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Interactive Impact of Intrinsic Motivators and Extrinsic Rewards on Behavior and Motivation Outcomes

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In this study we examined the interrelationship among extrinsic rewards and achievement goals (including a work-avoidance goal), competence beliefs, and task values associated with health-enhancing running tasks over a school year. A group of elementary school students (n = 119) from a program that promoted running for running's sake and another (n = 88) from a program that promoted running through games provided pre- and post-year data on students' achievement goals, competence beliefs, task values, achievement in running tests, and future intention to continue running as a health-enhancing activity. Results showed that students in the running-for-games program demonstrated significant growth in task-involved achievement goals. The regression analyses showed that extrinsic reward and selected intrinsic motivation constructs played a small role in predicting running-test scores. Interest, however, emerged as the most important intrinsic motivation construct for predicting future motivation for running. Interest seemed to override the effects not only of extrinsic reward but also of other intrinsic motivation sources. This finding suggests that interest-based motivation sources might have a strong and prolonged effect on learner motivation.

Helping children develop a healthy, physically active lifestyle rather than focusing on traditional team sports has become the center of physical education curriculum reform. Regarded as a "new physical education" (Weir, 2000), physical education focuses on teaching content that enhances health-related physical activity leading to fitness. The cornerstone of the curriculum model is an intention to educate K–12 students with a body of interdisciplinary knowledge integrating biomedical sciences, sociopsychosciences, and cultural humanities (National Association for Sport and Physical Education [NASPE], 2004).

An organized educational experience in physical education is considered a viable avenue and, in many cases, the only opportunity for school-age children to aquire comprehensive knowledge about the health benefits of physical activity

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and the necessary motor and behavior management skills to effectively participate in a variety of sports, physical activities, and exercises (Corbin, 2002). Available data, unfortunately, suggest that this opportunity has not been fully and efficiently utilized especially at the high school level (National Center for Education Statistics, 1996). Students' lack of interest in physical education during adolescence might be related to earlier experiences in physical education. Given that the steepest decline in physical activity occurs from age 12 to 17 (from an already low 40% to 24% for males and from 30% to 20% for females; Caspersen, Pereira, & Curran, 2000), it seems that physical education experiences in elementary schools could play a critical role in determining the value students place on physical activity participation in their lives.

The success or failure of curriculum reform might be dependent, in part, on the extent to which children are motivated to actively participate in learning tasks in physical education classes, and the extent to which they continue to apply the knowledge and skills they learn outside the physical education setting. It is undeniable that extrinsic rewards in various forms can motivate individuals to demonstrate high-achievement behaviors (see the debate between Cameron & Pierce, 1994, 1996, and Ryan & Deci, 1996, 2000). It is equally undeniable that intrinsic motivators, which often provide positive psychological incentives such as feelings of interest, enjoyment, and satisfaction, can also motivate people to achieve.

Although numerous studies on motivation have shown that both rewards and intrinsic motivators can generate initial motivation for achievement, intrinsic motivators are associated with stronger and more sustained motivation in achievement settings, such as learning. In addition, extrinsic rewards were found to have a detrimental effect on intrinsic motivation (Ryan & Deci, 1996, 2000). These general conclusions about the intrinsic and extrinsic motivators, however, have been challenged (Cameron & Pierce, 1994; Eisenberger & Cameron, 1996). Cameron and Pierce (1994) reported meta-analysis results for dozens of laboratory-based and school-based studies showing that, in general, extrinsic rewards do not have a negative impact on individuals' intrinsic motivations to engage in an activity with clearly defined achievement goals. Albeit, further analysis showed that extrinsic rewards could have detrimental effects on intrinsic motivation when participation is the sole purpose of the activity. In other words, when rewards are associated solely with participation in an activity rather than achievement or performance level, removing the rewards decreases participants' intrinsic motivation.

Results from another meta-analysis (Deci, Koestner, & Ryan, 1999) contradicted Cameron and colleagues' support for the benefits of extrinsic rewards. By differentiating rewards as informational (verbal rewards) or controlling (tangible rewards) and contingent (engagement-based or performance-based), Deci et al. found that all extrinsic rewards are detrimental to intrinsic motivation. The effects differed in degree, but not in nature. For example, tangible rewards tend to have a greater negative impact than verbal rewards (e.g., positive verbal feedback). Expected tangible rewards have motivation effects on both children and adults, whereas verbal rewards tend to have stronger motivation effects for children than for adults (Deci et al.).

The discrepancy in these findings and the debate (Cameron & Pierce, 1996; Ryan & Deci, 1996, 2000) reveal a need to further delineate the relationship between extrinsic rewards and important intrinsic motivation constructs (i.e., achievement goals, competence beliefs, task values, etc.) and to clarify the interactive effects of extrinsic rewards and intrinsic motivators on behavior and motivation. This inquiry is particularly important for research on physical education and physical activities where various motivation strategies have been used in different intervention programs for different groups. For example, in many intervention studies exploring effective ways to motivate Americans to engage in regular physical activity, various approaches to motivation included monetary compensation, T-shirts, award certificate, and others. Despite the rewards and an emphasis on scientific information about the benefits of physical activity, however, less than half of the participants in these studies demonstrated strong motivation to continue their physical activity programs (Stone, McKenzie, Welk, & Booth, 1998).

