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College Students' Goal Orientations, Situational Motivation and Effort/ Persistence in Physical Activity Classes

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The purpose of this study was to examine relationships among college students' 2 × 2 goal orientations (mastery-approach [MAp], mastery-avoidance [MAv], performance-approach [PAp], performance-avoidance [PAv]), situational motivation (intrinsic motivation, identified regulation, external regulation and amotivation) and effort/persistence in physical activity classes. Participants (140 female, 109 male) completed a battery of questionnaires assessing the outcome variables at the last week of instruction. Regression analyses revealed that MAp and PAp emerged as positive predictors for intrinsic motivation whereas MAp was the only positive predictor for identified regulation. MAp was negatively related to amotivation (AM), while PAp and PAv were positively related to AM. In addition, MAp, PAp, intrinsic motivation, and identified regulation were significant positive predictors of effort/persistence.

Keywords: mastery-approach, mastery-avoidance, performance-approach, performance-avoidance, and intrinsic motivation

Despite the known health benefits of regular participation in physical activity, American youth and adults are becoming less physically active as a consequence of prevalent sedentary living (U.S. Department of Health & Human Services [USDHHS], 2000, 2008). College students are of no exception. For example, several researchers have documented poor participation in physical activity among college students (e.g., Dinger & Waigandt, 1997; Douglas et al., 1997). As it is evident that participation in physical activity may lead to improved physical and psychological well-being, motivating college students to participate in and adhere to a physical activity regimen is critical. To this end, it is important to understand the specific reasons college students are reluctant to engage in regular physical activity. Achievement goal theory (Nicholls, 1989) and self-determination theory (Ryan & Deci, 2000) represent two viable theories in predicting individuals' participation in physical activity and behavioral change.

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According to achievement goal theorists, the distinguishing features of achievement behaviors are to develop or demonstrate competence, and to set goals that can influence individuals' cognition, affect, and behavior in achievement situations (Nicholls, 1989; Roberts, 2001). Achievement goals reflect how individuals evaluate their personal competence in achievement settings, and are either self-referent as in instances where the individual sets mastery goals or are other-referent and externally based in cases where the individual sets performance related goals. These goals lead to different participation cognitions, affect, and experiences, all of which influence the ways in which individuals participate in and manage their physical activity involvement (Pintrich & Schunk, 2002). Recent conceptualizations, expanded achievement goal orientations to include four dimensions, commonly termed the 2 × 2 multidimensional achievement goal framework. These dimensions include: mastery-approach (MAp), mastery-avoidance (MAv), performance-approach (PAp), and performance-avoidance (PAv; Elliot & McGregor, 2001). In general, mastery goals are adopted by students who are concerned with developing their competence and self-improvement. Accordingly, a MAp goal orientation is embraced by students who strive to increase their understanding, completely master the material, and meet academic challenges, while a MAv goal orientation is adopted by students who seek to avoid negative possibilities in the mastery context such as circumventing much of the learning process or failing to completely master the subject or failing to completely master the subject or avoid doing worse than they had done before (Pintrich, 2000). On the other hand, performance goals are adopted by students who seek to demonstrate their competence relative to their peers. Accordingly, students with PAp goals seek to perform better than their peers, while students with PAv goals want to avoid performing worse than relevant others (Elliot, 1999; Pintrich, 2000).

Empirical evidence has supported the relationship between the four goal orientations and students' academic and physical activity achievement outcomes. For example, adoption of a MAp goal orientation was related to intrinsic motivation in sport (Wang, Liu, Lochbaum, & Stevenson, 2009) and reported effort in fitness testing (Garn & Sun, 2009). Meanwhile, adoption of a MAv goal orientation was related to incompetence in sport (Wang et al., 2009), fear of failure (Pieper, 2003), and worry and disorganization (Elliot & McGregor, 2001). Substantial research has also supported the relationship between adoption of a PAp goal orientation and positive perceived competence in academia and sport, high intrinsic motivation, low state anxiety, and self-reported persistence/effort (Agbuga & Xiang, 2008; Agbuga, Xiang, & McBride, 2010; Cury, Da Fonseca, Rufo, Peres, & Sarrazin, 2003; Elliot & McGregor, 2001; Shen, Chen, & Guan, 2007; Wang et al., 2009). Conversely, adoption of a PAv goal orientation is related to low intrinsic motivation, high state anxiety, and disruptive behaviors (Agbuga & Xiang, 2008; Agbuga et al., 2010; Cury et al., 2003).

