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Implicit Theories and Physical Activity Patterns: The Mediating Role of Task Orientation

Marc R. Lochbaum* & Walter R. Bixby
Texas Tech University
Rafer S. Lutz
Baylor University
Megan Parsons & Tracie Akerhielm
Texas Tech University

**Marc Lochbaum, Ph.D.; Department of HESS; Box 43011 Texas Tech University; Lubbock, TX 79409-3011; Marc.Lochbaum@ttu.edu (email).*

ABSTRACT - Regular physical activity is associated with numerous health benefits; yet, most adults do not engage in recommended amounts of physical activity. Dweck and Leggett's (1988) social-cognitive model was utilized to explain self-reported strenuous exercise participation. Participants (N = 539) completed a measure of entity theory, goal orientations, attribution style, affect in response to exercise participation, perceptions of physical ability (PPA), and a 7-day recall of strenuous physical activity. The initial model fit with 100 randomly chosen participants was poor. A revised model that excluded ego orientation proved to be a good fit for low PPA participants and an excellent fit for high PPA participants. This revised model accounted for 29.5% and 21.1% of the variance in affect and 15.3% and 7.0% of the variance in strenuous exercise participation, respectively for high and low PPA participants. Future research is discussed stressing the promotion of a task orientation.

Regular physical activity is associated with a variety of beneficial physiological and psychological outcomes (US DHHS, 2000). Despite these benefits, the US DHHS (2000) estimates that 60% of the US population does not engage in recommended amounts of physical activity, 25% engage in no physical activity, and only 15% engage in 30 min of moderate activity for 5 or more days per week. Several approaches, both theoretical and atheoretical, have

been implemented to better understand and promote physical activity (King, Stokols, Talen, Brassington, & Killingsworth, 2002). These approaches have had some success; and likewise, physical activity interventions following these approaches have shown some promise (Bauman, Sallis, Dzewaltowski, & Owen, 2002). Yet, it has been suggested that researchers may gain a better understanding of physical activity behaviors through a variety of mediating psychological constructs (Bauman et al., 2002). Dweck and Leggett's (1988) social-cognitive model of motivation offers such an approach.

Implicit Theories and Achievement Outcomes

Dweck and Elliot (1983) and Dweck and Leggett's (1988) social-cognitive model, initially developed in the domain of intelligence, proposed the existence of two clusters of beliefs, entity and incremental. These belief clusters have been applied to explain views of stereotyping (Levy, Stroessner, & Dweck, 1998), morality (Chiu, Dweck, Tong, & Fu, 1997), and physical activity ability (Ommundsen, 2001). The two beliefs relate to how people view the malleability of traits. In the domain of intelligence, entity-theorists believe that intelligence is fixed and stable; whereas incremental-theorists believe that intelligence is changeable. The impact of implicit theory orientation upon cognitive, affective and behavioral responses is mediated by goal type (performance or learning), and these goal types are the central aspect of Dweck and colleagues' motivational model.

Dweck and colleagues' research (e.g., Dweck & Leggett, 1988; Elliot & Dweck, 1988) has consistently demonstrated that one's implicit–theory orientation leads one to emphasize either performance or learning goals, especially in the face of failure or challenge. Specifically, an entity theorist is oriented towards performance goals and is vulnerable for learned helpless cognitions (attributions to low ability), negative affect, and behavioral patterns (low task persistence), whereas an incremental theorist is oriented toward learning goals and tends to demonstrate mastery-oriented responses. In the physical activity domain, researchers most commonly measure ego (performance) and task (learning) orientations (e.g., Ommundsen, 2001). It is important to note that the clearest distinction among the goal orientations (and thus with regards to resultant behavior, cognitions, and affect) occurs when ability perceptions are low (Elliot & Dweck, 1988). In physical activity settings, individuals holding both low perceptions of ability and an ego or performance goal are theorized to be most likely to display maladaptive achievement strategies such as the learned helpless response (Roberts, 1992).

Purpose and Hypotheses

The purpose of this investigation was to extend Dweck and colleagues' motivational model to exercise participation. To do so, we proposed a model whereby the effect of entity-orientation on *strenuous* exercise participation, a

challenging endeavor, is mediated by goal orientations that in turn differentially affect attribution style and resultant affect. To best test our model, we formed two groups - those of high and low perceived physical ability. Based on our groups, we hypothesized that high ability participants when compared to low ability participants would display higher levels of cognitive, affective, and behavioral achievement patterns. This hypothesis will be supported if high perceived ability participants report greater amounts of strenuous exercise participation, report higher levels of perceived control for exercise participation, and report greater positive affect when thinking about their ability to consistently engage in strenuous exercise. This hypothesis was tested using differential statistics. In addition, we tested our model using path analysis. Therefore to achieve our desired ends, participants completed a measure of entity theory, goal orientations, attribution style, and affect in response to ability to engage in regular physical activity and perceptions of physical ability and a 7-day recall of typical physical activity participation.