An extrinsic reward is defined in general as an attractive object or event received as a consequence of a behavior (Woolfolk, 1998). It is not difficult to find examples in the popular media; losing weight or looking good has been offered as an extrinsic reward to motivate people, especially women, to join fitness clubs. Rarely are the intrinsic values of various physical activities emphasized and publicized. Under the influence of the extrinsic reward contingency, those physical activities that can provide quick rewards (e.g., losing the most weight in the shortest time period) are considered the most effective and best activity for everyone, including children. Running, for example, is one of these quick reward activities.

In current curriculum reform in physical education, physical activities are often selected for an instructional program based on their ability to provide these extrinsic rewards to students (e.g., losing weight, looking good). Consequently, activities with high efficiency in providing the rewards (e.g., running on tracks) can be prescribed to children in an instructional program. It is unfortunate, as Corbin (2002) pointed out, that "too many people in our profession decided that the Exercise Prescription Model, which was developed for adults, was a good one for children" (p. 131). In these programs, children are considered miniature adults. There should not be any doubt that activities such as running are excellent for developing and maintaining cardiovascular health. The way activities such as running are incorporated in an instructional program for children, however, might have motivational implications for children's decisions regarding whether to participate in those activities in the future. A major motivator for children to voluntarily participate in an activity is the enjoyment they experience during the activity rather than the knowledge that it will be good for them (Corbin). In other words, children are more likely to be motivated by the intrinsic value embedded in a physical activity than by the extrinsic rewards they might receive from participation.

Rarely has the interactive effect of intrinsic motivators and extrinsic rewards of a particular activity on children's learning behavior and motivation been examined in an elementary school physical education setting. The purpose of this study was to examine such an effect in elementary school physical education settings where both intrinsic motivation strategies and expected extrinsic rewards were applied routinely. To accomplish our purpose, we focused on the interrelationship of extrinsic rewards and the intrinsic motivational constructs of achievement goals (including work-avoidance), competence beliefs, and task values associated with health-enhancing running tasks over a school year.

Task values are defined as incentives for engaging in various activities (see Eccles, Wigfield, & Schiefele, 1998). They consist of attainment value/importance, intrinsic value/interest, and utility value/usefulness. Attainment value refers to children's perceptions of the importance of doing well in a given activity. Intrinsic value refers to the enjoyment children receive from performing the activity or personal liking of the activity. Utility value refers to children's perceptions of how useful an activity is to them. Children are more likely to engage in activities if they believe participation will be of some use to them. Researchers have found that task values are related to students' intention for future participation in subject areas such as mathematics and physical education (Meece, Wigfield, & Eccles, 1990; Xiang, McBride, Guan, & Solmon, 2003).

We chose running as the activity context for the study because it has high health-enhancing values and has been highly recommended by government agencies (e.g., National Institutes of Health, Center for Disease Control and Prevention) and professional organizations (e.g., American Alliance for Health, Physical Education, Recreation and Dance; American College of Sport Medicine) as a major component in physical education curricula across all levels of schooling (Center for Disease Control and Prevention, 2001). Running, however, is basically a repetitive, rather dull activity if taught as strictly running. If not performed in relation to a game or sport, it has a low perceived level of interest or intrinsic appeal and offers less enjoyment and fewer feelings of satisfaction to young students when compared with sport- or game-related activities (Chen, Darst, & Pangrazi, 1999). Without a doubt, sustaining motivation to run on a daily basis requires high levels of intrinsic motivation. Nurturing high intrinsic motivation in an activity with few intrinsic motivation sources such as running creates a context in which the relationship between rewards and behavior and intrinsic motivation and behavior can be better understood.

Therefore, we hypothesized that although running is a highly valuable activity for developing cardiovascular health in children, the way that it is taught in elementary schools might have an impact on children's learning behaviors and motivation outcomes. In this study we compared the interactive effects of extrinsic rewards and intrinsic motivators between two instructional settings: one characterized by promoting running for running's sake and the other characterized by running for the purpose of playing a game. Specifically, we examined the extent to which children's motivation sources changed over time because of different instructional approaches, and how expected extrinsic rewards and intrinsic motivators differed in predicting behavior and motivation outcomes.

Methodology

Research Setting and Comparison Groups

Two elementary schools were selected for the study based on the comparability of their physical education curriculum. Both schools offered very similar curricula focusing on skill development, physical fitness, and social skills. The programs consisted of a variety of fundamental movement skills (e.g., running, jumping, catching, throwing, dribbling, kicking) and age-appropriate games and sports. The President's Challenge was also an integral part of both curricula. The schools were similarly equipped for physical education. All four physical education teachers (two for each school) were certified and had similar teaching experiences. A daily 30-min physical education lesson was required of all students in both schools with the student–teacher ratio ranging from 25:1 to 35:1. Teachers at both schools primarily used the command style of teaching in their lessons, a teaching style that offers no opportunities for students to make decisions as to what and how to learn in the teaching–learning process (Mosston & Ashworth, 1994).

There was a major difference, however, between the two programs. At School A, running was taught as a stand-alone miniprogram named Roadrunners with an extrinsic rewards system as an integral part of the program. A sticker was given for completing 100 laps (one lap equals one third of a mile) during the school year, a certificate of success for 125 laps, a trophy for 150 laps, and a name plaque was displayed in the hall for 175 laps or more. Students were encouraged to run or walk briskly on the track as many laps as they could during one of the physical education classes during the week to earn the rewards. In addition, the number of laps students ran and walked over the school year was recorded by the physical education teachers and displayed publicly with their names on the wall in the gymnasium at the end of the school year.

