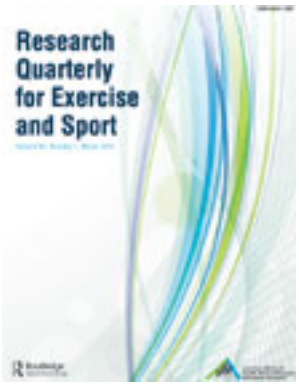

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The Impact of Achievement Goals on Cardiorespiratory Fitness: Does Self-Efficacy Make a Difference?

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The Impact of Achievement Goals on Cardiorespiratory Fitness: Does Self-Efficacy Make a Difference?

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Purpose: The relationships among students' self-efficacy, 2 × 2 achievement goals (mastery-approach [MAp], mastery-avoidance [MAv], performance-approach [PAp], and performance-avoidance goals), and achievement performance remain largely unanswered. We tested a model of the mediating role of self-efficacy on the relationship between 2 × 2 achievement goals and cardiorespiratory fitness **Method:** A sample of 276 middle school students (115 boys and 161 girls; 91 sixth graders, 87 seventh graders, and 98 eighth graders), aged 12 to 15 years ($M_{age} = 13.34$, $SD = 0.96$), responded to the Achievement Goals Questionnaire (Conroy, Elliot, & Hofer, 2003) and Self-Efficacy Questionnaire (Gao, Newton, & Carson, 2008) referenced to the fitness test. Their cardiorespiratory fitness was assessed via the Progressive Aerobic Cardiorespiratory Endurance Run (PACER) 3 days later. **Results:** Structural equation modeling demonstrated an acceptable model fit to the data, $\chi^2(2, N = 105) = 1.66$. Self-efficacy had a statistically significant direct effect on the PACER after controlling for the effects of the achievement goals ($\gamma_{self\text{-}efficacy\text{-}PACER} = .21$). MAv and PAp also had direct effects on PACER performance ($\gamma_{MAv\text{-}PACER} = -.24$, and $\gamma_{PAp\text{-}PACER} = .24$, respectively). MAp failed to exert direct effect on the PACER. However, the indirect effect of MAp on the PACER via self-efficacy was small although it was statistically significant. Additionally, the indirect effects of MAv and PAp on PACER through self-efficacy were not significant **Conclusions:** Students' self-efficacy fully mediated the effect of MAp on fitness performance, as well as partially mediated the effects of MAv and PAp on cardiorespiratory fitness performance. Study implications are provided for educators and practitioners.

Keywords: mastery-approach goal, mastery-avoidance goal, performance-approach goal, performance-avoidance goal

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In the past two decades, health-related physical fitness has been a critical goal of physical education (McKenzie, 2003). Many health-related physical fitness components (e.g., cardiorespiratory fitness, muscular strength/endurance) have been frequently assessed in school physical education

settings (Gao, Newton, & Carson, 2008; McKenzie, 2003). Recently, researchers have reported the positive relationships between student motivation (e.g., achievement goals, task values) and their cardiorespiratory fitness performance (e.g., time in 1-mile [1.61-km] run, the Progressive Aerobic Cardiorespiratory Endurance Run [PACER]) in physical education classes (Gao, Newton et al., 2008; Garn & Sun, 2009; Xiang, McBride, & Bruene, 2004, 2006). However, self-efficacy, a determining factor for achievement outcomes, has yet to receive much attention in combination with achievement goals. Therefore, we investigated the relationships between students' achievement goal orientations, self-efficacy, and cardiorespiratory fitness in physical education classes.

The 2 × 2 Achievement Goal Model

According to the achievement goal theory (Nicholls, 1989), individuals in achievement situations strive to demonstrate ability in either a self-referenced or norm-referenced manner, thus formulating two distinct achievement goals (known as the dichotomous achievement goal model)—namely, task (or mastery) and ego (or performance) goals. A task goal refers to a focus on the development of competence and involves the goal of developing one's ability through learning or task mastery. An ego goal, in contrast, is defined as an underlying concern for demonstrating competence or an avoidance of being judged as incompetent. In general, a task goal has been linked to adaptive motivational patterns such as choosing challenging tasks and persisting in the face of difficulty. In contrast, an ego goal has historically been associated with maladaptive motivational patterns such as avoiding challenging tasks or reducing their effort when faced with difficulty or withdrawing following failure (Elliot, 1999; Nicholls, 1989). However, some research revealed mixed findings of the relationships between two achievement goals and motivational patterns. Bouffard, Boisvert, Vexeau, and Larouche (1995), for example, found that college students with high task/high ego had the highest levels of motivation and actual achievement, whereas students with low task/low ego had the least adaptive pattern. In contrast, Meece and Holt (1993) reported that students with high task/low ego had the most adaptive profile of cognitive strategy use and academic performance, whereas students with both high task and high ego did not academically perform better.

