

Research Papers

Using Achievement Goal Theory to Assess an Elementary Physical Education Running Program

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ABSTRACT: *Using Achievement Goal Theory as a theoretical framework, this study examined an elementary physical education running program called Roadrunners and assessed relationships among achievement goals, perceived motivational climate, and student achievement behavior. Roadrunners promotes cardiovascular health, physical active lifestyles, and mastery behaviors such as persistence and effort. Students were required to run/walk once a week during the school year in their regularly scheduled physical education classes. Participants included 116 fourth graders (67 boys, 49 girls), who participated in Roadrunners since kindergarten. Near the end of spring semester, students completed a 36-item questionnaire assessing achievement goals and perceived motivational climate of Roadrunners. Student persistence/effort was assessed by the number of run/walk laps over the year-long program. Performance was measured by a timed, one-mile run. Results revealed the mastery goal related positively to student persistence/effort for Roadrunners and to their one-mile run performance. Interaction between the mastery goal and perception of a mastery-focused climate emerged as a positive predictor of student one-mile run performance. Results provided additional empirical support for mastery goals and perceptions of a mastery-focused climate as beneficial to student motivation and learning. (J Sch Health. 2004;74(6):220-225)*

With physical inactivity linked to overweight and obesity, research has focused on increasing activity levels in physical education classes. Effects of running programs, part of the physical education curriculum at many schools, often remain overlooked in such research. Benefits of regular running include reducing the risk of coronary heart disease and obesity, as well as enhancing perceived competence and self-esteem.¹

Physical education programs often incorporate running to promote cardiovascular health and physically active lifestyles among students. Running programs usually require students to run/walk in their regularly scheduled physical education classes one to three times a week during the school year. Such programs prove beneficial because time allocated for physical education at school fails to ensure a recommended amount of physical activity for children.² This study examined an elementary physical education running program, and assessed student motivation and achievement behavior from an Achievement Goal Theory perspective.

Both conceptual and empirical work demonstrate that motivation affects student engagement and achievement behavior in physical education classes.³ Defined as the energization, direction, and regulation of behavior,⁴ motivation influences student achievement behaviors such as activity choice, effort, persistence, and performance.⁵ To ensure successful participation and learning in physical education programs, teachers and researchers must know how to motivate students.

ACHIEVEMENT GOAL THEORY

Achievement Goal Theory represents an important theoretical approach to understanding student motivation and achievement behavior in physical education. Achievement goals and perceived motivational climate are two constructs central to the theory. Achievement goals, also known as dispositional goal orientations, refer to students' purposes for engaging in achievement-related behavior and the meaning they ascribe to the behaviors.^{6,9} They can influence how students approach, experience, and perform in achievement settings.

Researchers¹⁰⁻¹⁴ have examined two types of achievement goals. Mastery goals focus on developing competence through learning and task mastery, and performance goals focus on demonstrating superiority over others. Researchers observed that mastery goals were associated with adaptive motivational patterns, including working hard and attributing success to effort, whereas performance goals were associated with less-adaptive motivational patterns, including avoiding difficult learning tasks and attributing success or failure to natural ability.

Perceived motivational climate refers to student perceptions of achievement goals addressed by teachers.⁶ This construct is viewed as situational. What teachers say and do to communicate the purpose of achievement influences the degree to which mastery and performance goals are perceived as salient by students. In a mastery-focused climate, teachers present a variety of tasks in interesting, novel, and meaningful ways. They involve students in decision making, recognize individual accomplishments, and evaluate students on mastery and skill development rather than ability. In a performance-focused climate, teachers rarely emphasize meaningfulness of learning, place value on performance outcomes rather than effort and skill improvement, and focus student attention on social compe-

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tion more than cooperation.

