Sport Ability Beliefs, 2 x 2 Achievement Goals, and Intrinsic Motivation: The Moderating Role of Perceived Competence in Sport and Exercise

C. K. John Wang, Woon Chia Liu, Marc R. Lochbaum, and Sarah J. Stevenson

We examined whether perceived competence moderated the relationships between implicit theories, 2 x 2 achievement goals, and intrinsic motivation for sports and physical activity. We placed 309 university students into high and moderate perceived competence groups. When perceived competence was high, entity beliefs did not predict the performance-avoidance goal; yet when perceived competence was moderately low, entity beliefs did predict this goal. The mastery-avoidance goal had no relationship with intrinsic motivation when perceived competence was high, but had a significant negative relationship when perceived competence was moderately low. Our findings highlight the importance of reexamining the role of perceived competence when studying implicit beliefs and the 2 x 2 achievement goals.

Researchers have raised concerns about our physical activity participation patterns in relation to the advancement in computer technology and modernization (Chia, Wang, Teo-Koh, Quek, & Gosian, 2002; Pate et al., 1997; Robinson et al., 1993). For instance, over the last 10 years, the prevalence of obesity has increased from approximately 10% to 40% in most European countries (American Association of Obesity, 2006). In the United States, obesity-related illnesses have the potential to shorten the present generation of children's lifespan by 2 to 5 years on average (Hellmich, 2005). Regular physical activity reduces obesity and its related diseases, but studies have shown that majority of the population are not exercising regularly (e.g., Pate et al., 1995, 1997). There

is a strong need to use theoretically driven research to examine motivation for exercise to guide interventions. To accomplish this, our investigation examined the motivational processes of university students in their sports and exercise participation using three theoretical frameworks: sport ability beliefs or implicit theories (Biddle, Wang, Chatzisarantis, & Spray, 2003; Dweck, 1999; Wang & Biddle, 2001); achievement goal theory (Elliot, 1999, Elliot & McGregor, 2001, Wang, Biddle, & Elliot, 2007); and self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000a, 2000b).

Sport Ability Beliefs

Individual lay theories or beliefs influence a person's interpretation of events (Kelly, 1955). Dweck and colleagues (Dweck, 1999; Dweck & Leggett, 1988; Dweck, Chiu, & Hong, 1995) proposed two types of implicit theories: entity and incremental. With entity theory, individuals generally view ability as a fixed capacity that is unchangeable. They tend to adopt a performance goal and compare how much ability they have with others. In contrast, individuals holding the incremental theory view ability as an acquirable skill that can be changed through practice and effort. They are most likely to adopt a learning goal in skill development. In achievement settings, researchers (Dweck, 1986; Mueller & Dweck, 1998) found that participants with entity beliefs tended to select easy

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tasks, rather than challenging tasks, to avoid showing their incompetence, particularly when perceived competence was moderately low. When faced with challenges, these individuals tended to show detrimental performance along with negative affects and cognitions.

In the same research (Dweck, 1986; Mueller & Dweck, 1998), individuals with incremental beliefs selected more challenging tasks, viewed errors and mistakes as part of learning, and focused on increasing their skills and competencies. As a result, they tended to engage in more adaptive motivational patterns, operationally defined as increased persistence, more positive affect, and effective problem-solving strategies. Biddle and colleagues (Biddle et al., 2003) found that entity beliefs were important predictors of amotivation, and incremental beliefs were strong predictors of enjoyment in sports and physical activity. In addition, Wang and Biddle (2001) also found that incremental beliefs in sport ability were associated with intrinsic motivation, and entity beliefs related to a less adaptive motivational profile toward physical education. However, these studies only examined the approach dimension of achievement goals.

Achievement Goal Theory

Within the social-cognitive model of achievement motivation, implicit beliefs are predictors of achievement goals (Dweck, 1999). Nicholls' (1984, 1989) two achievement goals, task and ego, have dominated the sport and exercise psychology literature. Mastery or task goals focus on developing competence in a self-referenced manner and are based on self-improvement and effort invested in task mastery. Ego or performance goals focus on demonstrating normative competence; thus, one strives to defeat others or to outperform others with less effort. Theoretically, task-involved individuals should exhibit positive and adaptive motivated behaviors, regardless of their levels of perceived competence. Ego-involved individuals with high perceived competence should also show adaptive motivational patterns; however, those with moderately low perceived competence should exhibit maladaptive motivational responses (Dweck, 1986; Nicholls, 1984; 1989). This is because they are more concerned with the adequacy of their ability in comparison with others, which increases the likelihood of feeling incompetent, especially for those who doubt their ability. Therefore, perceived competence likely mediates the influence of achievement goals on achievement-related outcomes.

