sullivan (2002), BIA would be positively associated with external regulation and introjected regulation.
- 1b. Consistent with Ingledew and Sullivan (2002), BIA would be positively associated with integrated regulation but not intrinsic motivation and SE.
- 2. Consistent with Ryan and Deci (2000), external regulation and introjected regulation would be higher in the pre-maintenance than maintenance stages of exercise change.
- 3. Consistent with Ryan and Deci (2000), integrated regulation will more strongly discriminate the TTM maintenance stage of change from the pre-maintenance stages than pure intrinsic motivation.

**Methods**

**Participants**

Data were collected from 614 undergraduates, of whom 489 were students in psychology classes at a large public university in the northeastern United States, and 125 were students in business classes at a mid-size public university in the southeastern United States. Psychology and business classes were selected in order to balance the samples with respect to sex/gender or other characteristics that might define course selection. There were no significant institutional differences in the participants' demographic characteristics or with respect to any of the health behaviors, motivational factors, and BIA level. Therefore, the two institutional samples were combined in all further analyses.

**Materials and Procedures**

Participants filled out an internet survey that queried their exercise behaviors, BIA, and intrinsic and extrinsic motivation for exercise. The on-line survey was created using a format suggested by the WWW Survey Assistant (Schmidt, 1997a; Schmidt, 1997b). The survey took less than one hour to complete. The nature of the study was described to potential participants during a classroom session. Participants were given the internet web address to access the survey and were advised that they could choose whether, when, and where to fill it out. At survey completion, participants could print out a page confirming participation to return to their professor to receive an elective course credit. The survey was accessible for three months, and data collection took place during the fall semester. While the entire survey was anonymous, the participants' internet

“IP” addresses were checked for possible duplicates, to ensure that students were not taking the survey more than once. All study procedures were reviewed and approved by the Institutional Review Boards at both institutions.

## Measures

**The TTM Stages of Change Measure for Exercise.** This four-item measure classifies respondents as being in the precontemplation, contemplation, preparation, action, or maintenance stage of change with respect to exercise (Reed, Velicer, Prochaska, Rossi, & Marcus, 1997). For the current study, this measure was used to identify and categorize the stage of readiness each participant was in with respect to the adoption of exercise behavior. Stages are mutually exclusive and each participant can be placed into only one stage, represented as a score of 1 (precontemplation)-5 (maintenance). Exercise maintenance is defined as having exercised regularly for at least six months. This measure has demonstrated strong reliability and validity (Hall & Rossi 2008; Hellsten et al., 2008; Nigg et al., 2005; Schumann et al., 2002). In the current study, Cronbach’s alpha was .71. An example item from this measure includes: “Do you currently engage in regular exercise (at least four times per week for 30 or more minutes per session)?”

**The TTM Measure of Self-efficacy for Exercise.** This measure is comprised of 18 items that measure SE with respect to exercise (Rossi, Benisovich, Norman, & Nigg, 2003). For this continuous measure, the possible score range is 18-90. For hypotheses 1 and 3, we retained this variable in its continuous form for the discriminant function analysis (DFA). Previous studies have reported internal consistency coefficients of .94 (Rossi et al., 2003). In the current study, Cronbach’s alpha for this measure was .92. An example item from this measure is: “How confident are you to exercise when: a.) I am under a lot of stress, b) I am depressed, c) I am anxious, d) I feel I don’t have time, or e.) My significant other does not want me to exercise.”

**The Exercise Motivation Scale (EMS).** This measure is comprised of 31 items designed to assess behavioral tendencies according to SDT (Fuzong, 1999). The EMS consists of five subscales

measuring SDT extrinsic variants (amotivation, external regulation, introjected regulation, identified regulation, and integrated regulation) and three subscales assessing intrinsic motivation (learn, experience sensation, and accomplish things). For the current analyses, the three subscales of intrinsic motivation were summed together to form one intrinsic motivation variable. Previous studies have demonstrated that this measure has good factorial validity and internal consistency, with Cronbach’s alpha values ranging from .75 to .90 (Mullan, Markland, & Ingledew, 1997). In the current study, the Cronbach’s alpha for this scale was .88. An example item from this measure is: “Why are you currently exercising?”