Due to these mixed findings concerning the ego goal, Elliot and his colleagues (Elliot, 1999; Elliot & McGregor, 2001) have proposed the revision of the dichotomous achievement goal model by incorporating the valence of goals (approach, avoidance). This 2 × 2 achievement goal model includes the following two dimensions relative to perceived competence: how competence is defined (mastery or performance) and how competence is valenced (approach or avoid; Elliot & McGregor, 2001). Mastery- or performance-based goals are described in the previous paragraph. An approach valence indicates a behavior initiated by a positive or desirable event or possibility, while an avoidance valence indicates a behavior initiated by a negative or undesirable event or possibility (Elliot, 1999). Therefore, there are four types of goals within the two-dimension model: mastery-approach (MAp), mastery-avoidance (MAv), performance-approach (PAp), and performance-avoidance (PAv) goals. Many researchers in sport (Cury, Elliot, Da Fonseca, & Moller, 2006) and physical education (Garn & Sun, 2009; Guan, McBride, & Xiang, 2007; Wang, Liu, Lochbaum, & Stevenson, 2009) support the use of 2 × 2 model as a useful substitution for the dichotomous model. More specifically, in this goal model, a MAp goal orientation is embraced by students who strive to increase their understanding, completely master the material, and meet challenges, whereas a MAv goal orientation is adopted by students who seek to avoid negative possibilities in the mastery context such as not learning as much as possible or failing to completely master the subject (Wang et al., 2009). The discriminant validity of the MAp and the MAv goal orientations in sport was first confirmed by Conroy, Elliot, and Hofer (2003) through latent growth-curve analyses. Recently, researchers further secured the construct validity of the MAp and the MAv goals in physical education (Guan et al., 2007). On the other hand, students with PAp goals seek to perform better than their peers, while students with PAv goals want to avoid performing worse than their peers (Elliot, 1999; Wang et al., 2009).

Based upon the 2 × 2 model, each type of goal predicts a different pattern of achievement outcomes. Elliot and McGregor (2001) postulated that MAp and PAp predicted more adaptive motivational patterns, while MAv and PAv contributed to maladaptive consequences. Empirical evidence has provided support for the relationship between the four goals and students' achievement outcomes in physical education (Guan et al., 2007). For example, adoption of a MAp achievement goal was positively related to enjoyment (Wang, Liu, Chatzisarantis, & Lim, 2010) and in-class physical activity levels (Gao, Lochbaum, & Podlog, 2011) in physical education and was related to higher PACER performance (Garn & Sun, 2009). Meanwhile, adoption of a MAv achievement goal was related to incompetence in sport (Wang et al., 2009) and low PACER performance (Garn & Sun, 2009). Substantial research has also supported the relationship between adoption of a PAp achievement goal and positive perceived competence in sport (e.g., Wang et al., 2009) and high PACER performance (Garn & Sun, 2009; Lochbaum, Stevenson, & Hilario, 2009). Conversely, adoption of a PAv goal is related to low PACER performance (Garn & Sun, 2009).

Self-Efficacy and Its Relations to Achievement Goals

According to Bandura (1986, 1997), self-efficacy has been described as situation-specific perceived ability beliefs or

perceived competence, such as beliefs about one's capabilities to learn or perform behaviors at designated levels. In essence, individuals who feel efficacious are more likely to perform at a higher level, try new behaviors, expend more effort on those behaviors, and persevere longer when they encounter challenges (Bandura, 1997; Gao, Newton, et al., 2008). To date, studies have suggested that self-efficacy is a major determinant of performance and physical activity levels (Gao, Lee, Kosma, & Solmon, 2010; Gao et al., 2011).

Self-efficacy has also been examined in relation to achievement goals in the contexts of physical activity (Cumming & Hall, 2004; Kavussanu & Roberts, 1996) and physical education (Gao et al., 2011; Gao, Xiang, Harrison, Guan, & Rao, 2008). Specifically, individuals with ego orientation show a decline in self-efficacy when facing difficulty, while those with task orientation maintain high self-efficacy and set challenging goals. This work indicates goal orientations are related to one's self-efficacy. Additionally, considerable research has examined the mediating role that self-efficacy plays in the relationships between achievement goals and motivational responses in both academic and physical education contexts. For example, Gao et al. (2011) investigated the mediating role of self-efficacy in the relationships between 2×2 achievement goal orientations and middle school students' physical activity levels in physical education. Their findings supported the mediating effect of self-efficacy on the relationship between students' MAp goal orientation and physical activity levels.