Some have proposed that perceived competence may moderate the impact of ability beliefs on achievement outcomes (see Tabernero & Wood, 1999). Cury and colleagues (Cury, Elliot, Fonseca, & Moller, 2006) tested the moderating role of perceived competence on the effect of implicit theories and math performance (Cury et al., 2006, Study 1) and on the effect of implicit theories on IQ test performance and intrinsic motivation (Cury et al., 2006,

Study 2) and found little support for the moderating effect in both studies. However, they tested the moderating effect of perceived competence independently of achievement goals. Because Dweck (1999) theorized that implicit theories directly determine achievement goals, there is a need to test the moderating effects of perceived competence of implicit theories and achievement goals concurrently on achievement-relevant outcomes.

Achievement goal research has changed with the inclusion of a valence dimension, approach-avoidance, with the classic goal dimension, mastery or performance (Elliot, 1997; Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001). Existing relationships should be reexamined or modified based on the distinction between approach and avoidance dimension (Cury et al., 2006; Cury, Elliot, Sarrazin, Fonseca, & Rufo, 2002). The performance-mastery dimension differentiates two different ways of how competence is defined; the approach-avoidance dimension represents how competence is valenced. Competence is valenced in terms of whether the focus is on a positive possibility (approach) or a negative possibility (avoidance). Approach goals focus on attaining competence, whereas avoidance goals focus on avoiding incompetence. As a result, competence based on the mastery-approach goal is defined by a focus on task-based attainment, whereas competence based on the mastery-avoidance goal is characterized by a focus on task-based or intrapersonal incompetence, such as concerns about not learning. In addition, it involves focusing on not doing worse than before. From the performance goal perspective, the performance-approach goal defines competence based on normative achievements, whereas the performance-avoidance goal defines competence based on avoiding displays of normative incompetence.

To date, only one published study examined the 2 x 2 achievement goals in relation to perceptions of perceived competence as well as several other important motivational variables (Wang et al., 2007). Wang et al. (2007) used cluster analysis on data for nearly 1,000 Singapore youths and found that high scores on all four achievement goals were linked to high relatedness, perceived competence, and enjoyment of physical education activities. In contrast, low scores on all four achievement goals were linked to the least positive set of characteristics and outcomes, with lowest autonomy, relatedness, and perceived competence, and the highest amotivation, with least enjoyment of physical education activities. The results suggest that the degrees to which achievement goals are endorsed are related to different levels of perceived competence and achievement-related outcomes.

Cury et al. (2006) proposed that implicit theories and perceived competence should be viewed as independent antecedents of achievement goal adoption. They tested the moderation effects on implicit theory and achievement goals independently and found perceived competence

was not a moderator of relations between implicit theory or achievement goal effects. However, traditional achievement goal models maintain that perceived competence mediates the relationship between performance goals and subsequent outcomes. Though these findings are mixed (see Tabernero & Wood, 1999), future studies must reexamine the role of perceived competence on implicit beliefs and achievement goals. Hence, our study tested the effects of perceived competence on the relationship between implicit theories, achievement goals, and a key motivation variable, intrinsic motivation, concurrently.

Intrinsic Motivation

Intrinsic motivation within the SDT framework (Deci & Ryan, 1985; Ryan & Deci, 2000a, 2000b) is an important variable when attempting to examine participation in achievement or difficult task domains such as engaging in a consistent physical activity program. Therefore, it is important to have a clear understanding of the conceptual link between implicit theories, achievement goals, and intrinsic motivation, and whether or not perceived competence moderates these relationships. According to SDT, a mastery goal enhances intrinsic motivation because the focus is on task mastery, promoting challenges, and supporting autonomy (Dweck & Leggett, 1988). In contrast, a performance goal produces external pressure to perform well, leading to an increase in anxiety that should diminish intrinsic motivation (Dweck, 1986; Nicholls, 1989). According to SDT, intrinsic motivation occurs when an individual is doing something for its own sake. Previous studies (Biddle et al., 2003; Spray, Wang, Biddle, Chatzisarantis, & Warburton, 2006; Stevenson, 2006; Wang & Biddle, 2001; Wang & Biddle, 2007) showed that mastery goals and incremental beliefs are linked to intrinsic motivation and more adaptive motivational patterns. In contrast, entity beliefs are associated with moderately low perceived competence and lower intrinsic motivation, as well as low physical activity participation. Dweck (1999) maintained that implicit beliefs underpin the adoption of achievement goals, and subsequently, results in different affective and behavioral outcomes. Therefore, implicit beliefs should not predict intrinsic motivation directly but indirectly through achievement goals.