**The Physical Appearance State and Trait Anxiety Scale (PASTAS).** The PASTAS is a 16-item measure designed to rate anxiety associated with 16 body sites (Reed, Thompson, Brannick, & Sacco, 1991). Previous studies have reported internal consistency values ranging from .82 to .88 and a two-week test-retest reliability of .87 (Markland & Hardy, 1993). Cronbach’s alpha for this measure in the current study was .88. An example item from this measure is: “In general, I feel anxious, tense or nervous about: a.) the extent to which I look overweight, b.) my thighs, c.) my buttocks, d.) my stomach (abdomen), or e.) my muscle tone.”

## Data Analytic Plan

For hypotheses 1a and b, two hierarchical multiple regression analysis models were developed to assess the relationship of BIA with external regulation and introjected regulation (1a) and BIA with integrated regulation, intrinsic motivation and self-efficacy (b). Given that gender is associated with BIA, we controlled for gender in these analyses (Davidson & McCabe, 2005). For hypothesis 2, a multivariate analysis of variance was used to examine the effects of stage of change (PC-A vs. M) on external regulation and introjected regulation. For hypothesis 3, a stepwise discriminant function analysis (DFA) was performed to determine which of the two motivational variables (intrinsic motivation or integrated regulation) or SE was the strongest discriminator for classifying individuals in the maintenance stage of exercise (vs. all other stages, pre-maintenance).

## Results

The internet survey elicited a response rate of 95% (n=586). Participants were at least 18 years of age ( $M_{age}=19.6$  years), primarily female (64%),

Caucasian (81.4%) and identified as being in their freshman year (65%). A chi square analysis revealed a significant gender difference on exercise stage ( $\chi^2 = 30.1$ ,  $df = 4$ ,  $p < .01$ ) indicating that men were higher in the maintenance stage while women were higher in the pre-contemplation through action stages. See Table 1.

**Table 1**

Gender Differences by Exercise Stage of Change						
Gender	PC	C	Prep	A	M	Total
Men	6.3% (n=13)	9.1% (n=19)	22.1% (n=46)	10.1% (n=21)	52.4% (n=109)	100% (n=208)
Women	6.1% (n=23)	10.3% (n=39)	36% (n=136)	17.2% (n=65)	38.2% (n=115)	100% (n=378)

Variables: Precontemplation (PC), Contemplation (C), Preparation (Prep), Action (A), Maintenance (M)

### Multicollinearity Analysis

A bivariate correlation analysis was conducted to investigate multicollinearity between dependent variables (amotivation, external regulation, identified regulation, introjected regulation, integrated regulation, intrinsic motivation and self-efficacy). The coefficient values ranged from  $r = .02$ ; no correlation, to  $r = .58$ ; large correlation. These values were all below  $r = .70$  and presented no concern for multicollinearity (Harlow, 2005).

### Primary Findings

**Hypothesis 1a.** Two hierarchical multiple regression analysis models were developed to assess the relationship between BIA and external regulation and introjected regulation. Results of the first hierarchical regression analysis with external regulation as the dependent variable are presented in Table 2. In the first step, gender did not significantly account for the variance in external regulation. In the second step, BIA significantly contributed to 6.9% of the variance in external regulation. Results of the second hierarchical regression analysis with introjected regulation as the dependent variable are also presented in Table 2. In the first step, gender did not significantly account for the variance in introjected regulation. In the second step, BIA

significantly contributed to 9.3% of the variance in introjected regulation, and was statistically significant.

**Table 2**

Hypothesis 1a: Hierarchical Multiple Regression Analysis Predicting External Regulation and Introjected Regulation

Predictor	External Regulation			Introjected Regulation		
	$R^2$	$\beta$	$p$	$R^2$	$\beta$	$p$
Step 1: Males vs. Females	.00	-.15	.68	.01	.08	.84
Step 2: BIA	.07	1.83	<.001	.09	2.31	<.001

BIA= Body Image Anxiety

**Hypothesis 1b.** Three hierarchical multiple regression analysis models were developed to assess the relationship between BIA and integrated regulation, intrinsic motivation and self-efficacy. For the first hierarchical regression model, gender did not significantly account for the variance in integrated regulation. In the second step, BIA accounted for 2% of the variance in integrated regulation, and was statistically significant. In the second hierarchical regression model, gender did not significantly account for the variance in intrinsic motivation. In the second step, BIA accounted for 2% of the variance in intrinsic motivation, and was statistically significant. For the third hierarchical regression model, gender significantly accounted for 2% the variance in self-efficacy. In the second step, BIA did not significantly add to variance in self-efficacy. See Table 3.