This line of work is perhaps inspired by Nicholls's theorization (1989) that achievement goals may interact with perceived competence (self-efficacy in the present study) to influence motivational responses. For example, individuals with high ego orientation and high perceived competence would demonstrate adaptive motivational responses, while individuals with high ego orientation and low perceived competence would display maladaptive motivational responses. It is also built upon studies focusing on the mediating effect of ability beliefs in the relationships between achievement goal orientations and motivational responses (Li, Shen, Rukavina, & Sun, 2011; Sproule, Wang, Morgan, NcNeill, & McMorris, 2007). In general, findings from these studies revealed that perceived competence mediated the effect of ego orientations and partially mediated the effect of task orientations on motivational responses. Although these reported mediating effects are based on the dichotomous achievement goal model (Nicholls, 1989), they provide empirical evidence to support the examination of perceived competence as a mediator in the 2×2 model as task orientation and ego orientation are considered the building blocks of goal theory models. As such, it is plausible that self-efficacy may mediate the relationships among MAp, MAv, PAp, and achievement outcomes.

In summary, achievement goal orientations and self-efficacy are two important underlying factors that facilitate our understanding of motivated behaviors and achievement outcomes in physical activity (Cumming & Hall, 2004; Kavussanu & Roberts, 1996) and in physical education settings (Gao et al., 2011; Gao, Xiang, et al., 2008). Both theory and empirical evidence also indicate that achievement goals are linked to self-efficacy. However, the majority of the data-based studies have focused primarily on the correlations between them. Given the fact that achievement goals may affect students' self-efficacy and that self-efficacy affects fitness performance, it is important to determine whether self-efficacy mediates the relationships between achievement goals and fitness performance. Moreover, the majority of previous studies have only examined the dichotomous achievement goal model (Gao, Xiang, et al., 2008; Li et al., 2011), different goal profiles (e.g., high mastery/high performance, etc.), or goals and physical activity behavior (Gao et al., 2011). There is a clear need for additional research to investigate the relationships between the contemporary 2×2 achievement goals, self-efficacy, and achievement performance in physical education. Therefore, in this study, we examined the mediating role of self-efficacy between the 2×2 achievement goal orientations and cardiorespiratory fitness (assessed by the PACER) among middle school students within an integrative model (see Figure 1).

Based on the two integrated theoretical frameworks and past empirical studies (Gao et al., 2011; Li et al., 2011), we hypothesized that self-efficacy would mediate the effects of three goal orientations (MAp, MAv, and PAp) on cardiorespiratory fitness testing performance (i.e., PACER performance). First, we hypothesized that MAp, MAv, and PAp (independent variables) would be significant predictors of students' self-efficacy (mediating variable). Second, we hypothesized that students' MAp, MAv, and PAp would significantly predict their PACER performance (dependent variable). Third, we hypothesized that students' self-efficacy would be a positive predictor for their PACER performance after controlling for the effects of the goal orientations. Fourth, self-efficacy would mediate the effects of students' MAp, MAv, and PAp on their PACER performance.

METHOD

Participants

The present study is part of a larger project designed to investigate students' motivational beliefs and achievement behaviors in physical education (Gao et al., 2010). However, the data presented in this study have not been published. The participants were 276 middle school students (115 boys and 161 girls) enrolled in one public school in the Southern region of the United States. They came from nine classes, ranged in age from 12 to 15 years ($M_{age} = 13.34$, $SD = 0.96$), and included 91 sixth graders, 87 seventh

graders, and 98 eighth graders. As for race/ethnicity, participants were primarily Caucasian ($n = 226$), followed by African American ($n = 35$), Hispanic American ($n = 6$), and Asian American ($n = 9$). The participants resided in households with moderate-to-high family incomes. Permission was granted from the university's institutional review board and the participating school. We also obtained parental consent and child assent prior to the start of the study.

Research Design and Procedures

The participants took physical education classes taught by three physical education specialists in a block schedule. That is, they had two or three 90-min physical education classes every week. This was a short-term prospective study (e.g., use of psychosocial constructs to predict future performance), whereby students' achievement goals toward health-related physical fitness testing and self-efficacy toward the PACER test were first assessed and then their PACER test performance was assessed 3 days later. As participants of a larger research project, all the students in the present study took the PACER test at the beginning and the end of the school year. Thus, all participants except those who were new transfers had prior mastery experiences with the PACER test. We recruited participants in regularly scheduled physical education classes in May. They were told that refusal to participate in completing the survey would not negatively affect their physical education grades. The average time required to complete the survey was about 5 min. We encouraged participants to answer truthfully and ensured that their responses were confidential. In addition, the principal researcher assisted the students by answering any questions they had. Three days following the completion of the survey, the students completed the PACER test in their physical education class.