Method

Participants

Participants were 539 volunteer, university students (220 male, 295 female, 22 genders not indicated). All participants were recruited via personal communications from physical fitness courses at a large southwestern university. Participants were primarily college-aged with 16.0% reporting being between 18-19, 39.8% between 20-21, 20.1% between 22-23, and the remaining 24.1% being 24 years of age or older.

Measures

Implicit Self-Theories (IST). IST is a five-item scale adapted from past investigations (Erdley & Dweck, 1993; Robins & Pals, 2002) was used to assess participants' belief in the consistency of healthy behavior. A representative item is "My health is something about me that I can't change very much". Each item was rated on a 1 (not very true of me) to 5 (very true of me) scale. The IST has displayed strong psychometric properties (e.g., Robins & Pals, 2002) and the internal consistency for the present investigation (Cronbach's α) was .86.

Goal Orientation in Exercise Scale (GOES). The GOES developed by Kilpatrick, Bartholomew, and Riemer (2003) is a 10-item scale that measures task and ego orientation in an exercise motivation context. Each item was rated on a five-point scale that was anchored by the following sentence, "I feel most successful in a health/exercise setting when..." The GOES has adequate psychometric properties (Kilpatrick et al., 2003) and the internal consistencies for the present investigation (Cronbach α's) were .77 and .80 for task and ego orientation, respectively

The Revised Causal Dimension Scale (CDSII). The CDSII is a 12-item scale based on Weiner's (1985) attribution theory (McAuley, Duncan, & Russell, 1992). The CDSII yields measures of stability, locus of causality, and controllability. Only the personal control scale was scored. Each item was rated on a nine-point scale that was anchored by a sentence with the following lead in sentence, "Think about the reason or reasons that you do or do not exercise. The items below concern your impressions or opinions of the cause or causes of your exercise participation. Is the cause(s) something ..." The CDSII has adequate psychometric properties (McAuley et al., 1992) and the internal consistency for the present investigation (Cronbach α) was .79 for personal control.

Affective Response to Exercise Scale (ARES). The ARES is a 12-item that was adapted from past research (Robins & Pals, 2002) and the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988). Participants were asked to rate how they feel about their exercise behavior. Two emotions scores were calculated from this scale: positive and negative. Items were scored from 1 (very slightly to not at all) to 5 (extremely) in response to the following statement, "Use the following words to describe how you feel when you think about your ability to exercise." The internal consistency of the ARES for the present investigation (Cronbach α's) for positive and negative affect were .88 and .84, respectively.

Perceived Physical Ability (PPA). PPA is a 10-item scale that measured participants' perceptions of their physical ability developed by Ryckman, Robbins, Thornton, and Cantrell (1982). Each item is rated on a six-point scale that was anchored by the following sentence, "Read each of the statements listed below and indicate how strongly you agree or disagree with each statement." The PPA has adequate psychometric properties (Ryckman et al., 2003) and the internal consistency for the present investigation (Cronbach α) was .79.

Leisure Time Exercise Questionnaire (LTEQ). The LTEQ was used to assess participants' exercise behavior. Participants were asked "Considering a typical 7-day period (a week), how many times on average do you do the following kinds of exercise for *more than 15 minutes* during your *free time*?" Participants indicated their weekly frequencies of exercise in light, moderate, and strenuous exercise. These frequencies were rated on a 9-point scale ranging from 0 - "never" to 8 - "8 times or more a week." For the present investigation, only the strenuous exercise question was analyzed as it was conceptualized as a difficult task. The strenuous item on the LTEQ has shown very good test-retest reliability (r = .94: Godin & Shephard, 1985) and its concurrent validity has been examined using physiological surrogates of exercise participation (r = .38 with VO_2max: Godin & Shephard, 1985).

Procedures

Permission was granted from several instructors of a variety of physical activity courses to approach potential participants. The participants were presented with a questionnaire packet at a predetermined time that was approved by the first author's University Human Subject's Institutional Review Board. The packet contained the IST, GOES, CDSII, ARES, PPA, LTEQ, and demographic questions.

Data analyses

To test our hypothesis that high and low ability participants would differ significantly on perceived control, affect, and strenuous exercise behavior, a MANOVA was conducted. Post hoc ANOVAs were conducted. Alpha was corrected using the Bonferroni technique (.05/7). To examine the viability of our proposed model, we used observed variable path analytic procedures using maximum likelihood parameter estimation by entering the covariance matrix into the analysis (Arbuckle, 2003). Hu and Bentler (1999) recommend the use of both absolute (e.g., GFI) and incremental (e.g., CFI) fit indices and a variety of fit indices to ensure an acceptable model fit. Following these recommendations, we used the chi-square (χ^2): degrees of freedom (df) ratio, the comparative fit index (CFI), the goodness of fit index (GFI), and the root mean square error of approximation (RMSEA) to assess model fit. Recommendations state that acceptable model fit occurs if the χ^2:df ratio is three or less (Onodera, 1999), the CFI and GFI are greater than 0.95, and the RMSEA is less than .08 (Hu & Bentler, 1999).