Researchers^{13,15-17} found that students perceive the classroom as mastery- or performance-focused, and that perception influences their motivation and achievement behavior. Specifically, perceptions of a mastery-focused climate are associated with high levels of persistence, self-reported mastery behavior, and the belief that success results from effort. Conversely, perceptions of a performance-focused climate are associated with decreased intrinsic motivation and the belief that success comes from ability.

Student achievement goals may interact with perceptions about motivational climate to influence their achievement-related beliefs, affect, and behavior.^{9,18} Student achievement-related beliefs, affect, and behavior vary as a function of both individual differences in achievement goals and perceptions of the motivational climate. From this perspective, students endorsing high levels of mastery goals will demonstrate higher levels of effort and task engagement if they perceive their class as mastery-focused rather than performance-focused. Likewise, students who adopt performance goals would receive higher grades in a class they perceive as more performance-focused.

In physical education, the respective contribution of achievement goals, perceived motivational climate, and interaction of the two constructs on student motivational variables has not been analyzed extensively. Cury et al¹⁹ examined the influence of achievement goals and perceived motivational climate on adolescent girls' intrinsic interest in physical education. They reported that compared to achievement goals, perceived motivational climate proved more important at influencing the girls' intrinsic interest in physical education. Xiang and Lee,¹³ in a study on achievement goals, perceived motivational climate, and self-reported mastery behavior among students in grades 4, 8, and 11 in physical education, reported no interactions between achievement goals and perceived motivational climate in predicting student self-reported mastery behavior. Predictive power of achievement goals and perceived motivational climate, however, varied by grade level suggesting a need for continued inquiry.

This study extended previous research on achievement goals, perceived motivational climate, and their achievement-related correlates by focusing on an elementary physical education running program. Different from previous studies^{13,19} in which student achievement behaviors or outcomes were measured by self-report, this study took objective measures, including student persistence/effort for Roadrunners (measured by number of laps they ran/walked over the school year) and running performance (measured by a timed one-mile run). Compared to self-report, objective evaluation allows a more accurate test of achievement goal theory in predicting student motivation and achievement behavior in an achievement context. Research questions addressed were: What achievement goals do students endorse in the Roadrunners program? What motivational climate do students perceive their teachers to create in Roadrunners? What relationships exist among achievement goals, perceived motivational climate, and student persistence/effort for Roadrunners and the one-mile run performance?

METHODS

This study, one of a series, examined student motivation and achievement behavior in running programs during early

and middle adolescence from multiple theoretical perspectives.^{20,21} Data were collected when fourth-grade participants were near the end of the school year. The study focused on relationships among achievement goals, perceived motivational climate, and student achievement behavior in an elementary physical education running program.

Program

The study involved a program called Roadrunners, conducted at an elementary school in southwest Texas. The population included about 565 children in grades kindergarten through four from lower- to middle-class families. Children participated in 30-minute physical education classes every day taught by two physical education specialists. The student-teacher ratio ranged from 25:1 to 35:1.

As part of the school physical education program, Roadrunners promoted cardiovascular health, physically active lifestyles, and mastery behaviors such as persistence and effort. Students were required to run/walk once a week during the school year in their regularly scheduled physical education classes. Students could achieve four goal levels during the school year: 100 laps (one lap equals one-third mile), 125 laps, 150 laps, and 175 laps. The two physical education specialists recorded number of laps children ran/walked each time they participated in the running program. Parents and guardians were welcome to participate with their children.

An awards day was held at the end of the program where children received stickers, trophies, and certificates based on goals achieved in the program. Number of laps each child ran/walked during the school year also was posted on the gymnasium walls on awards day. Parents and guardians were invited to attend the event.

Participants

Of 125 fourth graders, 116 (67 boys, 49 girls) participated in the study. They were selected because they participated in Roadrunners since kindergarten, and they understood what it takes to succeed. They also held more-accurate perceptions about the motivational climate of Roadrunners than children in the lower grades. Institutional, parental, and child permission to participate were obtained prior to the study.