Variables and Measures

Achievement Goals

Participants' achievement goals toward the health-related fitness testing (i.e., cardiorespiratory endurance, muscular strength/endurance, etc.) were measured by the Achievement Goals Questionnaire for Sport (AGQ-S; Conroy et al., 2003) with the wording modified to reflect the context of the present study. The AGQ-S is a 12-item scale, with 3 items serving as indicators for each of the four goals regarding the upcoming fitness testing: MAp (e.g., "It is important for me to perform as well as I possibly can"), MAv (e.g., "I worry that I may not perform as well as I possibly can"), PAp (e.g., "It is important for me to do better than other students"), and PAv (e.g., "My goal 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 scores of each of the 3-item scales were

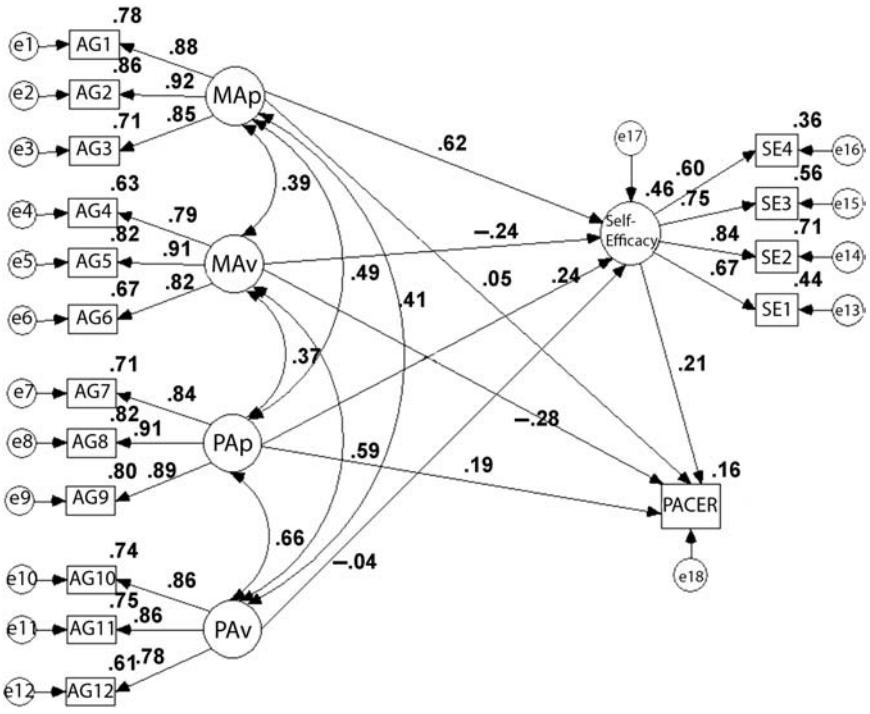

FIGURE 1 The hypothesized model. *Note*. The coefficients on the straight lines between the latent variables (e.g., MAp, MAv, self-efficacy) are the standardized regression weights; the coefficients on the straight lines between the latent variable (i.e., self-efficacy) and its indicators (self-efficacy items) are the individual item reliability coefficients; the coefficients above the mediate and dependent variables are variances explained by the model.

used to reflect students' MAp, MAv, PAp, and PAv. The AGQ-S has demonstrated reliability and validity in the context of the PACER test with middle school students (Garn & Sun, 2009). To verify that the change from sport to the PACER test did not detract from the scale meanings, a confirmatory factor analysis was conducted. The results revealed acceptable validity of the scale in the present study.

Self-Efficacy

To assess self-efficacy, we adapted four items from Gao, Newton, et al.'s (2008) study. Participants responded to four items on a 5-point Likert-type scale anchored from 1 = *strongly disagree* to 5 = *strongly agree*), with the stem, "In regards to the incoming PACER test, I have confidence in . . . " The answers were "my ability to do well in the PACER test," "my performance in the PACER test," "my success in the PACER test if I exert enough effort," and "my ability to handle the anxiety related to the PACER test." The mean of these four items was taken to give an overall indication of the magnitude of a student's self-efficacy toward the PACER test. The self-efficacy scale for fitness testing has demonstrated acceptable validity and Cronbach's alpha reliability coefficients ($\alpha = .76–.78$) in the previous studies (Gao et al., 2011; Gao, Newton, et al., 2008).

Cardiorespiratory Fitness

We assessed students' cardiorespiratory fitness via the PACER test developed by Cooper Institute for Aerobics Research (1999) at the end of the school year (i.e., May 2006). The PACER test is a valid and reliable assessment used to test aerobic capacity. It has also received a substantial amount of research attention and has obtained acceptable validity and reliability among children (Morrow, Martin, & Jackson, 2010). Approximately 100 students from three classes at the same grade took the test in one 90-min physical education class. Prior to the test, a 20-m distance was marked with visible tape at each end in the gym. In addition, the physical education teachers reinforced the detailed instructions of the test and demonstrated the test on the testing day. When the test began, a group of 20 students ran from one side of the 20-m course to the other side and had to touch the boundary line with their foot by the time the beep sounded. When the students heard the beep, they ran back to the starting position. The test continued in this manner until the students failed to maintain the pace for two laps by the time the beep sounded. The goal of the PACER test was to complete as many laps as possible. The pace started slowly and then increased with each minute. The score on the PACER test was the number of laps completed. Student helpers counted the number of laps for their corresponding testing students, and two research assistants monitored the testing process along with the teachers. After students completed the PACER test, the physical education teachers recorded their scores on the PACER score sheets and ensured student helpers counted the actual number of laps with the help of research assistants.