Results

Achievement Outcomes Analyses

The MANOVA examining attributions patterns, affect associated with exercise, and self-reported weekly engagement in strenuous exercise by the two participant groups was statistically significant, Wilks' Lambda = .87, $F(4,534) = 19.43$, $p < .001$. Post-hoc ANOVAs were significant ($p < .01$) and in the predicted direction. Effect sizes (ES) were also calculated to gauge the meaningfulness of these significant differences (Hedges, 1981). Examination of the mean scores verified that high perceived ability participants when compared to low perceived ability participants reported greater locus of control (M=19.52, SD=4.66; M=18.33, SD= 5.23; ES = .24), affect (M=13.34, SD=6.54; M=8.54, SD=7.64; ES = .67), and strenuous exercise engagement (M=3.28, SD=2.05; M=2.26, SD=1.83; ES = .53) compared to low perceived ability participants.

Path Analyses

The fit of the data to our model was examined using a randomly selected sample of 100 participants. The fit of the data to this model was poor (χ^2/df =

6.123; CFI = .711; GFI = .936; RMSEA = .227). The modification indices and standardized path coefficients suggested that ego goal orientation had a direct effect on exercise and that an entity orientation had no relationship to an ego goal orientation. Hence, a revised model was examined.

For the remaining 439 participants, a median split was performed to divide the sample into groups with low PPA (n = 215) and high PPA (n = 224). Data for these two groups of participants were examined for model fit. The fit of the data to the model for participants with low PPA was good (χ^2/df = 2.353; CFI = .972; GFI = .991; RMSEA = .080). For participants with high PPA, the fit of the data to the model was excellent (χ^2/df = 0.243; CFI = 1.000; GFI = .999; RMSEA = .000. The model accounted for 21.1% and 29.5% of the variance in affect and 7.0% and 15.3% of the variance in strenuous exercise participation for low and high PPA participants, respectively. Examination of standardized path coefficients (see Figures 1 & 2) suggested that relations between entity orientation and affective balance appears more direct for individuals with low PPA, while indirect effects through task orientation and control attributions appear larger for individuals with high PPA. In both cases, there appears to be support that the effect of entity orientation on exercise and affect is mediated by task orientation and personal control attributions.

Figure 1

Standardized Path Estimates for Revised Model for Low PPA Participants

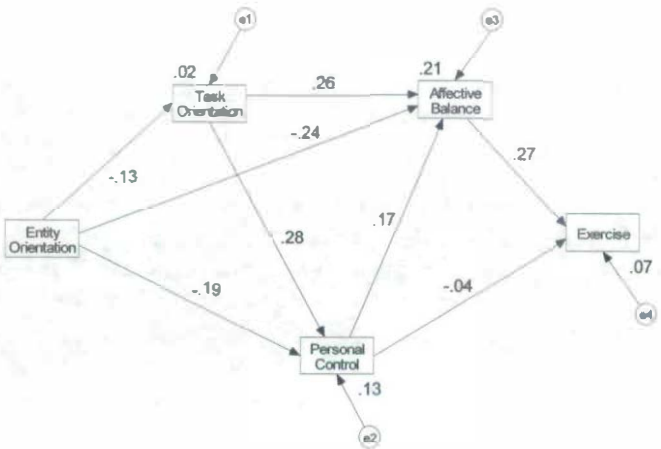
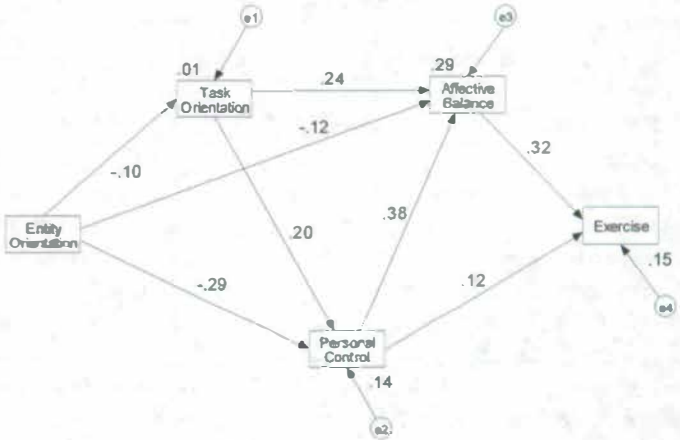