At School B, running was integrated in the motor skill development process and conducted within a skill development game structure. Students were encouraged to practice running, without a reward system, for the purpose of bettering their skills.

Thus, the two programs provided two naturally formed conditions for the study. A typical "Exercise Prescription Model" approach was used in School A coupled with a motivation strategy emphasizing extrinsic rewards. In School B, on the other hand, an enjoyment focus was clearly instilled in running as an activity through a variety of fun and novel games in which running was a critical component. It can be assumed that the teachers in School B might subconsciously emphasize the intrinsic motivation within the games. In order to maintain the two conditions for the study, we did not alter or manipulate either of the instructional programs or teaching approaches.

Research Design

We used a longitudinal design with pre- and postmeasurement of a set of motivation and behavior variables. The premeasurement was conducted at the beginning of the school year (early September). The postmeasurement was performed at the end of the school year (late April). The researchers visited the schools frequently and observed the implementation of the programs without interfering with the teachers' instructional plans. Most visits were unannounced. The purpose of the visits was to identify and document any possible deviation from the curricula. Comparisons between observations made during visits and the researchers' prior observations as university supervisors confirmed that there were no deviations.

Participants

A total of 119 fourth-grade students (67 boys; 52 girls) from School A (Roadrunners) and 88 students (56 boys; 32 girls) from School B (Running for Game) participated in the study. They came from families with lower-middle-class and middle-class backgrounds. The ethnic makeup of the students in this sample was as follows: 64.22% Caucasian, 10.29% African American, 11.27% Hispanic, 5.88% Asian American, and 8.34% from other ethnic backgrounds. Although the programs involved all students in both schools, we measured only responses from the 4th graders for the following reasons. We used the 1-mile-run test as one of the learning achievement measures because it was part of the President's Challenge implemented at both schools. Many fitness-test developers (e.g., the Cooper Institute for Aerobics Research, 1999), however, do not recommend the 1-mile-run test for children younger than 10 years of age. Therefore, children in the third grade or below were excluded from the study. In addition, some of the fifth-grade students had begun puberty, which might affect the reliability of their running scores; therefore the fifth-grade students were also excluded. Participation was voluntary. We obtained consent from parents and children and before data collection.

Variables and Measures

Demographic information. A personal data sheet was designed in order to collect students' background information including age, gender, grade, ethnicity, school, and participation in after-school sports for the past 12 months. Body height and weight were also measured.

Reward expectation. To assess students' expectation for external rewards, a statement showing the reward scale with laps to be completed was given to students at School A. The reward scale corresponded to the rewards that students might expect to receive from their teachers: a sticker for 100 laps, a certificate for 125 laps, a trophy for 150 laps, and a name plaque displayed in the hall for 175 laps or more. Meanwhile, students at School B were asked to respond to the question, "If you do well in running, your teachers would give you a sticker. How much would you like to have it?" They responded on a 5-point scale (1 = *not at all*, 5 = *very much*). The variable of reward expectation was coded as follows for analysis: *none/not at all* = 1, *sticker/no* = 2, *certificate/a little* = 3, *trophy/yes* = 4, and *plaque/very much* = 5.

Actual reward. This variable was assessed for students at School A only. As mentioned earlier, students at School A actually received stickers for 100 laps (coded as 2), certificates for 150 laps (coded as 3), trophies for 175 laps (coded as 4), and name plaques for 175 laps or more (coded as 5). The variable was coded as 1 for students who did not receive any reward.

Achievement goals. The students completed a 15-item questionnaire adapted from the Task and Ego Orientation in Sport Questionnaire (Duda & Nicholls, 1992) and the instrument used to assess achievement goals by Meece and Miller (2001). Questionnaire items were prefaced with the heading, "I feel really successful in running/Roadrunners when . . . " Students rated each item on a 1- to 5-point scale: 1 = *NO* to 5 = *YES*. Examples of the six items that constituted the task-involved goal scale were: "I do my very best," "Something I learn makes me want to go and practice more," and "Something I do really feels right." Examples of the six items from the ego-involved goal scale were, "I run faster than other children," "I am the only one who can run the most laps," and "The other children cannot run as well as me." The work-avoidance goal scale consisted of three items assessing students' concerns with minimizing effort expended. The items were, "I do not have to run a lot of laps," "I do not have to try hard," and "I am not pushed to run many laps." An average score was computed for each scale. Cronbach's alpha coefficients for the scales of task-involved goal, ego-involved goal, and work-avoidance goal were .76, .84, and .71 for the pretest data and .87, .84, and .72 for the posttest data, respectively.

Competence beliefs. Five questions, with answers on a 5-point Likert scale, assessed students' perceived ability and expectancies for success in running (for School B) or Roadrunners (for School A). Students were asked the following questions. "How good at running/Roadrunners are you?" (1 = *very bad* to 5 = *very good*). "If you were to list all the students from the worst to the best in running/

Roadrunners, where would you put yourself?" (1 = *one of the worst* to 5 = *one of the best*). "Some kids are better in one subject than in another. For example, you might be better in math than in reading. Compared with most of your other school subjects, how good are you at running/Roadrunners?" (1 = *a lot worse in running/Roadrunners* to 5 = *a lot better in running/Roadrunners*). "How well do you think you will do in running/Roadrunners this year?" (1 = *very bad* to 5 = *very well*), and "How good would you be at running/Roadrunners?" (1 = *very bad* to 5 = *very good*). Responses were averaged to form a score for competence beliefs, with a high score indicating high competence beliefs and a low score indicating low competence beliefs. Cronbach alpha coefficients were .88 for the pretest data and .89 for the posttest data.