Measures

Achievement Goals. A 12-item questionnaire adapted from the Task and Ego Orientation in Sport Questionnaire (TEOSQ)²² measured student achievement goals. The TEOSQ has been adapted successfully for physical education and yielded reliable and valid data.^{12,14} Questionnaire items were prefaced with the heading "I feel really successful in Roadrunners when..." Students rated each item on a five-point scale: "YES, yes, ?, no, NO" with the two extreme options printed in bolder type (5 = YES to 1 = NO). Nicholls et al²³ used this response scale in a study with second graders in mathematics, and they concluded young students could comprehend it (Table 1).

Perceived Motivational Climate. Participants completed a questionnaire adapted from the Perceived Motivational Climate in Sport Questionnaire (PMCSQ),²⁴ consisting of 11 mastery-focused and 13 performance-focused climate statements (Table 2). Participants responded to statements

beginning with the stem "In Roadrunners..." by indicating their level of agreement with 24 statements concerning their perceptions of the motivational climate in Roadrunners on a five-point scale: "YES, yes, ?, no, NO" with the two extreme options printed in bolder type (5 = YES to 1 = NO). The PMCSQ has generated reliable and valid data²⁴ and has been adapted successfully for physical education.^{13,16}

Persistence/Effort. This construct was assessed by number of laps the children ran/walked during the school year in Roadrunners. The two physical education specialists recorded laps each time children went running/walking. Persistence refers to continued investment in Roadrunners when obstacles such as physical discomfort are encountered. Effort refers to overall effort expended during the program.^{25,26} When children tried to run/walk as many laps as possible during the school year for Roadrunners, they had to overcome physical and psychological difficulties and be willing to "push themselves" in the year-long program. Therefore, number of laps children ran/walked during the school year represents a valid measure of persistence/effort.

Running Performance. A timed one-mile run assessed children's performance in running. Since Roadrunners enhanced children's cardiovascular health, it was logical to include the one-mile run as a performance measure. Times were recorded in minutes and seconds for each child. Children were encouraged to run as fast as they could in the test.

Data Collection

Near the end of spring semester 2002, researchers administered questionnaires to children during their regularly scheduled physical education classes. Each item was read aloud. Children also were encouraged to ask questions if they had difficulty understanding instructions or questionnaire items. Children raised no questions while completing the questionnaires, which took about 30 minutes to administer.

The one-mile run was administered to children during

Table 1
Achievement Goals Questionnaire

Master Goal Scale (six items, $\alpha = .88$)

1. I do my very best.
2. I learn something new by trying hard.
3. Something I learn makes me want to go and practice more.
4. Something I learn really feels right.
5. I learn something new and it makes me want to practice more.
6. I learn something that is fun to do.

Performance Goal Scale (six items, $\alpha = .84$)

1. I run faster than other children.
2. I can do better than my friends.
3. Other children mess up and I don't.
4. I'm the only one who can run the most laps.
5. The other children cannot do as well as me.
6. I am the only one who receives the best certificate.

Note: Scores for mastery and performance goals were computed by averaging the items on the scales.

their regularly scheduled physical education classes a week after completing the questionnaires. Children ran one mile as a class but were timed individually in minutes and seconds. The test took place on the same track where the children performed their weekly runs.

RESULTS

Descriptive Analyses

Means and standard deviations for student achievement goals, perceived motivational climate, persistence/effort, and performance on the one-mile run are presented in Table 3. Consistent with previous research,^{12,14} fourth graders in this study reported higher scores on the mastery goal than the performance goal. They also perceived the motivational climate in Roadrunners as more mastery-focused than performance-focused.