**Table 3**

Hypothesis 1a: Hierarchical Multiple Regression Analysis Predicting Integrated Regulation, Intrinsic Motivation and Self-Efficacy

Predictor	Integrated Regulation			Intrinsic Motivation			Self-Efficacy		
	$R^2$	$\beta$	$p$	$R^2$	$\beta$	$p$	$R^2$	$\beta$	$p$
Step 1: Gender	.00	-.51	.15	.00	-.25	.09	.02	-3.57	.01
Step 2: BIA	.02	.77	.02	.02	.30	.03	.02	-.72	.58

BIA= Body Image Anxiety

**Hypothesis 2.** A one-way multivariate analysis of variance (MANOVA) was used to examine the effects of stage of change (PC-A vs. M) on external regulation and introjected regulation. Multivariate

normality was determined by a statistically non-significant Box' Test Equality of Covariance Matrices ( $p > .05$ ). Stage of change demonstrated no statistically significant effect on the linear combination of the dependent variables (Wilks'  $\lambda = .986$ ,  $F_{2, 425} = 3.01$ ,  $p = .05$ ).

**Hypothesis 3.** A stepwise DFA was performed using integrated regulation, intrinsic motivation and SE as potential discriminators (predictors) of membership in either the pre-maintenance or maintenance stages of change. The discriminant function was significant (Wilks'  $\lambda = .90$ ,  $F_{2, 378} = 21.21$ ,  $p < .001$ ,  $\eta^2 = .10$ ). All three predictors were significantly different across the two groups, with individuals in the maintenance stage reporting higher mean levels of integrated regulation, intrinsic motivation, and SE. Please see Table 4 for ANOVA values and corresponding descriptive statistics. The structure matrix of pooled within-groups correlations between each predictor and the standardized canonical discriminant function revealed the largest values for SE (.76) and integrated regulation (.76), followed by intrinsic motivation (.49). The effect sizes were as follows: integrated regulation,  $\eta^2 = .04$ ; intrinsic motivation,  $\eta^2 = .008$ ; and SE,  $\eta^2 = .15$ . Thus, SE had a stronger effect than did integrated regulation or intrinsic motivation. Consistent with these results, the stepwise procedure excluded intrinsic motivation as a predictor while retaining integrated regulation and SE. The two-predictor solution resulted in 66.3% of the original grouped cases being correctly classified ( $z = 6.53$ ,  $p < .001$ ).

**Table 4**

Hypothesis 3: Motivational Variables as Predictive of Stages of Change

Motivational Variables and SOC	M (SD)	F (1,379)	p
Intergrated Regulation		16.61	<.001
PC-A	16.61 (3.45)		
Maintenance	18.27 (3.07)		
Intrinsic Motivation		14.96	<.001
PC-A	6.99 (1.42)		
Maintenance	7.53 (1.32)		
Self-Efficacy		24.25	<.001
PC-A	49.15 (12.51)		
Maintenance	55.82 (13.81)		

## Discussion

The results of this study demonstrate that BIA is a significant predictor for both controlled (external and introjected), autonomous (integrated) SDT-based extrinsic regulation motivational variables and intrinsic motivation. Although integrated regulation, in addition to SE and intrinsic motivation, differentiated the TTM maintenance stage of change from earlier stages, only integrated regulation and SE were the strongest predictors of exercise maintenance. These findings are consistent with the literature, given that most individuals initiate exercise for controlled extrinsic reasons and most individuals who rely on extrinsic motivation for exercise have high levels of BIA (Durkin & Paxton, 2002; Ingledew & Sullivan, 2002). In other words, since most people start exercising for extrinsic reasons and have high BIA, it is not possible for them to achieve pure intrinsic motivation for exercise. Therefore, such individuals are likely, at best, to attain integrated regulation, the most autonomous and thus most *intrinsic-like* extrinsic motivational mind-set (Deci & Ryan, 1985 & 2002) when achieving exercise maintenance.