Motivational orientations articulated in achievement goal theory have contributed to an understanding of physical activity antecedents. A more complete understanding of physical activity predictors is enhanced through behavioral regulations described in self-determination theory. According to self-determination theory, three classes of behavioral regulations (i.e., reasons for acting) are considered important in understanding the initiation and regulation of behavior: intrinsic motivation, extrinsic motivation (integrated regulation, identified regulation, introjected regulation,

and external regulation), and amotivation (Ryan & Deci, 2000). These motivation types lie on a self-determination continuum with individuals becoming increasingly self-determined as one moves from amotivation to intrinsic motivation (Deci & Ryan, 1991). Intrinsic motivation underlies participation in activities conducted for their inherent enjoyment and satisfaction while integrated regulation reflects a personal endorsement and integration of values and needs in line with one's other values and beliefs. Identified regulation, a slightly less self-determined motivational type, reflects behaviors energized by individuals' acceptance of certain activities as important to their personal goals and values. Introjected regulation energizes behaviors performed to avoid guilt or anxiety or to attain ego enhancements such as pride while external regulation is indicative of actions carried out to gain an external reward or avoid punishment. Finally, amotivation is apparent where there is a lack of intention to act and a relative absence of motivation. Intrinsic motivation, integrated regulation, and identified regulation represent higher levels of self-determined motivation and are expected to lead to positive consequences, while introjected regulation, external regulation, and amotivation refer to lower levels of self-determined motivation and are predicted to result in negative consequences. Empirical evidence supports such contentions with students higher in intrinsic motivation and identified regulation demonstrating better effort in physical education, and greater intention of being physically active in after-school activities (Ntoumanis, 2001, 2005). In contrast, students who indicate a predominance of amotivation display boredom in physical education or lack of intention to participate in after-school physical activities (Ntoumanis, 2001; Standage, Duda, & Ntoumanis, 2003). In addition, external regulation is posited to lead to maladaptive or undesirable consequences. Empirical support for this contention has been found in laboratory studies in which individuals induced to participate in an activity for extrinsic reasons (i.e., motivated in a non self-determined way) persisted less during a free-choice period than those who were intrinsically motivated (see Pelletier & Vallerand, 1993 for a review). Similarly, Vallerand, Fortier and Guay (1997) found that low levels of self-determined school motivation translated into intentions to drop out of high school, and later on to actual dropout behavior. Initial studies in the physical activity domain support these findings with low levels of self-determined motivation predictive of dropout in female handballers (Sarrazin, Vallerand, Guillet, Pelletier, & Curry, 2002) and lower persistence among competitive swimmers (Pelletier, Fortier, Vallerand, & Brière, 2001).

Achievement goal and self-determination theory are two important motivational theories that facilitate our understanding of motivated behavior and related cognitive, affective, and behavioral outcomes in the physical activity domain (Duda, 1992; Ryan & Deci, 2000). In fact, 2×2 multidimensional achievement goal orientations can be viewed as a complementary theory that elaborates on specific aspects of competence motivation within self-determination theory (Conroy, Elliot, & Coatsworth, 2007). However, few studies have integrated these theoretical frameworks in the field of sport and physical activity (Conroy, Kaye, & Coatsworth, 2006; Moreno, González-Cutre, Sicilia, & Spray, 2010; Shih, 2008). Both theory and empirical evidence indicate that goal orientations are linked to different types of situational motivation (Conroy et al., 2007; Moreno et al., 2010; Shih, 2008). For example, mastery goal orientation and self-determined motivations (i.e., intrinsic motivation and identified regulation)

are positively associated, while performance goal orientations have been associated with external regulation and amotivation (Moreno et al., 2010; Ntoumanis, 2001; Standage & Treasure, 2002; Wang et al., 2002). Surprisingly, the majority of previous studies have only examined mastery and performance goal orientations or goal profiles. The matrix of data linking 2×2 achievement goals with the three classes of behavioral regulations is largely incomplete. Thus, we attempt to investigate the links between these theoretical frameworks by connecting the major constructs from 2×2 multidimensional achievement goal and the major constructs in self-determination theory.