Attainment value/importance. Two questions assessed this construct using 5-point scales as follows: "For me, being good at running/Roadrunners is?" (1 = *not very important* to 5 = *very important*); and "Compared with your other school subjects, how important is it to you to be good at running/Roadrunners?" (1 = *not very important* to 5 = *very important*). Responses were averaged to form a score for importance, with a high score indicating high importance and a low score indicating low importance. Cronbach alpha coefficients were .80 for the pretest data and .81 for the posttest data.

Intrinsic value/interest. Two questions assessed this construct using 5-point scales. The children were asked: "In general, I find running/Roadrunners" (1 = *"way" boring* to 5 = *"way" fun*); and then, "How much do you like running/Roadrunners?" (1 = *don't like it at all* to 5 = *like it very much*). Responses were averaged to form a score for interest, with a high score indicating a high level of interest and a low score indicating a low level of interest. Cronbach alpha coefficients were .92 for the pretest data and .89 for the posttest data.

Utility value/usefulness. We also posed two questions to assess this construct. The first question was "Some things that you learn in school help you do things better outside of class. We call this being useful. For example, learning about plants might help you grow a garden. In general, how useful is what you learn in running/Roadrunners?" (1 = *not useful at all* to 5 = *very useful*). The second question asked students: "Compared with your other school subjects, how useful is what you learn in running/Roadrunners?" (1 = *not useful at all* to 5 = *very useful*). Responses were averaged to form a score for usefulness, with a high score indicating a high level of usefulness and a low score indicating a low level of usefulness. Cronbach alpha coefficients were .76 for the pretest data and .76 for the posttest data.

Intention for future participation in running. The following two questions were used to measure future intention for running: "Pretend that every Friday in your physical education class is a free activity day. Would you choose to do running activities?" and "The running/Roadrunners will continue next year. If you will have a choice whether you want to participate in it, how much would you like to do it again?" Both were on 5-point scales (1 = *not at all* to 5 = *very much*). Responses were averaged to form a score for the measure, with a high score indicating a high level of intention and a low score indicating a low level of intention. Cronbach alpha coefficients were .76 for the pretest data and .81 for the posttest data.

The 1-mile-run test. The 1-mile-run test assessed children's performance in running. Times were recorded in minutes and seconds for each child. Children were encouraged to run as fast as they could in the test.

The preceding self-report measures were all modified from questionnaires developed and used by Eccles and her colleagues (Eccles & Wigfield, 1995; Eccles, Wigfield, Harold, & Blumenfeld, 1993), as well as Xiang and her associates (Xiang, McBride, & Bruene, 2004; Xiang et al., 2003). The reliability and validity of these measures have been demonstrated in several previous studies in both academic and physical education settings (Eccles et al., 1993; Eccles & Wigfield, 1995; Xiang et al., 2003, 2004).

Data Collection

Students completed questionnaires, height and weight measurements, and the 1-mile-run test during their regularly scheduled physical education classes at the beginning of the school year (early September) and again at the end of the school year (late April). More specifically, questionnaires were given to the students before the 1-mile-run test was administered and for the posttest before actual rewards were given to group A. The researchers read all items on the questionnaires aloud to the students during data collection. In order to help students at School B understand the context of the questions, the researchers emphasized to the students that all the questions in the questionnaire referred to the running they did in games, and that is what they should base their responses on. All students were also encouraged to ask questions if they had difficulty understanding the instructions or questions. Few questions were raised during the data collection. It took approximately 30 min for students to complete the questionnaires.

The 1-mile-run test was administered to the students by their physical education teachers with assistance from the research team, which consisted of one university faculty member and one doctoral student, a week after the questionnaires were administered. The students ran a mile as a whole class but were timed individually in minuts and seconds. The test took place on the track on which students ran weekly for the Roadrunners program or physical education class. The distance on the tracks was calibrated by the researchers using a measuring wheel before the test. After students completed the 1-mile-run test, the researchers measured their height and weight.

Data Analyses

After initial screening for any missing data and outliers, as well as descriptive analyses, a MANOVA repeated-measure analysis was conducted to examine differences between the two schools in change in the measures because the variables were affected by time and the different approaches to teaching running adopted by the two schools. Multiple regression analyses (with stepwise predictor entry method) were used to examine the predictability of the variables in the various motivation constructs on achievement (running improvement) and intention for continuing running in the future. One multiple-regression analysis was performed with premeasures of running test performance and intention as dependent variables and the premeasures of motivational constructs as predictors. The purpose of the analysis was to determine the predictive relationships in the premeasurement conditions. A second multiple-regression analysis was conducted with the changes in running test performance and intention as the dependent variables and both premeasures of the motivational constructs and changes in them (differences between pre- and postmeasures) as predictors. The purpose of this analysis was to explore the extent to which the changes in behavioral performance and intention were influenced by the motivational constructs and their changes over time under the two reward conditions.

