6-2011

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THE INFLUENCE OF TEACHER-INITIATED REMINDERS ON THE ATTAINMENT OF STUDENTS' AEROBIC FITNESS GOALS

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ABSTRACT

Goal setting in the physical education classroom can be a successful technique to enhance motivation, increase effort, and improve performance. A critical component of effective goal setting is providing feedback. Therefore, the purpose of the current study was to examine the influence of teacher-initiated reminders of the goal on the attainment of self-set aerobic goals in physical education classes. This study was quasi-experimental in nature and used a nonrandomized pretest-posttest, control group design to carry out the procedures. Participants were from two fifth grade classes: one class was designated the experimental group (n = 15) and the other was the control group (n = 16). Participants completed the aerobic fitness pre-test and then created their aerobic fitness goal. Participants completed two cardio units each two weeks in duration with the experimental group being exposed to teacher-initiated reminders of their aerobic fitness goals, three times a class period; whereas, the control group was not exposed to any teacher-initiated reminders. At post-test, both groups completed the aerobic fitness test and determined whether their goal was met or surpassed. Results showed that more students than expected in the experimental group obtained their goal, which was not the case with the control group. Specifically, 80% of students in the experimental group surpassed their goal and only 56% of those in the control group surpassed their goal. The results suggest that keeping goals in focus through feedback can increase attainment. Overall, these results can serve to help physical educators use an effective goal setting to increase the success of their students.

KEYWORDS: goal-setting, pedagogy, feedback, physical education.

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Over the last half a century, the effectiveness of goal setting has been researched in different fields. Ninety percent of the studies conducted on goal setting have shown positive or partially positive effects to support the use of goal setting in a variety of fields (Locke, Shaw, Saari, & Latham, 1981). Within the field of education, goal setting is widely used by teachers to increase the achievement of their students, including physical education. For goal setting to be effective, practitioners must implement the three main elements of goal-setting theory – the goal core, goal mechanisms, and goal moderators (Locke & Latham, 1990; 2002). Of interest to the current study, was the influence of the goal moderator, feedback, on the attainment of self-set aerobic goals in physical education classes.

Feedback is often provided by others to check the progress towards goal achievement. In a review of the effectiveness of feedback and goal setting, seventeen out of the eighteen reported studies found that the combination of both produced better performance gains than either one alone (Locke & Latham, 1990). Specifically, effective feedback enhances commitment, motivation, performance strategies, and, most importantly performance (Neubert, 1998). Effective feedback can (a) indicate skill level, (b) identify performance quality, and (c) help provide information on future success of the task (Kluger & DeNisi, 1996).

Feedback is an important tool teachers can use to enhance the effort of their students. Henderlong and Lepper (2002) argued that feedback has a beneficial effect on the motivation of task performance when it is (a) perceived as truthful by the recipient, (b) aimed at linking success to effort and strategies, and (c) focused on self-referenced improvement and learning. In addition, feedback also has been shown to increase performance as well. A study conducted by Fredenburg, Lee, and Solmon (2001) sought to investigate the effects of feedback on performance during the instruction of a cup-stacking task with fourth-graders. The participants were assigned to one of four feedback treatment conditions (a) no feedback, (b) positive--motivational feedback, (c) task-knowledge feedback, and (d) positive-motivational and task--knowledge feedback. Results showed that participants in the motivational, task-knowledge, and motivational and task-knowledge treatment groups all had a greater increase in performance from pre-test to post-test than the no feedback group. Therefore, appropriate feedback could possibly be a key to positive student engagement within the physical education lesson.

Another type of feedback that physical education teachers can provide is reminders to students of their self-set goals. In this manner, teachers are creating a supportive goal-setting atmosphere where they prompt student to remember the goals they set (Weinberg & Gould, 2007). These teacher-initiated reminders can help students focus on their specific self-set goal for an educational unit and their action plan for goal achievement. Because goal setting is becoming an increasingly popular motivational tool to use with students to help increase performance in physical education, the current study examined the influence of teacher--initiated reminders of goals (i.e., feedback) on the attainment of self-set aerobic goals in physical education classes.