Correlational Analyses

Table 4 contains correlations for variables in the regression analyses. The measurement scale for the one-mile run test was an inverse scale. A lower score on the test indi-

Table 2
Perceived Motivational Climate Questionnaire

Perception of a Mastery-Focused Climate Scale (11 items, $\alpha = .72$)

1. The teachers focus on improvement, not who is the best runner.
2. Trying hard is rewarded.
3. Every student's improvement is important.
4. The teachers want me to improve and not worry about how well other classmates do.
5. Students are encouraged to work on getting better.
6. The teachers do not worry about who is the best runner in the class.
7. Students try to improve just based on their own number of laps.
8. All students have an equal opportunity to participate.
9. All students are encouraged to do their best.
10. Most students get to participate the same amount.
11. Students do not worry about their mistakes.

Perception of a Performance-Focused Climate Scale (13 items, $\alpha = .79$)

1. Students feel good when they do better than classmates.
2. Students are embarrassed when they make mistakes.
3. Students lose their opportunity to run because of mistakes.
4. Outperforming classmates is important.
5. The teachers pay the most attention to the best runners.
6. Doing better than others is important.
7. The teachers favor some students.
8. Every student wants to be the best runner.
9. Only the top runners "get noticed."
10. Students are afraid to make mistakes.
11. Only a few students can be the "stars."
12. Students feel left out if they are not among the best runners.
13. Students give up easily if they are not good at running.

Note: Scores for perceptions of a mastery-focused climate and perceptions of a performance-focused climate were computed by averaging the items on the scales.

cated higher performance. As a result, correlations of the mastery goal, performance goal, perception of a mastery-focused climate, perception of a performance-focused climate, and student persistence/effort to the one-mile run test all were negative. Consistent with the research literature reviewed previously, this paper reports negative correlations with scores on the one-mile run as positive.

As reported in Table 3, the mastery goal was not related significantly to the performance goal. While no significant correlation existed between the mastery goal and perception of a mastery-focused climate, the performance goal related positively to perception of a performance-focused climate. Perception of a mastery-focused climate related negatively to perception of a performance-focused climate. Only the mastery goal related positively to both student persistence/effort for Roadrunners and their one-mile run performance. Student persistence/effort related positively to their one-mile run performance.

Multiple Regression Analyses

To examine the independent and combined effects of achievement goals and perceived motivational climate on student persistence/effort for Roadrunners, and their one-mile run performance, two stepwise multiple regression analyses were conducted. The model regressed student persistence/effort and their one-mile run performance onto the mastery goal, performance goal, perception of a mastery-focused climate, perception of a performance-focused climate, mastery goal x perception of a mastery-focused climate, and performance goal x perception of a performance-focused climate. For each analysis, all main effect terms were standardized, then interaction terms were created with these variables.²⁷ To interpret significant interaction effects, predicted values (\hat{y} s) were computed for representative high and low groups ($\frac{1}{2}$ standard deviation above and below the mean) from regression equations using unstandardized regression coefficients.

As reported in Table 4, the mastery goal was the only positive significant predictor of student persistence/effort

for Roadrunners and accounted for 8.4% of the variance. Conversely, for student one-mile run performance the mastery goal, and interaction between the mastery goal and perception of a mastery-focused climate, emerged as positive significant predictors explaining 22.47% of the variance. The interaction effect indicated students with high mastery goals, combined with high perceptions of a mastery-focused climate, performed best on the one-mile run ($\hat{y} = 10.02$), relative to those high in mastery goals but low in perceptions of a mastery-focused climate ($\hat{y} = 11.21$), those high in perceptions of a mastery-focused climate but low in mastery goals ($\hat{y} = 12.18$), and those low in both ($\hat{y} = 12.7$).

DISCUSSION

Fourth graders in Roadrunners endorsed mastery goals more than performance goals. They also perceived the motivational climate of Roadrunners as more mastery-oriented than performance-focused. Research from other achievement settings has demonstrated that mastery goals and perceptions of a mastery-focused climate are associated with adaptive motivational patterns, such as working hard, attributing success to effort, and increased intrinsic motivation for learning.^{6,22} Fourth graders in Roadrunners displayed positive motivational responses conducive to continued involvement in running. It is encouraging to see these positive motivational responses among fourth graders because running can become a lifelong activity for children that will help them stay physically fit.