Results

Table 1 reports the descriptive statistics for pre- and postmeasures of the variables. The data show a similar pattern of change in the variables from both schools. Results from the repeated-measure MANOVA show that, compared with their pre-measurements, the students' running-test scores improved significantly ($p < .05$), ego-involved goals weakened, competence beliefs were lowered, and

Table 1 Descriptive Statistics of Roadrunners (*n* = 97) and Run-for-Game Schools (*n* = 71): Mean (*SD*)

Variable	Road-runners	Mean change	Run for Game	Mean change
Running test				
prescore	12.29 (2.89)		13.52 (3.38)	
postscore	11.11 (3.02)	–1.11 (2.40)	11.91 (2.63)	–1.49 (2.40)
Achievement goals				
pre task-involved	4.28 (0.60)		3.97 (0.80)	
post task-involved	3.96 (0.86)	–0.28 (0.74)	4.14 (0.79)	0.17 (0.92)
pre ego-involved	3.04 (1.04)		3.37 (1.12)	
post ego-involved	2.84 (1.07)	–0.22 (0.98)	2.78 (1.14)	–0.52 (1.15)
pre work-avoidance	2.84 (1.14)		3.02 (1.27)	
post work-avoidance	2.87 (1.18)	0.03 (1.32)	3.21 (1.14)	0.22 (1.38)
Competence beliefs				
prescore	3.91 (0.74)		4.04 (0.83)	
postscore	3.85 (0.78)	–0.05 (0.72)	3.75 (0.93)	–0.29 (0.76)
Importance				
prescore	4.18 (0.82)		4.09 (0.96)	
postscore	3.76 (1.10)	–0.05 (0.72)	3.84 (1.06)	–0.22 (1.18)
Interest				
prescore	3.85 (1.17)		4.07 (1.14)	
postscore	3.23 (1.27)	–0.62 (1.11)	3.44 (1.24)	–0.65 (1.29)
Usefulness				
prescore	4.06 (0.84)		4.09 (0.86)	
postscore	3.84 (1.01)	–0.24 (0.91)	3.93 (0.84)	–0.17 (0.99)
Reward expectation				
prescore	3.47 (1.23)		3.67 (1.35)	
postscore	4.04 (1.33)	0.57 (1.57)	4.20 (1.04)	0.53 (1.60)
Intention for future participation in running				
prescore	3.64 (1.08)		3.84 (1.14)	
postscore	3.28 (1.17)	–0.37 (1.15)	3.33 (1.23)	–0.54 (1.23)

Note. Measured in minutes required to run 1 mile; pre = premeasure of variable; post = postmeasure of variable.

they thought running less important, interesting, and useful. Students demonstrated a significantly weaker intention to participate in running in the future and higher expectation for extrinsic rewards for their running ($p < .05$).

The repeated-measure MANOVA showed that within-subjects differences between pre- and postmeasures of the variables were statistically significant in all variables except the task-involved goal. All students ran faster in the 1-mile-run test in the posttest. Their postmeasures on all motivation constructs, however, decreased significantly with the exception that their expectation for external rewards increased (see Table 1). As shown in Table 2, when the school effect was tested (Roadrunners vs. Run-for-Game approaches), the repeated-measure model revealed statistically significant differences in the changes of task- and ego-involved goals. Students in the Run-for-Game school became more task involved and less ego involved, whereas their counterparts in the Roadrunners school became less task involved (see Table 1). The differences in the changes in achievement goals between the schools indicate that running with a game purpose increased children's task-involved goals, whereas running for running's sake reduced it.

The relationship of expected extrinsic rewards with other measures is reported in Table 3. The variable was moderately correlated with running-test scores, negatively with the work-avoidance goal, and highly correlated with future intention for running. It is noticeable that the relationship of the strength of expected extrinsic rewards with running-test scores and future intention decreased over time for students in both schools.

Results from the regression analyses revealed different sets of predictors for running performance and intention to run in the future. Data in Table 4 indicate that the pretest running scores were predicted by reward expectation, actual reward

Table 2 Repeated MANOVA Results: Comparison of Changes in Variables Over Time Between Roadrunners and Run-for-Game Schools (Time × School Effects)

Variable	Mean square	*F*	*p*	h^2	Obs. power
Running test	0.72	0.40	.40	.00	.14
Intention for future participation in running	0.68	0.98	.32	.01	.17
Task-involved goal	4.41	12.89*	.00	.07	.95
Ego-involved goal	2.60	4.49*	.03	.03	.56
Work-avoidance goal	2.28	2.41	.12	.01	.34
Competence beliefs	1.03	3.52	.06	.21	.46
Importance	0.15	0.23	.63	.00	.08
Interest	0.42	0.58	.45	.00	.12
Usefulness	0.01	0.15	.70	.00	.07
Reward expectation	0.41	0.34	.56	.00	.09

*Multivariate Pillai's trace value = .172; $F_{(9, 158)} = 3.66$; $p = .00$.