Figure 2
Standardized Path Estimates for Revised Model for High PPA Participants



Discussion

The purpose of this investigation was to explain strenuous physical activity participation within Dweck and Leggett's (1988) social-cognitive model of motivation by paying special attention to perceived physical ability. Our original model that the effect of an entity-orientation on strenuous physical activity participations was mediated by goal orientations was not statistically viable because an entity orientation was not related to an ego goal orientation. In fact, the correlation between the two variables was surprisingly low ($r = .04$) though this correlation was significant ($p < .01$) albeit low for the low PPA participants ($r = .16$). This finding is difficult to explain given Dweck and colleagues work (e.g., Dweck and Leggett, 1988) has repeatedly demonstrated that holding an entity theory of intelligence leads one toward a performance or ego orientated goal.

The leading goal orientation theorists (Ames, 1984; Dweck, 1986; Nicholls, 1989) have consistently delineated two achievement goals (ability goals, performance goals, or ego involvement and ability goals, learning goals, or task involvement) despite different conceptual frameworks. Nicholls conception of ego and task involvement has dominated physical activity research (Roberts, 1992), and was employed in the present investigation. It has been argued that

these conceptual frameworks are similar enough to justify two orientations: performance goals that focus the individual on the demonstration of competence to others and mastery goals that focus the individual on the development of task mastery (Ames & Archer, 1987). But, given the finding that an entity theory of health was not related to an ego orientation, it is important to explore literature to explain this result.

The achievement goal and intrinsic motivation literature provides a potential explanation (Rawsthorne & Elliot, 1999). Performance goals have been theorized to undermine intrinsic motivation because of this goal produces evaluative pressures and anxiety (Harackiewicz, Manderlink, & Sansone, 1984). Mastery goals, on the other hand, facilitate many factors such as feelings of autonomy that promote intrinsic motivation (Butler, 1987). Though the facilitative effect of mastery goals on intrinsic motivation has been empirically supported the undermining effects of performance goals is mixed (Rawsthorne & Elliot, 1999). Rawsthrone and Elliot (1999) contend that the reason for this confusion is that performance goals have more than one conception, whereas mastery goals do not. Indeed, the authors reported in their meta-analysis that the conceptualization of performance goals does indeed differentially impact intrinsic motivation. Specifically, performance goals may be conceptualized as contingent upon self-esteem or normative evaluation. The ego orientation measure utilized in the present investigation (Kilpatrick et al., 2003) is conceptualized as normative evaluation (e.g., "I feel most successful in a health/exercise setting when I can do better than my friends"). A normative evaluative conception does not necessarily emphasize dimensions of the individual's personality that impacts self-esteem (Rawsthrone & Elliot, 1999). Dweck and Leggett's (1988) social-cognitive model conceptualizes performance goals as self-esteem contingent; hence, the lack of an entity-ego orientation relationship in the present investigation may have resulted from the conceptualization of the ego orientation measure. Our measure focused participants on normative comparisons as opposed to more direct self-esteem contingent evaluations (i.e., "I do not feel good about myself because my friends exercise more than I exercise"). Thus, our measure of ego orientation was not well suited for the model.

Our second model that excluded ego orientation provided an excellent and good fit for the high PPA and low PPA participants, respectively. For the high PPA participants, the model accounted for 15% of strenuous physical activity participation as well as 29% of affect in reference to thoughts of strenuous exercise participation. For the low PPA participants, the model accounted for 7% of strenuous physical activity participation and 21% of affect. The mediating role of task orientation is conceptually consistent with implicit self-theory and goal orientation literature. Task orientation or learning goal has consistently and fairly robustly been related to both positive and negative affect in sport (Biddle, Want, Kavussanu, & Spray, 2003), physical activity (Ntoumanis & Biddle, 1999), and

educational settings (Elliot & Dweck, 1988). In addition, it has been argued that this propensity for positive affect is an outcome of views of controllability (Roberts, 1992); hence, the relationships among task orientation, perceived control, and affect were conceptually consistent in the present investigation.

Given the low rates of adult physical activity participation and especially those rates for strenuous physical activity participation (approximately 15%: US DHHS, 2000), one may easily argue that the most important research in exercise psychology should be focused on understanding and promoting physical activity participation. The present investigation sought to understand strenuous physical activity participation by extending Dweck and Leggett's (1988) social-cognitive model. In addition to increasing the understanding of strenuous physical activity participation, interventions to increase strenuous physical activity participation may be proposed from the current findings. Though path analysis does not allow causal statements, it is fairly clear that interventions designed to promote a task orientation will be beneficial. The relationship between task orientation and strenuous physical activity itself for both participant groups was extremely low (r's $\leq .07$), but the resultant impact of task orientation upon personal control and affect, especially, suggest the benefits of task orientation promotion.

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