Purpose

The purpose of the present study was to examine the moderating role of perceived competence on implicit theories, achievement goals, and intrinsic motivation. Based on the work of Dweck (1999) and Elliot (2005), we tested four hypotheses (see Figure 1):

- H1: When perceived competence is high, entity beliefs will predict performance-approach goals positively, and not performance-avoidance goals.

- H2: When perceived competence is moderately low, entity beliefs will positively predict performance-avoidance goals, and not performance-approach goals. The two performance goals will be negatively associated with intrinsic motivation.
- H3: Regardless of the levels of perceived competence, incremental beliefs will positively predict mastery-approach goals and in turn, positively predict intrinsic motivation.
- H4: When perceived competence is moderately low, incremental beliefs will positively predict mastery-avoidance goals and in turn, negatively predict intrinsic motivation.

In addition, we tested an alternative model with sports ability beliefs and perceived competence as antecedents of the four achievement goals proposed by Cury et al. (2006). In this model (Figure 2), we hypothesized that the two performance goals were predicted positively by entity beliefs, whereas incremental beliefs positively predicted mastery goals. Perceived competence positively predicts the two approach goals and negatively predicts the two avoidance goals. Of the four achievement goals, only the mastery-approach goal positively predicts intrinsic motivation, while the other three achievement goals would negatively relate to intrinsic motivation.

Method

Participants and Procedures

We recruited 309 university students (125 men, 184 women) from physical activity classes (e.g., strength and conditioning, health promotion, sports classes) at a large southwestern U.S. university. They ranged in age from 18 to 32 years (M age = 21.37 years, SD = 1.87). Participants completed questionnaires in quiet classroom conditions. A large percentage of the sample reported never having competed on a college athletic team (91%). Our research was approved by the University's human subject review board. We informed participants that the general purpose of the study concerned motivation for physical activity and sports, and that their identities would be kept strictly confidential. We instructed participants to answer all items on the questionnaires as honestly as possible and that they could withdraw from the study any time without adverse effects to themselves or to their class grade.

Measures

The 2 x 2 Achievement Goals in Physical Education Questionnaire (AGPEQ). The 2 x 2 AGPEQ was adapted from Wang et al. (2007) to measure four achievement goals in physical activity. The goals are mastery-approach (e.g., "I

want to learn as much as possible from this activity class"), mastery-avoidance (e.g., "Sometimes I'm afraid that I may not learn certain aspects of this activity as thoroughly as I'd like in this class"), performance-approach (e.g., "It is important for me to do better than other students in this activity class"), and performance-avoidance (e.g., "My goal in this activity class is to avoid performing poorly"). Three items measured each goal. Participants responded on a 5-point Likert-type scale ranging from 1 (not at all true for me) to 5 (very true for me).

Sport Ability Beliefs. The Conceptions of the Nature of Athletic Ability Questionnaire, Version 2 (CNAAQ-2; Biddle et al., 2003) was used to examine incremental and entity beliefs in sports abilities. Incremental beliefs were assessed through the two subscales reflecting Learning (three items; e.g., "to be successful in sport you need to learn techniques and skills, and practice them regularly") and Improvement (three items; e.g., "How good you are at sport will always improve if you work at it"). Entity beliefs

were measured through two subscales reflecting Stable (three items; e.g., "It is difficult to change how good you are in sport") and Gift (three items; e.g., "To be good in sports you need to be naturally gifted"). The proposed hierarchical measurement model (with two higher order factors, entity and incremental, and four first order factors) has good factorial, convergent, and discriminant validity, as well as internal consistency (Biddle et al., 2003). Responses were made on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). In this study, only the higher order constructs were used in the analyses.

Perceived Competence. Participants' perceptions of competence in physical activities were determined using an adapted version of the Sport Competence subscale of the Physical Self-Perception Profile (Fox & Corbin, 1989). The scale was made up of six items. Example items included "Some people feel that they are good when it comes to playing sport or exercising" and "Some people are quite confident when it comes to taking part in sports activities
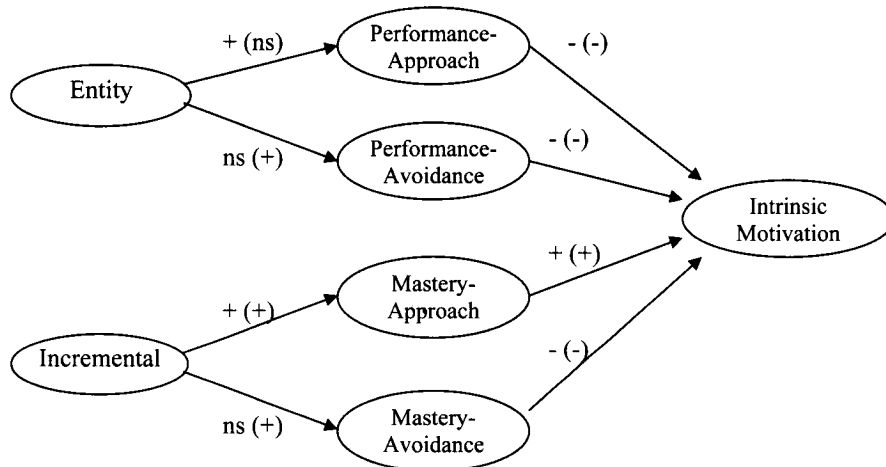