Data Analyses

Descriptive statistics and Pearson product–moment correlations were calculated to describe the sample, followed by using coefficients of determination (squares of correlation coefficients) to interpret the correlation coefficients among the variables. Then, we employed structural equation modeling (SEM) to test the study hypotheses using Analysis of Moment Structure, Version 6.0 (Arbuckle, 2003). A two-step process was involved in this analytic approach. In the first step, observed variables were hypothesized to measure the underlying constructs and were tested via confirmatory factor analysis. This resulted in the establishment of a measurement model where the validity of an item of a latent variable was determined by the magnitude of its deviation from the standardized regression estimate of the path of an indicator variable to the latent variable in the model. Prior to proceeding to the second step, an assessment of the validity and reliability of each observed variable was carried out with three indicators: individual item reliability using squared standardized loading, overall reliability using composite reliability, and average variance extracted.

The second step focused on testing all four hypothesized relationships in the structural model as depicted in Figure 1. We used maximum likelihood estimation to evaluate the fit of the structural model to the data. The criteria for assessing the structural model were the same as those for the measurement model, using path significance or standardized regression estimates. Acceptable model fit for both the measurement and structural models was assessed using multiple indexes. The overall fit of the model to the data was examined via the chi-square (χ^2) divided by degrees of freedom. The value of χ^2 by degrees of freedom less than 2.00 indicates acceptable model fit. Root mean square error of approximation (RMSEA) represents closeness of fit, and values approximating .08 and 0 demonstrate close and exact fit of the model (Schumacker & Lomax, 2010). The comparative fit index (CFI), the Tucker-Lewis index (TLI), and the normed fit index (NFI) test the proportionate improvement in fit by comparing the hypothesized model (over-identified model) with a just-identified model. Acceptable model fit represents CFI, TLI, and NFI values higher or equal to .95 (Schumacker & Lomax, 2010).

RESULTS

Descriptive Data, Correlations, and Coefficients of Determination

The initial descriptive analysis indicated that students' PACER scores ($M = 35.73$, $SD = 16.36$) had very large

TABLE 1
Descriptive Statistics and Correlations Among Variables ($N = 276$)

Variable	*Mean*	*SD*	*1*	*2*	*3*	*4*	*5*
1. Self-efficacy	4.04	0.64					
2. MAp	5.93	1.25	.54**				
3. MAv	4.87	1.62	−.18*	.35**			
4. PAp	5.07	1.58	.39**	.47**	.35**		
5. PAv	5.25	1.56	−.20**	.37**	.53**	.60**	
6. PACER	50	10	.27**	.16*	−.18*	.20**	−.04

Notes. *SD* = standard deviation; MAp = mastery-approach goal; MAv = mastery-avoidance goal; PAp = performance-approach goal; PAv = performance-avoidance goal; PACER = Progressive Aerobic Cardiorespiratory Endurance Run *T* score.
*$p < .05$. **$p < .01$.

variability, as the skewness of this variable was greater than 1.5. To facilitate further data analyses, each student's PACER performance was converted to a standard score, the *T* score. The *T* score sets the mean at 50 and the standard deviation at 10. Table 1 contains the means, standard deviations, and correlations for all variables. In general, students scored above the median value on all the self-reported measures (four goals and self-efficacy) as their scores were above the mean of each variable (4 for the goals and 3 for self-efficacy). Additionally, students' MAp and PAp were positively related to self-efficacy, while MAv was negatively associated with self-efficacy. The coefficients of determination showed these three goals accounted for 29.16%, 15.21%, and 3.24% of the variance of self-efficacy, respectively. Students' MAp and PAp were statistically significantly related to the PACER but only explained 2.56% and 4% of its variance as indicated by their coefficients of determination. Their MAv ($r = -.18$) was negatively related to the PACER, but its coefficient of determination revealed this goal only accounted for 3.24% of the variance for the PACER. Moreover, students' self-efficacy ($r = .27$) was positively related to the PACER. However, its coefficient of determination revealed it contributed to 7.29% of the variance for PACER performance. Finally, although PAv was related to the three other goal orientations and self-efficacy, it only explained 0.16% of the variance for the PACER as evidenced by a coefficient of determination.

The Mediating Role of Self-Efficacy on the PACER

Measurement Model

The hypothesized measurement model was generated from the predicted paths among observed and latent variables predicted from the literature and empirical studies and tested via a confirmatory factor analysis. The χ^2 values (173.21) indicated that the model fit the data with degrees of freedom of 105 (χ^2 by degrees of freedom = 1.65). The RMSEA values were found to be below .05, and CFI, TLI, and NFI were above .95, indicating acceptable fit of the model. Individual item reliability for achievement goals and self-efficacy was assessed by squared standardized loading for each item. The reliability coefficients ranged from .78 to .93 for achievement goals and from .60 to .84 for self-efficacy, which met the recommended value of .60 (Schumacker & Lomax, 2010).