Correlations and multiple regression analyses showed the mastery goal as the only motivational construct related positively to both student persistence/effort for Roadrunners and their one-mile run performance. Specifically, fourth graders reporting a mastery goal worked hard to run as many laps as possible and to perform well in the one-mile run. These results are consistent with research documenting beneficial effects of mastery goals.^{10,13} They also provide empirical support for the notion that, while mastery and performance goals both exist

Table 3
Means, Standard Deviations, and Correlations for All Variables

	M	SD	1	2	3	4	5	6
Achievement Goals								
1. Mastery goal	3.96	0.86	.	-.03	.21	-.02	.37*	.32*
2. Performance goal	2.85	1.17		.	-.04	.51*	.15	.16
Perceived Motivational Climate								
3. Mastery-focused	4.04	0.50			.	-.31*	.16	.19
4. Performance-focused	2.84	0.65				.	-.03	.06
Achievement Behaviors								
5. Persistence/effort	147.93	43.92						.74*
6. One-Mile Run (min.)	11.07	3.00						.

Note: Signs of correlation coefficients with one-mile run were inverted.
* $p < .01$.

among students, the mastery goal is consistently associated with a variety of motivational variables likely to enhance long-term and high-quality engagement in learning.^{5,9}

The mastery goal interacted with the perception of a mastery-focused climate to predict student one-mile run performance. The interactive effect indicated fourth graders performed best on the one-mile run when they reported high levels of mastery goals combined with high perceptions of a mastery-focused climate. While this finding appears consistent with the theoretical prediction that achievement goals and perceived motivational climate may interact to influence student achievement-related cognitions and behaviors,^{9,18} no interaction effect emerged for student persistence/effort. Xiang and Lee¹³ also found no interactions between achievement goals and perceived motivational climate in predicting student mastery behavior measured by self-report. Collectively, these findings suggest that the complex nature of interaction between achievement goals and perceived motivational climate in influencing students' achievement behaviors may depend on physical activity settings, student achievement behaviors, and how behaviors are measured. Future research should clarify the complex interaction between achievement goals and perceived motivational climate with different achievement behaviors, in different physical activity settings, and with students of different ages.

Although the mastery goal and interaction between the mastery goal and perception of a mastery-focused climate emerged as significant predictors of fourth graders' persistence/effort for Roadrunners and their one-mile run performance, they explained little of the variance in these two behaviors. Perhaps a dichotomous achievement goal framework (mastery goals versus performance goals) oversimplifies the complexity of student motivation and achievement.

Table 4
Results of Stepwise Multiple Regressions
on Student Achievement Behavior

Predictor	Student Persistence / Effort			
	b	β	R ² (cumulative)	t-value
Mastery goal	14.11	0.29	.084	2.84*

Predictor	Student One-Mile Run (signs inverted)			
	b	β	R ² (cumulative)	t-value
Mastery goal	1.10	0.34	.1369	3.56*
Mastery goal x perceptions of a mastery-focused climate	0.94	0.30	.2247	3.14*

Note: b-values are unstandardized regression coefficients from the final state of the regression analysis. R² values are cumulative, with each incremental step adding to the variance explained.

* $p < .01$.

Students can pursue many goals in school settings, such as a desire to please parents and to gain peer approval, each of which may affect level of motivation for particular tasks in school.²⁸ Some studies found that achievement goals, when contrasted as a mastery goal and a performance goal, failed to account for a substantive portion of variance in student learning.^{10,13} Therefore, researchers must go beyond a dichotomous achievement goal framework to study relationships among student achievement goals, perceived motivational climate, and achievement-related cognitions and behaviors.

In terms of limitations, participants came from only one school, and they had been in the program since kindergarten. Data from this sample may have biased the findings. Readers should interpret the results with caution. Studies that expand the sample populations and schools to replicate findings are recommended. ■

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