Table 3 Correlation Coefficients of Expected Reward with Other Measures

	Roadrunners		Run for game	
	Prereward	Postreward	Prereward	Postreward
Running test [a]	–.21*	–.61**	–.40**	–.12
Task-involved goal	.32**	.28**	.31**	.43**
Ego-involved goal	.21*	.23*	.20	.05
Work-avoidance goal	–.01	–.35**	–.45**	–.26*
Competence beliefs	.44**	.66**	.56**	.41**
Importance	.40**	.50**	.57**	.42**
Interest	.45**	.43**	.69**	.58**
Usefulness	.41**	.51**	.47**	.40**
Intention for future participation in running	.89**	.49**	.92**	.61**

Note. Prereward = premeasure of r reward expectation; postreward = postmeasure for reward expection.
[a]Running test: Negative signs should be read as positive because of the reversed performance scaling in the running test (low score = better performance).
* $p < .05$. ** $p < .01$.

condition (School A or B), and gender. Given the nature of running tests, the scores were reverse scaled (lower score = better performance). In the analysis, the Road-runners school was coded 1 and Run-for-Game school 2. Boys were coded 1 and girls 2. The standardized b suggested that reward expectation, boys, and the Roadrunners program positively predicted running performance in the pretest. Positive predictors for intention to run in the future included reward expectation, interest, importance, and competence beliefs. These predictors accounted for approximately 90% of variance for intention. Among these variables it seems that reward expectation and interest were two strong predictors.

Table 5 reports the results of the regression analyses that explored the predictive relationships of the changes in running-test performance and intention for future running to premeasurements of the motivational constructs and their changes over the year. It appears that about 40% of running-performance change (improvement in this case) was accounted for by prior running performance, prior competence beliefs, change in competence beliefs, and students' receipt of actual rewards. Given that running performance change was on a reverse scale, all predictors except change in competence beliefs (it was negative, see Table 1) were positive predictors for running performance improvement with prior running performance and prior competence beliefs as stronger predictors.

The change in intention for future running was predicted by prior intention, prior running performance, and changes in interest, importance, and reward expectation. During the year, students' intention for future running decreased, as did their interest, the importance of running, and their reward expectation. The standard bs for intention change seem to suggest that the decrease of intention can be predicted from the decrease in interest, importance, and reward expectation. In

Table 4 Predictors for Running Performance and Intention for Future Participation in Running in Premeasurements

	$R^2_{adjusted}$	B	b	$r_{(0\ order)}$	$r_{(partial)}$	Toler-ance	VIF[a]
Running test (*df* = 1, 174)	.28						
reward expectation	.20	– 1.84	–.45	–.44*	–.47*	.99	1.01
school	.07	1.79	.28	.24*	.32*	.99	1.01
gender	.02	.87	.14	.14	.16	.99	1.01
Intention for future participation in running (*df* = 1, 173)	.90						
reward expectation	.83	.61	.70	.91*	.88*	.64	1.57
interest	.06	.23	.24	.72*	.48*	.51	1.97
importance	.01	.12	.09	.57*	.23*	.63	1.59
competence beliefs	.01	.01	.07	.60*	.15	.55	1.84

Note. Predictors entered: premeasures of task-involved goal, ego-involved goal, work-avoidance goal, competence beliefs, importance, interest, usefulness, reward expectation, body-mass index (BMI), gender, and school.
[a]*VIF*: Variance Inflation Factor.
* $p < .05$.

addition, it might be predicted from prior intention, in which case higher scores might indicate a change to lower levels of future intention for running. Prior running performance, although it was included as a predictor, seems to have little predictive effect for intention change.

Discussion

This study was designed to examine the interactive effect of intrinsic motivators and extrinsic rewards on elementary school students' behavior and motivation for running. We hypothesized that the way running is taught to elementary school students might have direct impact not only on their behavior outcome (performance achievement) but also, and perhaps more importantly, on their motivation to continue running, an activity that is valuable to their health, in the future. In addition, we were interested in exploring the extent to which various motivators changed and predicted the behavior and motivation outcomes.

Changes in Motivation Constructs

The repeated-measure model showed that students in both programs did not change their task-involved goals during the year, although the changes in other measured motivation constructs were found to be statistically significant. It is interesting, however, that except for expected external rewards, postmeasurement rating scores on motivation constructs (achievement goals, competence beliefs,

Table 5 Predictors for Changes in Running Performance and Intention for Future Participation in Running Over the Year

	$R^2_{adjusted}$	*B*	b	*r* (0 order)	*r* (partial)	Tolerance	VIF[a]
Running test score change (*df* = 1, 174)	.40						
pre running-score	.20	–0.55	–.72	–.45*	–.61*	.69	1.56
pre competence-beliefs	.06	–1.31	–.43	–.03	–.41*	.67	1.50
competence beliefs change	.11	–0.99	–.33	–.18	–.35*	.77	1.30
actual reward	.03	–0.24	–.18	–.03	–.20	.80	1.26
Intention for future participation in running change (*df* = 1, 161)	.70						
pre intention	.21	–0.26	–.23	–.46*	–.33*	.64	1.57
pre running-score	.02	–0.01	–.03	–.01	–.04	.85	1.18
interest change	.41	0.53	.54	.73*	.67	.78	1.28
importance change	.05	0.21	.20	.48*	.32	.83	1.20
reward expectation change	.03	0.15	.20	.56*	.28	.64	1.58

Note. Predictors entered: Premeasures (pre) of intention for future participation in running, task-involved goal, ego-involved goal, work-avoidance goal, competence beliefs, importance, interest, usefulness, reward expectation, gender, school, body-mass index (BMI) change, changes between pre- and postmeasures of the variables, and actual reward.
[a]VIF: Variance Inflation Factor.
$*p < .05$.

importance, interest, usefulness, and intention for future running) declined significantly in comparison with those of premeasurements. At the same time, however, students' performances on the 1-mile-run test improved significantly. Based on these data, it seems that although behavioral indicators (running performance in this case) might indicate promising achievement behavior, the motivators necessary to sustain that behavior decline over time.