METHODS

This study was quasi-experimental in nature and used a nonrandomized pretest-posttest, control group design to carry out the procedures. Because students were already grouped into two classes within the school at the fifth grade level, it was most convenient, for research purposes, to label one class as the experimental group and the other as the control group. The independent variable was the teacher-initiated reminders. The dependent variable was goal attainment (yes or no) on the post-test. We were not interested in how much students surpassed their goals, only whether or not they attained it. It was hypothesized that the treatment group, exposed to daily, teacher-initiated goal reminders, would be more successful in meeting or surpassing their aerobic fitness goal on the PACER post-test compared to the control group.

Participants

Participants were 31, fifth grade students (n_{girls} = 12 and n_{boys} = 19) enrolled in a rural elementary school. The experimental group contained 15 participants (6 girls and 9 boys) and 16 participants composed the control group (6 girls and 10 boys). All participants identified as White American/Caucasian.

Instrumentation

PACER Test. The Fitnessgram Progressive Aerobic Cardiovascular Endurance Run (PACER) was used to measure aerobic fitness levels at pre-test and post-test. The PACER test is a multistage aerobic capacity test that involves running back and forth across a 20-meter course between 2 identified lines in time to music played from a CD (Cureton & Plowman, 2008). The test begins at a slow pace, and after each minute, increases in pace. A participant continues running until the pace can no longer be maintained. The more laps completed equates with a higher aerobic capacity (Cureton & Plowman, 2008). The PACER test is both a valid and reliable instrument (see Barnett, Chan, & Bruce, 1993; Leger, Mercier, Gadourt, & Lambert, 1988; .Liu, Plowman, & Looney, 1992; Mahar et al., 1997). The max number of laps during the administration of the PACER pre-test and PACER post-test for this study was 75.

Goal setting form

The goal setting form allowed participants to record their PACER pre-test scores and the goal they wished to achieve at the post-test. Specifically, this form asked the students to record their pre-test PACER score, PACER goal, post-test PACER score and goal achievement (yes/no).

Procedures

Institutional Review Board approval was obtained prior to the start of data collection. Before participation in the study, parents of the participants completed a consent form and the participant completed a child assent form. One of the 5th grade classes was the control group and the other 5th grade class was the experimental group. The lead physical education teacher at the school was the instructor of both classes during the study. Students in both the control and experimental groups were introduced to a goal setting orientation. Two separate goal setting sessions occurred the week prior to the aerobic fitness unit. The orientations trained the participants to set SMART goals. SMART is an acronym that stands for specific, measureable, attainable, realistic and timely, which are techniques for setting effective goals (Weinberg & Gould, 2007).

At the beginning of the aerobic fitness unit, students in both the experimental and control groups completed the aerobic fitness pre-test (PACER), created aerobic fitness goal based on their PACER test lap score, and recorded the information on the goal setting form. The lead teacher, as well as the researcher, checked all participants' goals to ensure that they were in accordance with attributes of the SMART guidelines. Following the establishment of the students' aerobic fitness goal, students in both the control and experimental group completed two cardio units (i.e., jump roping and invasion games), each two weeks in duration. During this time, students in both the experimental and control groups used heart rate monitors to ensure they spent at least 15 minutes in or above their target heart rate zones (60%-90% of their maximum heart rate).

During the two units, the experimental group was exposed to teacher-initiated reminders of their aerobic fitness goals, three times a class period; whereas, the control group was not exposed to any teacher-initiated reminders. Examples of teacher-initiated reminders that were used during this study were (a) "visualize the PACER test goal that you set and think about how you can best improve your chances to reach it during this activity," (b) "the more time spent in your target hear rate zone during class, the better chance you have of achieving you PACER test goal," and (c) "remember back to when you wrote down the PACER test goal you wished to achieve and think about how your effort can best be directed toward achieving that today in physical education." Reminders given to the experimental group were spaced throughout the lesson with one being said at the beginning of class, one in the middle of class, and one at the end of class, each day. At the end of the two cardio units, both the control and experimental groups completed the aerobic fitness post-test (Fitnessgram PACER Test). All students recorded the number of laps they completed on their goal setting form and determined whether their goal was met or surpassed.