Most studies on links between achievement goals and behavioral regulations have primarily focused on intrinsic motivation while neglecting the other behavioral regulations (e.g., Cury et al., 2003; Wang et al., 2009). For example, in research with cognitive and motor tasks, MAp and PAp goals have been shown to facilitate intrinsic motivation as compared with PAv goals (Cury et al., 2003; Elliot & Harackiewicz, 1996). There is a clear need for additional research investigating the relationships among achievement goals and the other two behavioral regulations, specifically, variants of extrinsic motivation and amotivation. In addition, most of the research on achievement motivation (e.g., achievement goals, intrinsic motivation) to date has focused primarily on sport or physical education (Ntoumanis, 2001, Standage & Treasure, 2002; Standage, et al., 2003). Relatively scant attention has been devoted to examination of the relationships of achievement motivation and achievement outcomes in physical activity settings. Therefore, the purposes of this study were: (1) to examine relationships among 2×2 multidimensional achievement goal orientations, situational motivation and effort/persistence of college students participating in physical activity classes; (2) to examine the predictive attributes of 2×2 achievement goals toward different types of situational motivation; and (3) to determine the role of 2×2 achievement goals and situational motivation in predicting physical activity effort/persistence.

Methods

Participants and the Research Setting

Participants were 249 college students (140 female, 109 male) with a range of degree majors, from a southeast university enrolled in a variety of college physical activity classes including strength training, jogging, soccer, and tennis. The age of the participants ranged from 18 to 29 years ($M = 21.06$, $SD = 1.55$). The majority of the participants, 83.9%, were Caucasian, followed by 8.8% African-American, and 7.2% of others (e.g., Hispanic American, Asian American, etc.). In this study, the physical activity classes were elective courses for all participating college students and were taught by instructors with at least two-years teaching experience. The participants were considered equivalent for different types of physical activity classes and the levels of instruction to which they were exposed. The classes met three times per week for 50 min per class (e.g., weight training, jogging) or twice every week for 90 min per class (e.g., soccer, tennis). Institutional Review Board approval was granted before questionnaire administration and all participation in the study was voluntary and confidential. Consent forms were obtained from participants before the study.

Variables and Measures

Demographic Information. A personal data sheet was designed to gather information regarding the students' background. Students responded to questions relating to age, gender, academic classification, and race.

Achievement Goals.
Participants' achievement goals were adopted from the Achievement Goals Questionnaire for Sport (AGQS;Conroy, Elliot, & Hofer, 2003). The AGQS is a 12-item scale, with three items serving as indicators for each of the four goals: MAp (e.g., It is important to me to perform as well as I possibly can in this class), MAv (e.g., I worry that I may not perform as well as I possibly can in this class), PAp (e.g., it is important for me to do better than other students in this class), and PAv (e.g., My goal in this class is to avoid performing worse than others). The participants responded on a 7-point scale ranging from 1= *not at all like me* to 7= *completely like me.* The average score of each of the three-item scales were used to reflect students' MAp, MAv, PAp, and PAv. The 2 × 2 goal model instrument has demonstrated reliability and validity in sport and physical activity settings (Conroy et al., 2003).

Situational Motivation. The Situational Motivation Scale (SIMS) was used to assess the participants' situational motivation in physical activity classes. This measure is a 16-item self-report inventory that measures intrinsic motivation, identified regulation, external regulation and amotivation (Guay, Vallerand, & Blanchard, 2000). Integrated and introjected regulations were not measured in this scale because: (1) conceptual distinctions have largely failed to receive statistical support, and (2) it is difficult to differentiate the real meaning between these and the adjacent levels (e.g., external regulation). In this study, participants were asked to rate how important each of the 16 statements were to their personal motives to engage in physical activity classes in which they were enrolled, by responding to the stem, "Why are you currently engaged in this class?" A 7-point Likert scale, ranging from 1 = *strongly disagree* to 7 = *strongly agree*, was used for all responses. Sample statements included: (a) because I think that this activity is interesting (i.e., intrinsic motivation); (b) because I am doing it for my own good (i.e., identified regulation); (c) because I am supposed to do it (i.e., external regulation); and (d) there may be a good reason to do this activity, but personally I don't see any (i.e., amotivation). The average score of each of the four-item scales were used for students' intrinsic motivation, identified regulation, external regulation and amotivation. The SIMS has demonstrated acceptable validity and reliability in physical education settings (Standage & Treasure, 2002).