Statistically significant between-school effects were found in achievement-goal constructs. As visualized in Figure 1, the students in the Roadrunners school demonstrated a weakened task-involved goal, whereas those in the Run-for-Game school showed a strengthened task-involved goal. The ego-involved goal was weakened over time in both schools. It appears, however, that students in the Run-for-Game school had a more significant decrease in their ego-involved goal than did their peers in the Roadrunners school.

Our findings indicate that the addition of a focused running program (Roadrunners) with an extrinsic reward system did not change the work-avoidance goal, competence beliefs, importance, usefulness, interest, intention for future running, or even running-test performance more than did a regular physical education program that emphasized applying running in game-like situations. In addition, if the task-involved goal is a desirable motivation disposition that we need to nurture in

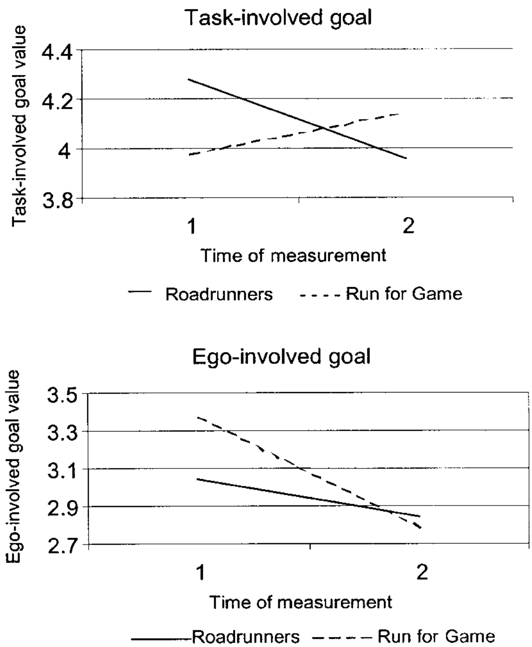

Figure 1 — Changes in achievement goals.

students, the running-for-running's-sake program and the associated extrinsic rewards, in contrast, result in a questionable outcome. Although there is little doubt that running enhances much needed cardiovascular fitness in children, teaching running for running's sake might not produce desirable intrinsic motivation in elementary school children.

These results might have an important implication for studying children's motivation and behavior change in relation to physical activity. Based on an analysis of a national database, Caspersen et al. (2000) reported that the steepest decline in physical activity occurs during the adolescent years. Considering our data in this context, we could speculate that a weakening of motivators preceeds a decline in physical activity behavior.

Although the effects of almost all intrinsic motivation constructs were weakened, expectations for extrinsic rewards were strengthened over time in the children in both schools. A correlation analysis revealed that expected extrinsic rewards were associated with performance and motivation for future participation in running. When coupled with a negative correlation between expectation for extrinsic rewards and the work-avoidance goal, the findings seem to suggest that extrinsic rewards could have a positive motivation effect initially, but that the motivation effect might gradually diminish over time. This trend can be clearly observed by comparing the strength of the correlation in pretest and posttest results.

The debate about the effect of extrinsic rewards on motivation has revealed the complexity of using rewards to stimulate intrinsic motivation (Cameron & Pierce, 1994; Deci et al., 1999; Ryan & Deci, 2000). Our findings, however, indicate that the reward strategies routinely used in elementary school physical education are associated with students' participation behavior, performance, and initial motivation for continuing the activity. Through prolonged experience with the activity, however, students' expectation for the rewards increased. Although the increase might not be associated with motivation, it might indeed be associated with performance in an environment where the activity itself has little intrinsic motivating effect such as running in the Roadrunners school. In an environment in which the emphasis is on providing intrinsically motivating activities, the association between expectation for rewards and performance might become minimal.

Predictive Motivation Constructs

The regression results showed that rewards and selected intrinsic motivation constructs failed to emerge as strong predictors of the behavior outcome—improvement in running scores for elementary school children. Prior running ability, as manifested in the children's pretest running scores, and children's competence beliefs and its change over time seem to be meaningful predictors ($b = .72$ .43, and .33, respectively) for running performance improvement. Actual rewards did not show meaningful predictability for running performance or future intention.

Interest emerged as the most important intrinsic motivation construct predicting future intention for running for the children. Changes in interest in running seemed to override the effects not only of extrinsic rewards but also of other intrinsic motivation sources. Similarly, importance and changes in reward expectation became important predictors for future intention as well.

Children's interest, importance, and reward expectations declined as their future intention for running decreased in both schools. The results seem to suggest that intentions to continue to run in the future might be determined by the extent of the "fun" running can provide. Other motivational constructs and extrinsic rewards, including reward expectations, might not determine intention.

These findings replicate findings that reveal that interest can profoundly influence student motivation in physical education (Chen, 2001; Shen, Chen, Scrabis, & Tolley, 2003). Particularly consistent with previous findings (Chen, Shen, Scrabis, & Tolley, 2002) is the finding that achievement goals were found to play a minimal role in predicting both performance and motivation outcomes, whereas interest had a major impact on children's intention to participate in the future. In both schools, interest accounted for more than half of the variance in students' future intention for running participation. This finding supports previous work suggesting that interest-based motivation sources might have strong and prolonged effects on learner motivation (Alexaner, Jetton, & Kulikowich, 1995; Hidi, 2000).