Figure 1. Hypothesized model for the high perceived competence group; hypothesized paths for the low perceived competence group are in parentheses.
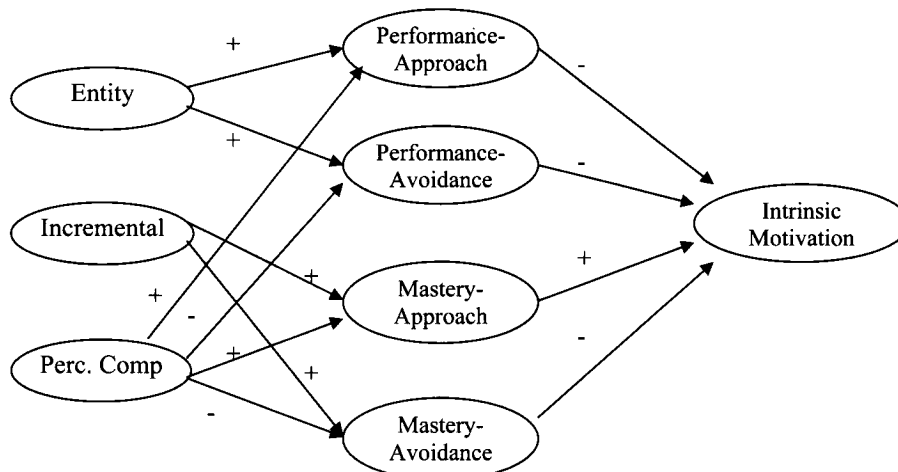

Figure 2. Alternative hypothesized model with perceived competence and implicit beliefs as antecedents of achievement goals.

and exercise." Responses were modified from a structured alternative form to a 5-point scale ranging from 1 (not at all like me) to 5 (very much like me) to be consistent with all items in the previous study (Wang & Liu, 2007).

Intrinsic Motivation. Intrinsic motivation was assessed using three items from the interest-enjoyment subscale of the Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1989). An example item is, "I usually enjoy playing sport." The items were measured on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Data Analysis

We conducted a confirmatory factor analysis (CFA) to examine the factorial validity of all the measures using EQS for Windows 6.1 (Bentler, 2005), except for intrinsic motivation, which has only three items. We computed the internal consistency coefficients, and tabulated the descriptive statistics and the Pearson product-moment correlations of the main variables. To test for the moderating role of perceived competence, we divided the sample into two groups based on perceived competence. Due to the smaller sample size, we used a median split (median = 3.33) to create the high perceived competence (n = 146) and moderately low perceived competence (n = 143) groups, which had a mean score of 2.48 on a 5-point scale.

In the initial analyses, there was evidence of multivariate nonnormality in the distribution (Mardia's coefficient = 77.12, normalized estimate = 22.59). Therefore, we used the Robust Maximum Likelihood method as the estimation method. We also used the Satorra-Bentler scaled chi-square statistic, the nonnormed fit index (NNFI), the comparative fit index (CFI), and incremental fit index (IFI) and mean square error of approximation (RMSEA) to evaluate the adequacy of the models. For NNFI, CFI and IFI, Hu and Bentler (1999) recommended a cut-off value close to 0.95. For RMSEA, values close to .06 indicate a good fit to the data (Hu & Bentler, 1999). We selected these indexes because of their widespread use (Marcoulides & Hershberger, 1997). The change in the CFI was used to compare across two different models,; if the difference in the CFI between the two models is smaller than or equal to -.01, the null hypothesis of invariance should not be rejected (Cheung & Rensvold, 2002).