Effort/Persistence. The self-report measure on students' effort/persistence to perform or learn in their physical activity classes was adapted from Guan, Xiang, McBride, and Bruene (2006), and was assessed via eight items. Students rated each item on a 7-point scale, ranging from 1 (*not at all true for me*) to 7 (*very true for me*). The stem for these items was: "In this physical activity class…", followed by items such as: "When I have trouble performing some skills, I go back and practice"; "Regardless of whether or not I like the activities, I work my hardest to do them.; " The average score of these items was computed for effort/persistence. The effort/persistence scale has been found to demonstrate acceptable levels of reliability and validity among American students (Guan et al., 2006).

Data Collection and Analyses

After the informed consent was obtained from all participants, the researcher or the research assistants administered the questionnaires during the last week of instruction. Specifically, the participants completed the AGQ-S, the SIMS, and the effort/persistence scale along with the demographic information sheet. Students were encouraged to answer truthfully. They were also assured that their responses were anonymous and that their participation in the study would not affect their grades in the physical activity classes. In addition, the researcher and assistants monitored and helped students by answering any questions they had.

There were four major phases in the data analysis for this study. First, confirmatory factor analyses (CFA) were conducted on the achievement goal and situational motivation measures to test the validities. Second, Cronbach's coefficient alphas were computed to ensure the internal consistencies of all measures. Third, descriptive analysis and Pearson correlations were calculated to describe the sample and relationships among students' achievement goals, situational motivation and effort/persistence. Finally, a series of hierarchical multiple regressions were performed to assess the predictive utility of achievement goals toward different types of situational motivation; and to assess the relative contributions of achievement goals and situational motivation variables to physical activity effort/persistence.

Results

Confirmatory Factor Analyses and Reliability

The utilization of CFAs in this study provided evidence for the factorial validity of achievement goals and situational motivation measures. Four indices assessing goodness of fit between the model and the data were the followings: (a) Chi-square; (b) Chi-square divided by degrees of freedom, for which a value in the range of 2:1 or 3:1 indicated an acceptable fit between the hypothetical model and the sample data (Carmines & McIver, 1981); (c) the comparative fit index (CFI; Bentler, 1990); (d) the Goodness of Fit Index (GFI); and (e) the root mean square error of approximation (RMSEA). Values larger than .90 for the second and third indices, and less than .08 for the last indices, indicate marginally good model fit (Hu & Bentler, 1999). All CFAs were conducted using the SAS 9.1 system's PROC CALIS, in which the data were entered as a covariance matrix. Maximum likelihood procedures were used, and the latent factors were allowed to correlate freely with one another. Chi-square, Chi-square divided by degrees of freedom, CFI, GFI, and RMSEA for the 2×2 achievement goal scale were 85.15, 1.77, .98, .95, and .06, respectively. Chi-square, Chi-square divided by degrees of freedom, CFI, GFI, and RMSEA for the situational motivation scale were 243, 2.49, .91, .90, and .10 (approaching .08), respectively. Thus the results suggested acceptable fits of the data with the two separate models (achievement goal model and situational motivation model). The CFAs provide support for the factorial validity for both measures. With regard to the internal consistencies of the study variables, the Cronbach's alpha coefficients showed that all the coefficients (See Table 1) exceeded the acceptability criterion of .70, suggesting that all measures demonstrated acceptable internal consistency (Nunnally, 1978) among the target population in this study.