Since integrated regulation was more likely to be seen among individuals in the maintenance than pre-maintenance stages of change, interventions should consider the role of BIA in the motivational mind-set of such individuals who initiate exercise with controlled extrinsic motives. Such interventions need to go beyond simply promoting exercise for "fun and enjoyment" as in interventions that promote pure intrinsic motivation. Instead, interventions for individuals with high BIA need to foster the *internalization* process so as to promote integrated regulation and the transition from less to more active stages of change. In turn, this may reduce BIA and increase SE. The current study also provides support for Deci and Ryan's (1980) suggestion that intrinsic motivation and extrinsic motivation are not mutually exclusive. Instead, it appears that helping individuals develop a *more intrinsic* approach to exercise is integral to the development of interventions aimed at fostering long-term exercise maintenance (Deci & Ryan, 2002). That is, helping individuals transition from beginning exercise with controlled extrinsic motives

(external or introjected regulation) to maintaining exercise with more autonomous extrinsic motives (integrated regulation).

Overall, the current study highlights specific ways in which motivational interventions might be tailored to facilitate achievement of long-term exercise maintenance and overall health and well-being among young adults suffering from BIA. Specifically, these findings indicate that integration of the TTM and SDT theoretical models may better guide personalized interventions that foster integrated regulation or self-determined motives for exercise and a sense of SE. Ultimately, these efforts may help to reduce BIA by shifting the focus from body image to exercise enjoyment as “intrinsic like” motives are internalized.

The study findings are also directly applicable to school-related sports contexts. Since the college environment is more contained, it can more effectively emphasize the importance of exercise for overall health and wellness (Leenders et al., 2002). For example, the individual’s coach, campus nurse, friend, or significant other can be taught how to provide environmental support that fosters a sense of autonomy and choice. Specifically, the individual’s support system could highlight the range of exercise activities available and emphasize the importance of choosing activities that are most enjoyable, while de-emphasizing the socio-cultural pressure to engage in activities to achieve external goals. This way, the individual will gradually come to internalize the value of exercise and engage in physical activity for more intrinsic reasons, rather than in response to external pressures (e.g., to change personal appearance, to gain attention or to win an award). With psychosocial support, the individual can learn the many positive mental and physical health benefits of exercise while exploring different physical activities.

### **Limitations**

There are several study limitations that should be noted. First, the data were cross-sectional, limiting the possibility of inferring causal relationships among variables. Second, this study used a self-report method; thus, participants may have over-

reported their physical activity level (Adams, Matthews, & Ebbeling, 2005). However, our previous work found that participants thought they were more likely to be honest when participating in an internet study because of increased comfort associated with anonymity (Scioli et al., 2009). Third, the utilization of the internet also could introduce bias and limit the generalizability of the findings. For example, individuals of low socioeconomic status may have more limited access to the internet (Coomber, 1997), although this may not have been of as great a concern in this university-based study. Finally, there is increasing evidence that use of the internet for research may actually result in higher completion rates (Ritter, Lorig, Laurent, & Matthews, 2004). Participants in this particular study (64%; n = 386) reported that they liked some aspects of the survey, including the flexibility provided by the internet because they could take the survey at a time most convenient for them. Thus, these data may only be reflective of the behavior of a young adult college population and may not be broadly representative of all college aged adults due to the sample being a primarily a convenience sample.

### **Conclusion**

In summary, by providing personalized feedback matched to each participant’s motivational state and stage of change, the transition from exercise action to maintenance can be facilitated for individuals with BIA. The goal is to help such individuals experience greater SE in relation to exercise behaviors and to feel more autonomous in the transition to exercise maintenance. In turn, this will reduce BIA, aid in the attainment of integrated regulation, result in lasting, healthy exercise habits.

### **Acknowledgement**

The research described here was supported in part by the Department of Veterans Affairs, Veterans Health Administration, Rehabilitation Research and Development Service.--Award number 1IK2RX000704-01A2.



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