In the structural equation modeling (SEM) analyses, we used a full latent variable model rather than a structural model. For clarity of presentation, the latent variable indicators were omitted in the figures. In the first stage, we tested the two models with differing levels of perceived competence separately. The first model dealt with the high perceived competence group, and the second involved only the moderately low perceived competence group (see Figure 1). H1 tests the relation-

ships between entity beliefs and the two performance goals. H2 examines the paths between entity beliefs and the two performance goals, and between the two performance goals and intrinsic motivation. H3 tests the paths between incremental beliefs and mastery approach goal, and between mastery approach and intrinsic motivation, and H4 examines the paths between incremental beliefs and mastery-avoidance goals, and between mastery-avoidance and intrinsic motivation (see Figure 1).

In the second stage, we tested the invariance of the models for the two perceived competence groups using multisampling by simultaneously fitting the model to the data for high and moderately low perceived competence groups. We tested the models simultaneously with none of the parameters constrained to be equal across groups. Next, we imposed four equality constraints—factor loadings, factor correlations, measurement errors, and error variances—on all parameters except the fixed parameters. This step allowed us to assess the equivalency of the structural models. The Lagrange Multiplier (LM) test examines whether any of the constraints placed on the two models should be released to improve the fit of the model (Bentler, 1995). Because we had no prior knowledge of the exact paths to be freed between the two models, the use of LM test was the best option.

Results

Psychometric Properties of Measurement Tools

Prior to conducting our main analyses, we performed a CFA on the AGPEQ, CNAAQ-2, and perceived competence scale to examine the factorial validity of the measurement models. Byrne (2006) suggested the measurement model should be tested before fitting SEMs to ensure the parameters are correctly estimated. For the AGPEQ, we allowed the four achievement goal factors to be correlated. The CFA on the AGPEQ showed acceptable fit indexes (scaled χ^2 = 92.80, df = 44, CFI = .955, IFI = .955, NNFI = .932, RMSEA = .061, 90% CI of RMSEA = .043–.077). The internal consistencies for mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance (Cronbach's alpha) were .83, .76, .85, and .70, respectively. For the CNAAQ-2, the CFA showed adequate fit for the proposed hierarchical model (scaled χ^2 = 98.71, df = 51, CFI = .957, IFI = .958, NNFI = .944, RMSEA = .055, 90% CI of RMSEA = .039–.071). We obtained satisfactory internal consistencies for incremental beliefs (α = .79) and entity beliefs (α = .81). In addition, for the single-factor perceived competence, the CFA showed adequate fit indexes: scaled χ^2 = 16.65, df = 8, CFI = .990, IFI = .990, NNFI = .981, RMSEA = .060, 90% CI of RMSEA = .017–.010. Alpha coefficients for the perceived competence scale and intrinsic motivation were .90 and .93, respectively.

Descriptive Statistics

The means, standard deviations, and correlations based on the observed variable scores between the key variables of the overall sample are shown in Table 1. Overall, the participants had high incremental beliefs, and moderately high levels of perceived competence. They also reported high levels of intrinsic motivation in their exercise classes. Mastery-approach goals were positively associated with performance-approach goals, while mastery-avoidance goals were moderately related to performance-avoidance goals. The correlation among the two performance goals was also positive but small. Mastery-approach goals were also positively associated with incremental beliefs, perceived competence, and intrinsic motivation. Performance-approach goals were related to perceived competence and intrinsic motivation.

The correlation matrices, means, and standard deviations for the high and moderately low perceived competence groups are shown in Table 2. In the moderate group, the two mastery goals were correlated moderately; this was not the case in the high perceived competence group. In both groups, the two performance goals were moderately correlated. Entity and incremental beliefs were also negatively correlated in both groups. In the high perceived competence group, perceived competence was positively related to intrinsic motivation, but in the moderate competence group, the relationship was stronger.

Structural Equation Modeling

The model yielded fit statistics of: scaled χ^2 = 233.24, df = 180, NNFI = .922, CFI = .934, IFI = .937, RMSEA = .047, 90% CI of RMSEA = .028–.063 (see Figure 1). The results show that when perceived competence is high, entity beliefs positively predicted performance-approach goal; the relationship between entity beliefs and performance-avoidance goal was negative but not significant. Incremental beliefs positively predicted mastery-approach.

Only the mastery-approach goal positively predicted intrinsic motivation, accounting for 38.6% of variance in intrinsic motivation.

For the moderately low perceived competence group, the SEM analysis showed a marginal fit for the hypothesized relationships, scaled χ^2 = 242.51, df = 180, NNFI = .909, CFI = .923, IFI = .926, RMSEA = .052, 90% CI of RMSEA = .034–.067. The mastery-approach goal was positively predicted by incremental beliefs, and the performance-avoidance goal was positively predicted by entity beliefs. The mastery-approach goal positively predicted intrinsic motivation and the mastery-avoidance goal negatively predicted intrinsic motivation. The model accounted for 71.9% of the variance in intrinsic motivation.