Table 1 Descriptive Statistics, Internal Reliabilities, and Correlations

	1	2	3	4	5	6	7	8	9
1. MAp	.74								
2. MAv	.11	.76							
3. PAp	.21*	.21*	.73						
4. PAv	.0002	.30**	.48**	.74					
5. IM	.37**	.08	.24*	.10	.74				
6. IR	.37**	.13*	.04	.02	.47**	.76			
7. ER	-.03	.05	-.04	.04	-.15*	-.09	.83		
8. AM	-.10	.09	.17*	.23*	-.19*	-.31*	.42**	.82	
9. E/P	.53**	.15*	.22*	.04	.52**	.52**	-.08	-.10	.71
Mean	6.21	4.41	4.34	4.01	5.41	6.04	3.38	1.86	5.20
SD	.93	1.66	1.77	1.83	1.24	1.06	1.69	1.18	1.06

Note. Cronbach alpha coefficients are provided along the diagonal. *SD* = standard deviation; MAp = mastery-approach, MAv = mastery-avoidance, PAp = performance-approach, PAv = performance-avoidance; IM = intrinsic motivation, IR = identified regulation, ER = external regulation; AM = amotivation; E/P = effort/persistence; * $p < .05$; ** $p < .01$.

Correlation Analyses

Descriptive statistics for each variable are presented in Table 1. In general, college students displayed moderate levels of situational motivation and goal orientations toward physical activity classes, as the mean scores of intrinsic motivation and identified regulation (both considered higher levels of self-determined motivation) and the four goal orientations were above the midpoint (i.e., 4) of the scale. Conversely, amotivation was far below the scale midpoint and external regulation was slightly below the scale midpoint. In addition, students reported relatively high levels of physical activity effort and persistence ($M = 5.2$). Correlation analyses revealed that intrinsic motivation was positively related to MAp and PAp ($r = .37$; $r = .24$; respectively). Identified regulation was positively related to MAp and MAv ($r = .37$; $r = .13$; respectively), and amotivation was positively related to PAp and PAv ($r = .17$; $r = .23$; respectively). In addition, except for PAv, external regulation and amotivation, all other variables were positively associated with effort/persistence ($r = .15$ to $.53$).

Hierarchical Multiple Regression Analyses

Four hierarchical multiple regression analyses were performed to examine the relative contributions of multidimensional achievement goals to students' situational motivational beliefs (intrinsic motivation, identified regulation, external regulation and amotivation), respectively. Based on previous empirical research and literature (e.g., Conroy et al., 2006; Conroy et al., 2007; Moreno et al., 2010; Shih, 2008),

the orders for the entries of the independent variables were specified a priori with MAp and PAp being entered first followed by MAv and PAv.

As shown in Table 2, our data reveals that, for intrinsic motivation, MAp and PAp emerged as significant and positive predictors in the first step, F (2, 245) = 23.60, $p < .01$, and MAv and PAv were not significant predictors when entered into the second step of this model. The result indicates that when the variance explained by MAp and PAp was controlled for in the model, MAv and PAv failed to account for an additional significant portion of the variability related to intrinsic motivation. A total of 16.2% of variance of intrinsic motivation was accounted for by MAp and PAp. In regards to identified regulation, MAp was the only positive predictor in the first step, F (2, 245) = 22.63, $p < .01$, and accounted for 14% of the variance. Similarly, MAv and PAv failed to predict identified regulation in the second step. Surprisingly, no achievement goal orientations emerged as significant predictors for external regulation in either step. In addition, MAp negatively while PAp positively predicted amotivation in the first step, F (2, 245) = 6.05, $p < .01$, and accounted for 4.7% of the variance. PAv was the only positive predictor in the second step, F (4, 243) = 4.6, $p < .01$, explaining an additional 2.3% of the variance.

With regard to students' physical activity effort/persistence, the achievement goals were entered in the first step, followed by situational motivation variables in the second step (Conroy, Elliot, & Coatsworth, 2007). Our data revealed that students' MAp and PAp significantly predicted their effort/persistence in the first step, F (4, 243) = 26.1, $p < .01$, accounting for 30.1% of the variance (See Table 3). Intrinsic motivation and identified regulation were also significant predictors when entered into the second step of this model, F (8, 239) = 27.38, $p < .01$, and explained an additional 17.7% of the variance.

Discussion

This study was an initial attempt to examine the relationships between multi-dimensional achievement goals, situational motivation, and effort/persistence among American college students in a physical activity class setting. Before the main analyses, support was provided for the internal consistency and validity of the measures used in this study. According to the descriptive analyses, students reported moderate levels of achievement goals, situational motivation and effort/persistence toward physical activity classes. In addition, the correlations between the four goal orientations and between the four types of situational motivation are in line with previous physical activity studies (Geogiadis, Biddle, & Chatzisarantis, 2001; Wang et al., 2009; Zahariadis & Biddle, 2000).