The Structural Model

The hypothesized model demonstrated a good fit to the data, $\chi^2 = 175.70$, χ^2 by degrees of freedom = 1.66, CFI = .98, TLI = .96, NFI = .94, RMSEA = .049 (95% CI [.036, .064]). Figure 1 shows the path diagram and standardized path coefficients of the structural model. The overall variance in self-efficacy and the PACER explained by the model was 46% and 16%, respectively. More specifically, MAp, MAv, and PAp had direct effects on self-efficacy ($\gamma_{MAp\text{-}self\text{-}efficacy} = .61$, $\gamma_{MAv\text{-}self\text{-}efficacy} = -.24$, $\gamma_{PAp\text{-}self\text{-}efficacy} = .24$, respectively; Hypothesis 1). MAv and PAp had direct effects on PACER performance within the model ($\gamma_{MAv\text{-}PACER} = -.28$, $\gamma_{PAp\text{-}PACER} = .20$, respectively; Hypothesis 2). Self-efficacy also had a small although statistically significant direct effect on the PACER after controlling for the effects of the goal orientations ($\gamma_{self\text{-}efficacy\text{-}PACER} = .21$; Hypothesis 3). Additionally, the indirect effect of MAp on the PACER via self-efficacy was small although statistically significant ($\gamma_{MAp\text{-}self\text{-}efficacy\text{-}PACER} = .13$). However, the indirect effects of MAv and PAp on the PACER through self-efficacy were not statistically significant ($\gamma_{MAv\text{-}self\text{-}efficacy\text{-}PACER} = -.05$, $\gamma_{PAp\text{-}self\text{-}efficacy\text{-}PACER} = .05$, respectively; Hypothesis 4). The coefficients of the direct and indirect effects within the SEM are shown in Table 2. Based on the results, it appears that the mediating role of self-efficacy on the PACER varied as a function of achievement goals. Specifically, self-efficacy fully mediated the effect of MAp on the PACER but partially mediated the effects of MAv and PAp on the PACER.

DISCUSSION

The present study used an integrative framework to examine the mediating role of self-efficacy on the relationships between middle school students' four achievement goal orientations and cardiorespiratory fitness. To date, research

TABLE 2
Standardized Total Effects, Direct Effects, and Indirect Effects Among Variables

Variable	*PAp*	*MAv*	*MAp*	*PAv*	*Self-Efficacy*
Total Effects					
Self-efficacy	.24**	−.241**	.617**	−.044	0
PACER	.245**	−.33**	.179*	−.009	0.211*
Direct Effects					
Self-efficacy	.24**	−.241**	.617**	−.044	0
PACER	.195*	−.279**	.049	0	0.211*
Indirect Effects					
Self-efficacy	0	0	0	0	0
PACER	.051	−.051	.13*	−.009	0

Notes. MAp = mastery-approach goal; MAv = mastery-avoidance goal; PAp = performance-approach goal; PAv = performance-avoidance goal; PACER = Progressive Aerobic Cardiorespiratory Endurance Run.
*$p < .05$. **$p < .01$.

in physical education has rarely examined these variables together, especially the mediating effect of self-efficacy. Using a two-step method of SEM, the present study tested four specific hypotheses based on theoretical integration of self-efficacy and achievement goal constructs. Results of the SEM measurement model support the validity and reliability of the scores provided by the achievement goals and self-efficacy measures used in this study.

The first hypothesis was that students' MAp, MAv, and PAp would emerge as the significant predictors of students' self-efficacy. The SEM yielded results that supported this hypothesis. Specifically, the MAp coefficient was statistically significantly and moderately related to self-efficacy, followed by PAp and MAv. The MAv relationship with self-efficacy was statistically significant but negative in direction and was smaller in absolute value than were the MAp and PAp coefficients. The findings are in line with theoretical propositions and empirical studies, indicating MAp and PAp are positively related to perceived competence, while MAv is negatively associated with perceived incompetence (Elliot, 1999; Wang et al., 2009). Recently, researchers investigated the predictive strengths of achievement goals on perceived competence/self-efficacy within integrative models in middle school physical education. For example, Li et al. (2011) indicated that both mastery and performance goals positively predicted perceive competence in physical education. Gao et al. (2011), using the 2 × 2 achievement goal model as the framework, further suggested that MAp and PAp were positively related to self-efficacy in physical education. The findings of this study suggest that individuals promoting their MAp and PAp over MAv may facilitate their self-efficacy, which has a strong history of being related to performance variables (Bandura & Locke, 2003). In addition, Elliot's (1999) theoretical construction of the valence dimension does indicate the appetitive nature of the approach dimension regardless of one's definition of competence (i.e., mastery or performance); thus, it seemingly would be always expected that both approach goals (MAp and PAp) would relate positively to a construct such as self-efficacy.