We then tested the model above for the two perceived competence groups separately using multigroup analysis with no constraints. The fit indexes showed satisfactory fit: scaled χ^2 = 474.26, df = 360, NNFI = .921, CFI = .934, IFI = .936, RMSEA = .035, 90% CI of RMSEA = .026–.043. In the next stage, we tested the invariance of the models for the two perceived competence groups by simultaneously constraining all the parameters to be equal across the two groups. These equality constraints included factor loadings, factor correlations, measurement errors, and error variances. We then assessed the equivalency of the structural model between the two perceived competence groups and found that the fit was not acceptable (scaled χ^2 = 567.58, df = 399, NNFI = 0.896, CFI = 0.906, IFI = 0.909, RMSEA = .040, 90% CI of RMSEA = .033–.047).

The LM test suggests three constraints on the path coefficients between intrinsic motivation and mastery-avoidance, intrinsic motivation and mastery-approach, and entity beliefs and performance-avoidance to be released to improve the model fit. The constraints on the three paths were released and a multigroup analysis was repeated. The fit statistics showed adequate fit, scaled χ^2 = 505.92, df = 396, NNFI = .925, CFI = .934, IFI = .935, RMSEA = .034, 90% CI of RMSEA = .025–.042. The ΔCFI

Table 1. Descriptive statistics and zero-order correlations between all variables of the overall sample

	M	SD	1	2	3	4	5	6	7
1. Mastery-approach	3.65	.88							
2. Mastery-avoidance	2.77	.84	.14*						
3. Performance-approach	2.90	.99	.49**	-.01					
4. Performance-avoidance	3.03	.85	.14*	.30**	.28**				
5. Incremental	4.04	.58	.37**	.15**	.04	.12			
6. Entity	2.42	.70	-.15*	.02	.09	.06	-.26**		
7. Intrinsic motivation	4.12	.85	.69**	-.00	.43**	.03	.33**	-.23**	
8. Perceived competence	3.25	.91	.59**	-.13*	.54**	-.02	.14*	-.08	.71**

Note. M = mean; SD = standard deviation.
*p < .05.
**p < .01.

= .028, compared to the fully constrained model. Therefore, we concluded that this partially constrained model has significantly better fit to the data. Figure 3 showed the standardized solutions of the two groups.

Finally, we tested the alternative model with sport ability beliefs and perceived competence as independent predictors of achievement goals. The standardized solution is shown in Figure 4. The fit indexes were: scaled χ^2 = 461.18, df = 237, NNFI = .904, CFI = .918, IFI = .919, RMSEA = .057, 90% CI of RMSEA = .049–.064, indicating poor fit of the data to the proposed model.

We showed that perceived competence moderated the relationship between entity beliefs and the performance-avoidance goal. Entity beliefs predicted the performance-avoidance goal when perceived competence was moderately low, but not when it was high (see Figure 3). In addition, we found that perceived competence moderated the effects on mastery-avoidance goal and intrinsic motivation. That is, when perceived competence was high, mastery-avoidance had no effect on intrinsic motivation. However, when perceived competence was moderately low, mastery-avoidance negatively predicted intrinsic motivation. In the high perceived competence group, the model accounted for 38.6% of variance in intrinsic motivation, while in the moderately low perceived competence group, it accounted for 71.9%. The alternative model, with sport ability beliefs and perceived competence as independent predictors of achievement goals, had no satisfactory fit statistics.

Discussion

The main purpose of our investigation was to examine the role of perceived competence with regard to implicit theories, 2 x 2 achievement goals, and intrinsic motivation. Specifically, we examined the implicit theory (Dweck, 1999) in combination with the more recent 2 x 2 achievement goal framework (Elliot, 1997), and whether perceived competence simultaneously moderated the effects of implicit beliefs and achievement goals or independently with implicit beliefs on achievement goals and intrinsic motivation. The results of the initial analysis showed that the two perceived competence groups had different scores on most of the main variables. The participants in the high perceived competence group had higher mastery-approach and performance-approach goals compared to the moderately low perceived competence group. They also reported higher incremental beliefs and higher intrinsic motivation in sport and exercise classes, demonstrating there were mean level differences between the two perceived competence groups.