As expected, students' MAp and PAp were significant positive predictors for their intrinsic motivation in the current study. The finding is consistent with recent empirical studies suggesting positive relationships between MAp and interest (Elliot & McGregor, 2001), positive attitudes in academics (McGregor & Elliot, 2002), and intrinsic motivation in sport (Wang et al., 2009), and between PAp and intrinsic motivation in physical education (Shen et al., 2007). Apparently, positive outcomes (e.g., intrinsic motivation) are associated with adoption of both types of approach goals, namely mastery-approach goal and performance-approach goal. Recently, many scholars have considered the *multiple goal perspective* (e.g., Barron & Harackiewicz, 2001), suggesting the optimal goal orientation for students to

Table 2 Results of Regression Analyses for Students' Situational Motivation

Independent variable	Dependent variable	β	R^2	*t* value
	Intrinsic Motivation			
First step			.162	
mastery-approach		.33		5.57**
performance-approach		.16		2.78**
Second step			.162	
mastery-approach		.34		5.51**
performance-approach		.16		2.25*
mastery-avoidance		.00		-.01
performance-avoidance		.02		.31
	Identified Regulation			
First step			.156	
mastery-approach		.39		6.51**
performance-approach		.02		.30
Second step			.166	
mastery-approach		.39		6.42**
performance-approach		-.02		-.31
mastery-avoidance		.09		1.39
performance-avoidance		.05		.67
	External regulation			
First step			.002	
mastery-approach		-.03		-.39
performance-approach		-.04		-.54
Second step			.009	
mastery-approach		-.02		-.35
performance-approach		-.08		-1.01
mastery-avoidance		.05		.76
performance-avoidance		.06		.81
	Amotivation			
First step			.047	
mastery-approach		-.14		-2.18*
performance-approach		.20		3.11**
Second step			.07	
mastery-approach		-.12		-1.94
performance-approach		.11		1.51
mastery-avoidance		.03		.48
performance-avoidance		.16		2.23*

Note. * $p < .05$; ** $p < .01$.

Table 3 Results of Regression Analyses for Students' Effort/ Persistence

Variables	β	R^2	*t* value
First step		.301	
mastery-approach	.49		8.86**
mastery-avoidance	.09		1.51
performance-approach	.13		2.04*
performance-avoidance	-.05		-.75
Second step		.478	
mastery-approach	.29		5.50**
mastery-avoidance	.05		1.09
performance-approach	.09		1.64
performance-avoidance	-.08		-1.43
Intrinsic motivation	.24		4.14**
Identified regulation	.33		5.58**
External regulation	.01		.16
Amotivation	.07		1.28

Note. β values are standardized regression coefficients from the final stage of the regression analysis; * $p < .05$; ** $p < .01$

adopt may be multidimensional (e.g., endorsing MAp and PAp). Although this is in contrast to the traditional *mastery goal perspective* asserting individuals should focus on a mastery goal orientation to obtain optimal outcomes, a number of studies have found students' adoption of multiple goal orientations to be beneficial in promoting positive motivational outcomes such as interest and performance (e.g., Barron & Harackiewicz, 2000; 2001; Dowson & McInerney, 2003; Pastor, Barron, Miller, & Davis, 2004).

Students' MAp was found to be the only positive predictor of identified regulation. The finding is in line with the extant studies indicating a mastery orientation to be predictive of motivational variables with high self-determination (e.g., Ntoumanis, 2001; Wang et al., 2009). Surprisingly, none of the goal orientations predicted external regulation in this sample. One would expect MAv and/or PAv goals to predict external regulation as avoidance tendencies to not fail in front of (or in comparison with) relevant others is synonymous with externally referenced motives such as receiving praise or social prestige in demonstrating superiority in relation to one's peers. Explanations regarding the lack of association between goal-orientations and externally regulated motives for physical activity remain speculative and require further empirical examination in various physical activity contexts.