The second hypothesis concerned the prediction utility of achievement goals on children's cardiorespiratory fitness performance. Examination of coefficients revealed that MAp and PAp positively predicted PACER performance, whereas MAv negatively predicted PACER performance. The findings are also consistent with previous studies (Elliot & McGregor, 2001; Xiang, McBride, & Bruene, 2004). In addition, the Map, MAv, and PAp goals were related to the PACER test. For instance, past research has demonstrated that mastery or task goals and performance goals have been related to performance in sports and physical education (Wang et al., 2009; Xiang, McBride, & Bruene, 2004). Alternatively, MAv has been demonstrated to be negatively related to academic performance (Finney, Pieper, & Barron, 2004) and disorganized study strategies (Elliot & McGregor, 2001). Therefore, there is support in the literature that MAv may have a direct yet negative relationship with measured outcomes. In this study, it is apparent that adopting MAv is detrimental to fitness performance. This result supports the notion of splitting the mastery goal by valence (i.e., approach and avoidance) and indicates the 2 × 2 model can provide more accurate and differentiated predictions than can the dichotomous model. Based on these findings, we advocate that future researchers incorporate the distinction between approach and avoidance into the achievement goal framework when evaluating students' achievement goals in physical education settings.

The third hypothesis examined the predictive utility of self-efficacy on PACER performance. As expected, self-efficacy was positively related to the PACER performance, which is in accordance with the self-efficacy theory and empirical studies (Bandura, 1997; Gao, Newton, et al., 2008). Thus, the finding provides robust support for the third hypothesis. The fourth and most important hypothesis with regards to the integrated model concerned the mediating role of self-efficacy on the relationships between four achievement goals and PACER performance. The SEM results revealed that self-efficacy fully mediated the relationship between MAp and the PACER. This is an important finding. Elliot (1999) has posited the achievement goals as mediators themselves from a number of theoretically linked antecedents to outcomes. The present study examined a mediator of achievement goals to a motivated outcome variable. Achievement goals are ways in which individuals construe competence (Elliot, 1999). These constructions of competence should impact both immediate and more distal cognitions, emotions, and performance results (Elliot, 1999). In this study, two outcome variables (i.e., self-efficacy and PACER performance) were examined with self-efficacy being placed more as the mediator variable. The result that self-efficacy emerged as a full mediator of MAp on PACER performance

demonstrates that students with higher MAp had higher self-efficacy, which in turn led to better performance on the PACER test. This finding also indicates that self-efficacy should be included in future achievement goal research to get a more accurate estimate of the effects of achievement goals on students' fitness test performance.

Additionally, students' self-efficacy partially mediated the effects of PAp and MAv on PACER performance. The partial mediations observed in the present study suggest that there are other potential mediators for PAp or MAv. For example, research evidence indicates that PAp is positively related to effort/persistence (Guan, Xiang, McBride, & Bruene, 2006), and effort/persistence is positively related to students' time in 1-mile (1.61-km) run performance (Xiang et al., 2006; Xiang, McBride, & Guan, 2004). As a result, it is likely that students whose goals are to outperform others (i.e., PAp) may perform well through effort/persistence. Similarly, MAv was found to be positively related to test anxiety (e.g., Elliot & Pekrun, 2007), but test anxiety was negatively associated with student learning and performance (see Hembree, 1988). It is therefore possible that students whose goals are to avoid performing worse than before (i.e., MAv) may demonstrate poor performance through test anxiety. We recommend that future research should explore these possibilities.

In conclusion, the present research was conducted to examine the relationships among Elliot's (1999) achievement goals, self-efficacy, and performance of a cardiorespiratory fitness test in children, with self-efficacy being hypothesized to mediate the effects of achievement goals on the fitness test. Past research on the relations between the 2×2 achievement goals, self-efficacy, and fitness has been scarce in physical education; thus, this study provides the empirical evidence in this area of inquiry. Overall, the results partially supported the mediating role of self-efficacy.

Considering the fact that the relationships among 2×2 achievement goals, self-efficacy, and achievement performance remain largely unknown and that the majority of empirical studies have not investigated the mediating function of self-efficacy using SEM in physical education, exploring whether self-efficacy mediates the relationships is highly warranted. In other words, investigating the links between the more contemporary achievement goals, self-efficacy, and health-related physical fitness is critical for physical educators to fully understand the underlying factors in relation to students' fitness performance. By examining the mediating effect of self-efficacy on the relations between achievement goals and fitness performance, physical educators may better understand the antecedents of students' health-related physical fitness from the psychological perspective, which will facilitate design of effective intervention programs to improve students' fitness. To this end, this study advances the body of knowledge by bridging the gap of understanding the psychological antecedents of fitness performance and implementation of school-based physical activity interventions to improve fitness.