We tested the hypotheses that perceived competence moderated the effects of entity beliefs on performance goals, and between 2 x 2 achievement goals and intrinsic motivation, our outcome variable. Our results supported our hypothesis in that entity beliefs predicted performance-approach goals and not performance-avoidance goals when competence was high (H1). H2 was not supported as the results showed that entity beliefs predicted both performance-avoidance and performance-avoidance goals when competence was low. In addition, the two performance goals had no influence on intrinsic motivation, regardless of levels of perceived competence.

Dweck (1999) proposed that people holding an entity view were more likely to endorse performance goals to gain favorable judgments or prevent negative judgment. We expected when perceived competence was high, the performance-approach goal would be adopted and when perceived competence was moderately

Table 2. Descriptive statistics and zero-order correlations between all variables by competent group

| | Moderate perceived competence | | | | High perceived competence | | | | | | | |
	M	SD	M	SD	1	2	3	4	5	6	7	8
1. MAP	3.19	.85	4.06	.70	—	.02	.25**	.02	.42**	-.04	.56**	.25**
2. MAV	2.86	.84	2.68	.85	.40**	—	-.08	.29**	.17*	-.02	-.16	-.21**
3. PAP	2.43	.85	3.35	.93	.47**	.23**	—	.30**	-.00	.21*	.21*	.32**
4. PAV	3.06	.85	3.04	.84	.29**	.32**	.38**	—	.25**	-.07	-.04	-.03
5. Incr	3.94	.57	4.15	.55	.24**	.15	-.07	.02	—	-.19*	-.29**	.08
6. Entity	2.46	.69	2.38	.70	-.21*	.03	.04	.18*	-.34**	—	-.13	.18*
7. IMV	3.61	.91	4.58	.47	.61**	.13	.32**	.13	.27**	-.32**	—	.36**
8. PCM	2.48	.67	4.01	.41	.47**	-.00	.40**	.01	-.07	-.21*	.61**	—

Note. M = mean; *SD* = standard deviation; MAP = mastery-approach; MAV = mastery-avoidance; PAP = performance-approach; PAV = performance-avoidance; Incr = incremental; IMV = intrinsic motivation; PCM = perceived competence; correlation coefficients for the low competent group are below the diagonal; correlation coefficients for the high competent group are above the diagonal.
*p < .05.
**p < .01.

low, the performance-avoidance goal would be adopted. However, entity beliefs also predicted the performance-approach goal when perceived competence was moderately low. It is possible that the perceived competence of the moderate group was not low enough for them to adopt a performance-avoidance goal only. We expected both performance goals to negatively predict intrinsic motivation; however, the path coefficients found were not significant for both groups, although they were negative in direction. Previous studies that found strong negative relationships between performance goals and intrinsic motivation were experimental and failure was encountered (Dweck & Leggett, 1988). Nevertheless, our study reinforces that entity beliefs and performance goals will not enhance intrinsic motivation.

In terms of incremental beliefs, the results showed that incremental beliefs positively predicted mastery-approach goals, and in turn, positively predicted intrinsic motivation, regardless of levels of perceived competence. Thus, H3 was supported. Finally, when perceived competence was moderately low, incremental beliefs positively predicted mastery-avoidance goals, and in turn, negatively predicted intrinsic motivation. H4 also was supported.

Our findings shed light on the moderation effects of perceived competence on implicit beliefs and achievement goals. Few researchers have examined the influence of implicit theory in sport on the avoidance dimension of the 2 x 2 achievement goal framework. Our findings showed that both entity and incremental beliefs have some impact on the avoidance dimension of achievement goals.
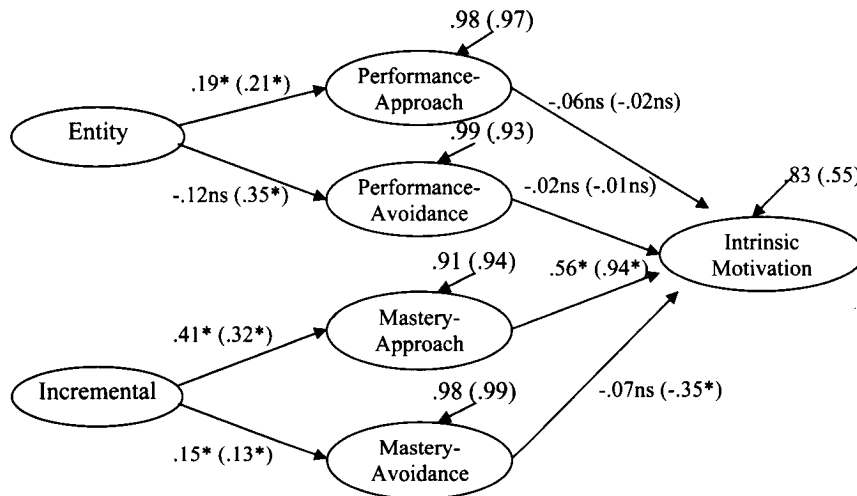