In regards to students' amotivation, PAv and PAp were both positive predictors. The PAv finding is consistent with goal-orientation/self-determination theory and empirical research in which adoption of a PAv goal has been found to lead to low intrinsic motivation and high state anxiety (Agbuga & Xiang, 2008; Cury et al., 2003). That PAp was also a positive predictor of amotivation is logical when considering the possibility that for *some* students the prospect of having to engage

in an activity class with normative based comparisons might represent a situation that one lacked interest in. Further research examining this contention is needed. Finally, MAp negatively predicted amotivation. This finding may be explained by the fact that an inclination toward self-improvement and personal mastery of tasks is incongruous with the tendency to display apathy (i.e., amotivation) in achievement situations such as a physical activity class.

In terms of the predictive variables in relation to students' effort/persistence in physical activity classes, the results indicated that MAp, PAp, identified regulation, and intrinsic motivation were significant positive predictors. Again, the important link between MAp and positive achievement behaviors was observed (Lochbaum, Stevenson, Hilario, Surles, & Havenar, 2008). Consistent with achievement goal theorizing and previous research, a PAp goal orientation was also likely predictive of students' effort/persistence in physical activity classes as an element of inter-student competitiveness and other based comparisons likely fostered a sense of effort and determination (Elliot & Harackiewicz, 1996; Lochbaum, Bixby, Wang, 2007). Although intrinsic motivation emerged as a positive predictor which is in accordance with previous studies (e.g., Ntoumanis, 2001), it trigged our curiosity that identified regulation emerged as a stronger predictor of effort/persistence than intrinsic motivation. One explanation highlighted in previous research is the fact that exercise is generally more extrinsically motivated than sport participation (Frederick & Ryan, 1993; Ryan & Deci, 2007). Although university students may certainly enjoy physical activity for its own sake, participants in this study likely had a multiplicity of externally based motives (e.g., physical appearance, stress relief, health outcomes) driving their physical activity involvement. As such, it is not entirely surprising that identified regulation (a self-determined form of extrinsic motivation) was found more salient than intrinsic motivation in determining their physical activity effort and persistence levels. Indeed, this interpretation is supported by the fact that identified regulation had the highest mean scores among the four types of situational motivation.

Taken together, the findings of this study support a growing body of evidence that it is imperative for students to adopt a *multiple goal perspective* if exercise energy and persistence are to be optimized. Educational professionals might help students adopt PAp along with MAp to facilitate optimal learning outcomes. Second, the findings indicate that both approach achievement goal orientations and self-determined motivation (i.e., intrinsic motivation and identified regulation) had predictive utility on students' effort/persistence, supporting the integration of the two theoretical perspectives in understanding student motivation to participate in physical activity. In addition, our data suggest that MAp goals not only had positive predictive strength on students' effort/persistence but also were related to higher levels of self-determined motivation, specifically, intrinsic motivation and identified regulation. This suggests that promoting a MAp goal orientation can be effective in increasing students' situational motivation and engagement in college physical activity classes. Therefore, the study findings offer some teaching implications in real practice. First, physical educators and health professionals should promote a MAp goal orientation among students by emphasizing task mastery, personal improvement and skill learning in their classes. Second, physical educators need to adapt learning to students' ability and help them successfully master the task/activity, thus allow them to achieve a sense of success and promote a PAp goal

orientation. In addition, physical educators should present and organize the physical activities in an interesting and enjoyable way, as well as help students set optimal yet realistic goals to foster students' intrinsic motivation and identified regulation toward physical activity.

This study has several limitations. First, this cross-sectional study cannot identify any causal effects between the study variables. Prospective or retrospective designed studies are recommended in the future to ascertain this information. Second, although the measure of effort/persistence was previously validated as an indicator of achievement behaviors, it would have been desirable to obtain objective measures for the outcome variables (e.g., accelerometer-based physical activity intensity, heart rate variability), a recommendation for future study. In addition, the participants came from one university, and therefore the variables in this study should be tested with a larger sample in future research. Despite these limitations, this study adds an important contribution to the physical activity literature by highlighting the importance of mastery and performance approach goals in fostering adaptive motivational outcomes in university age exercisers. Moreover, results support the integration of goal orientation and self-determination theory variables in the prediction of important physical activity outcomes like effort and ongoing persistence. Given a high rate of decline in activity levels among university aged individuals, these findings have relevance for health promotion agents interested in encouraging continued physical activity participation during the college years.

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