What is worth noting in the regression models is that achievement goals (including the work-avoidance goal) and competence beliefs played a minimal role in accounting for future intention for running participation. Similar results were observed in an earlier study (Chen et al., 2002) in which middle school students' achievement goals in various physical education content units including dancing, volleyball, fitness labs, fencing, and multiple games were found to have a weak correlation with the learning-process outcome measured using the number of steps students had taken in lessons and summative skill and knowledge acquisition. Chen and Ennis (2004) argued that physical education curricula often create an environment in which competence-development goals (e.g., learning a skill) are often blurred with goals that don't relate to competence development (e.g., having fun). This blurred conception of goals might create an incoherent curricular context in which achievement goals are not viewed as an integral part of the context because the relevance of learning the content is misunderstood by both students and teachers. In the current case, although running was a part of physical education in both schools, and its values (for health in the Roadrunners program, for efficient game play in Run for Game) were emphasized by teachers, running was apparently not considered by teachers or students to be vital content to be learned. Chen and Ennis suggested that, in this curriculum context, "the misunderstanding characterized by perceived low value in the content and mixture of competence-based and non-competence-based learning goals appears to dramatically reduce the effectiveness of achievement goals as a primary motivator for enhancing student learning in physical education" (pp. 332-333).

In the physical education setting, it has been observed that competence beliefs might be a function of activity choice (Scrabis, 2003). When comparing middle school physical education students' perception of competence in various physical activities, Scrabis found that students tended to perceive high competence in those activities over which they felt they had control over their participation decisions. She argued that competence beliefs could be a valid motivator in a constructivist learning environment in which students are provided opportunities to decide learning approaches and are nurtured with specific self-appraisal skills. Although no student choice data were collected for this study, it was our understanding that the children were offered few choices for physical activities in their physical education programs, and they had minimal choice in decisions made regarding running. In this curriculum context, the motivation effect from competence beliefs might be minimal.

In relation to the issue of choice, the findings should be understood within the boundary of content choice as well. Although running contributes to health in a profound way, it is just a part of physical movement taught in physical education. The relationships observed among the variables in this study could change if they are examined in different physical activities. Physical activities offered in physical education are selected for their appropriateness to child development. Many of the activities offer intrinsically rewarding experiences for the learner. For instance, game-like fitness exercises present a situationally interesting activity environment in which students often feel rewarded simply by participating in the activity (Darst, Chen, van der Mars, & Cusimano, 2001). It can be speculated that these experiences, which have built-in intrinsic rewards, might alter the relationships in this study. One question that might have resulted from studying running is that: Given the tide of fitness-enhancing physical activity promotion, especially in school-based physical education curriculum reform attempts, should we use the Roadrunners' model, the Run-for-Game model, or a combination of both to enhance and maintain student motivation for future participation in physical activity? After all, this is one of the ultimate goals of school-based physical education.

Conclusion

It was hypothesized that the way that running activities were taught in elementary schools might have an impact on children's learning behavior and motivation outcomes. Particularly, the motivational approach used by the teachers could influence children's motivation for participating in future running activities. The repeated-measure MANOVA results demonstrated that for both behavior outcomes and the functional motivators of competence beliefs of importance, interest, and usefulness, the two distinctive ways of including running in physical education made no significant differences in children's outcomes. In other words, performances in the running test improved in both schools, motivational impact decreased in both schools, and children's expectations for rewards increased significantly in both groups.

The two distinct ways of teaching running did, however, result in significant differences in changes related to children's achievement goals. Running for running's sake had a detrimental impact on students' task-involved goal, whereas running for games strengthened the goal. Given the nature of this study, a cause–effect relationship cannot be established. It is logical, however, to speculate that young children taught running in order to improving health might come to the conclusion that running lacks a purpose. Children run in their daily lives, and they often run for particular purposes, many of which, naturally, are for playing, fun, and enjoyment. Teaching an activity that has high health value, such as running, in a context isolated from direct and tangible purposes that children appreciate could create an incoherent curriculum context. In this incoherent curriculum context, as Ennis (2001) pointed out, physical education becomes a "high need, low demand" commodity in schools, and it will gradually lose its curricular value.

Our data call for further examination of the interactive impact of intrinsic motivators and extrinsic rewards in the context of the curriculum in which daily teaching and learning occur. The curriculum should provide a context that energizes, motivates, and gratifies the learner by enhancing learning experiences. The exceptional predictive function of interest observed in our data echoes Burke's (1995) claim that content that stimulates interest, curiosity, and self-fulfillment can be the ultimate motivator. Thus, research on student motivation can only be meaningful when motivation is studied within the realm of a curriculum with learning goals that inspire the learner to achieve (Burke).

To change physical education's "high need, low demand" status, researchers and teachers should continue to search for a theoretical stance in which the curriculum is designed with built-in motivational components. Motivation and content should no longer be separate entities in physical education or on schools' curriculum development drawing boards. Instead of tolerating the decline of the function of intrinsic motivators observed in our data, researchers and teachers should develop content-based motivation strategies to help students enhance their competence-based achievement goals, appreciate task values embedded in activities, internalize interest and enjoyment from physical activities, and sustain a stronger motivation for future participation in physical activity. In order to accomplish this goal, it is logical to recommend that physical education curriculum designers should clearly define and distinguish competence-based goals from goals that are not competence based. A curriculum with a balance of the two types of goals can explicitly provide both challenging learning tasks and enjoyable learning experiences so the learner can acquire and sustain the knowledge, skill, and values needed for a healthy, physically active lifestyle.

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