Figure 3. Standardized solution of modified model for the high perceived competence group; standardized loadings for the low perceived competence group are in parentheses.
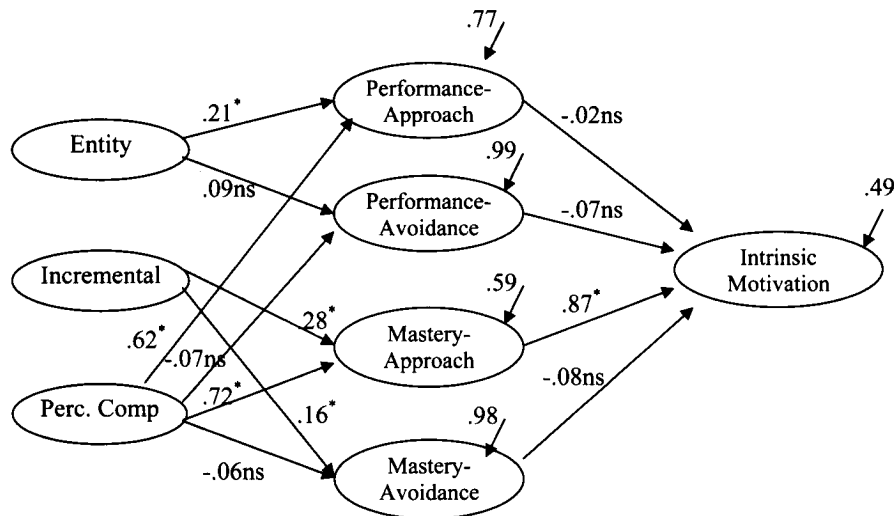

Figure 4. Standardized solution of the alternative model.

Therefore, both theories can be integrated to extend our understanding of complex achievement behaviors. The main findings are consistent with the conventional implicit self-theory (Dweck, & Leggett, 1988) in that entity beliefs lead to adoption of a performance goal, and incremental beliefs predict mastery goal orientation. In addition, performance goals have no positive impact on achievement-related outcomes. Past studies in education and physical education contexts have supported these contentions (e.g., Dweck & Leggett, 1988; Dweck, 1999; Ommundsen, 2001; Spray et al., 2006).

With the recent inclusion of the approach-avoidance dimension to the achievement goal theory (Elliot, 2005; Elliot & McGregor, 2001; Wang et al., 2007), there is a need to reexamine the relationships between implicit theories and achievement goals. In the basic tenants of achievement goal theory, perceived competence is seen as a moderator between performance goals and subsequent outcomes and behaviors (Dweck, 1986; Dweck & Leggett, 1988; Nicholls, 1989). In the new 2 x 2 achievement goal framework, perceived competence is construed as the antecedent of achievement goals according to how the goals are defined and valenced. Based on Elliot and Church (1997), Cury and colleagues (Cury et al., 2006) provided support for perceived competence as an antecedent to goal adoption as opposed to a moderator of goal outcomes, but their research did not examine the moderating effects of perceived competence concurrently with implicit theories and achievement goals. Our results did not support perceived competence and implicit theories as independent predictors of achievement goals.

The results of our investigation provide a clear direction for future experimental inquiry. We demonstrated that perceived competence did have a moderating effect on implicit theories and achievement goal, as well as on mastery-avoidance goals and intrinsic motivation. Thus, to best determine the causal effects of perceived competence on the variables of interest, future experimental research could focus on intrinsic motivation for physical activity, especially in children (e.g., Cury, Da Fonseca, Rufo, Peres, & Sarrazin, 2003; Spray et al., 2006). Future research also could manipulate perceptions of competence as well as entity and incremental beliefs. These manipulations would help determine whether implicit theory coupled with perceived competence leads to theorized goal adoption and adaptive or maladaptive achievement outcomes. As for the applied implications of our research, university physical education teachers should stress feelings of competence as well as mastery-approach views since increasing intrinsic motivation for lifetime physical activity is a primary goal of their classes.

Despite the potential contribution of our findings, we noted several limitations. The sample size of the study was rather small and was based on university activity classes. Therefore, generalizability of the findings is limited.

Because it was a cross-sectional study, links between the constructs examined were merely correlational and causality cannot be inferred. In addition, we examined intrinsic motivation as the only outcome variable, which limits the findings in terms of other cognition and emotion responses. Future research could include other outcome variables. Finally, this study did not include physical activity behavior as an outcome variable.

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