The research findings provide practical implications for physical educators. Based upon the findings, physical education teachers should promote a MAp mindset and avoid statements such as "not doing worse than before" when conducting cardiorespiratory fitness tests such as the PACER. It appears, based on our results, that the MAp mindset is an intervention in and of itself to increase self-efficacy for fitness test performance. Second, as the results have shown, students with MAv tended to perform worse in fitness performance. Physical education teachers may help students successfully complete the task in fitness testing and may assist them in the avoidance of an illusion of incompetence. To achieve this, teachers can provide verbal instruction, model demonstration, and practice opportunities, as well as categorize students with the same fitness levels into the same testing groups. Third, as students' PAp positively predicted their fitness performance, it is also imperative to promote this goal by highlighting the positive possibilities of being a top performer. Though physical education typically strives to promote personal mastery, Elliot's (1999) split of the performance goals was because of the notion that this goal has desirable achievement outcomes. It is very reasonable that physical education teachers promote both goals and students will gravitate to either the MAp goal, the PAp goal, or both goals simultaneously. Either choice will facilitate performance either directly or indirectly through self-efficacy.

It should be noted that this study is not without limitations, such as the needs to include past PACER scores in the tested model, a better understanding of the children's overall self-efficacy for physical education class, and a larger and more diverse sample. In addition, gender and age differences have been reported in children's perceived competence/self-efficacy and fitness. For example, boys perform better than girls in many health-related physical fitness components. Boys also demonstrate higher perceived competence than do girls in sport and physical activity. Younger children also displayed higher perceived competence than did the older children (e.g., Xiang, McBride, & Bruene, 2004). However, the moderate effects of gender and age on the hypothesized model were not investigated in this study due to limited sample size. On the other hand, although it is highly recommended that at least 200 participants are required to run an SEM test (Schumacker & Lomax, 2010), the statistically significant relations between the study variables might be biased due to the large sample employed in the present study (Zhu, 2012).

The overall variance in students' PACER performance (16%) explained by the model was lower than the amount of variance (28%) in objective physical activity levels in physical education accounted for by similar psychological constructs in the study of Gao et al. (2011) among middle

school students. It is plausible that in the present study, other significant factors such as previous mastery experiences might have been more important predictors of PACER than the psychological variables in this study. According to Bandura (1986), successful previous mastery experiences are posited to be the most influential predictor of an individual's performance on a task/activity. For example, in Gao, Newton, et al.'s (2008) study, students' past scores on the PACER and curl-up tests were the most important contributors to PACER and curl-up testing scores, and explained 41% and 53% of the variance, respectively. That is, students who did better on the PACER and curl-up tests at the beginning of the school year were more likely to score higher at the end of the school year. However, prior mastery experiences on the PACER were not included in the hypothesized model, which might significantly reduce the predictive utility of the model. Thus, it is highly recommended that students' prior mastery experiences be included in predicting fitness testing scores in the future. In addition, the small variance explained suggests that the psychological variables alone are not adequate enough to explain individuals' cardiorespiratory fitness performance. Other factors affecting cardiorespiratory fitness might include individual physical attributes (i.e., weight, height, and percent body fat), health status, social support (e.g., peer support, family support, and teaching support), and lifestyle. Therefore, physical educators should collaborate with a variety of stakeholders and look at the whole picture when attempting to promote students' health-related physical fitness in physical education programs.

WHAT DOES THIS ARTICLE ADD?

Focusing on the mediating role of self-efficacy in the relationships between 2×2 achievement goals and students' performance on the PACER test in the context of middle school physical education, the present study has added to our knowledge base on student motivation and performance by providing the first empirical evidence that self-efficacy fully mediated the relationship between MAp and student PACER performance. In particular, students whose goals were to develop competence through learning and task mastery (i.e., MAp) were more likely than students who did not endorse MAp to display positive self-efficacy toward the PACER test, which in turn led them to perform well on this test. This finding can also help physical educators more fully understand the antecedents of students' health-related physical fitness from the motivational perspective, and thus could help them to design effective physical activity intervention programs to improve students' fitness performance. The mediating role of self-efficacy observed in this study has some important pedagogical implications. The motivation literature has consistently demonstrated that MAp is motivationally beneficial to students. As a result, teachers are encouraged to promote a MAp mindset to foster positive motivation among students in physical education. But this is not sufficient as our findings indicate MAp impacted student PACER performance through their self-efficacy. Therefore, physical education teachers must also employ instructional strategies that can help students hold positive self-efficacy toward physical fitness. According to Bandura (1986, 1997), these strategies may include: demonstrating the testing items to provide students with vicarious experiences; providing accurate and timely feedback during fitness testing and practice; and most important of all, providing students with plenty of opportunity to master fitness activities and achieve a sense of success when attempting to assist them to develop and maintain health-enhancing levels of physical fitness.

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