RESULTS

The purpose of this study was to determine whether or not teacher-initiated reminders of students' self-set, aerobic fitness goals throughout physical education class increase the frequency of the desired achievement outcome. Because the dependent variable was dichotomous (i.e., attained goal or did not attain goal), a chi-square analysis was used to answer the research question. The means, standard deviations, and range for the number of laps completed during the PACER pre-test and PACER post-test can be found in Table 1. The sizeable range of lap scores suggests various fitness levels of the participants.

Table 1. Mean, Standard Deviations, and Range of Lap Scores by Testing Group

	Experimental Group (n = 15)			Control Group (n = 16)		
	M	SD	Range	M	SD	Range
PACER Pre-Test	39.00	17.82	18-72	35.44	13.57	17-68
PACER Post-Test	45.53	17.97	23-75	42.06	17.85	12-72

We expected that 50% of the students in each group would attain their goal (see Table 2). The experimental group met or surpassed their self-set aerobic PACER goal 80% of the time while the control group met or surpassed their self-set aerobic PACER goal only 56.25% of the time. Therefore, a chi square goodness of fit test was calculated. The chi square value for the experimental group, who received the teacher-initiated reminders of the participants' self-set aerobic fitness goals throughout the two units, was significant ($X^2(1) = 5.40$, $p = .02$). The chi square was not significant for the control group ($X^2(1) = .250$, $p > .05$). These results suggest that the teacher-initiated reminders contributed to the achievement of the aerobic fitness goals.

Table 2. Observed and Expected Frequencies of Goal Achievement by Testing Group

	Experimental Group (n = 15)		Control Group (n = 16)	
	Met / Surpassed Goal	Did Not Meet Goal	Met / Surpassed Goal	Did Not Meet Goal
Observed Frequencies	12	3	9	7
Expected Frequencies	7.5	7.5	8	8

Heart rate data were analyzed to determine the average amount of time the participants spent in, above and below their target heart rate zone. The average time spent in and above zone for both testing groups exceeded 20 minutes. Thus, workout intensity was likely not a confounding variable.

DISCUSSION

Previous work conducted by Locke and Latham (2002) demonstrated that goal setting coupled with the use of feedback is more effective in encouraging performance than either goal setting or feedback alone. As a result of this finding, Locke and Latham suggest in their theory that goals need to be kept in constant focus (1990). Therefore, the current study examined whether or not teacher-initiated reminders of students' self-set, aerobic fitness goals throughout physical education class increase the frequency of the desired achievement outcome.

Examining the self-set goals revealed that students, on average, desired to increase their laps by 6.75 in the experimental group and 6.40 in the control group. These mean scores were expected to be very similar since both groups went through the exact same goal setting orientation before creating their individual, self-set goals. This goal setting orientation taught students how to create proper goals according to the goal setting theory. Specifically, the orientation focused on setting goals that are both specific and difficult rather than vague and non-quantitative in order to optimize performance (Locke & Latham, 1990).

The outcome variable in the current study was whether or not students attained their self-set aerobic goal. We expected that 50% of students in the treatment and control group would attain their self-set aerobic goal at the post-test. Observed frequencies for the control group showed that nine participants met or surpassed their self-set aerobic fitness goal while seven participants did not, which was expected. Observed frequencies for the experimental group, however, showed that twelve participants met or surpassed their self-set aerobic fitness goal while only three participants did not. More students in the experimental group than expected attained their self-set goal and the chi-square test was statistically significant. Thus, there was a strong likelihood that the teacher-initiated reminders helped to increase the frequency of the desired achievement outcome. It is likely that teacher initiated reminders as a type of feedback are an effective way to keep students' self-set goals in constant focus in an effort to lead to increased attainment.

The results of this study also help to confirm the previous findings of Fredenburg, Lee, and Solomon (2001). In relation to a cup stacking task, they found that the three treatment groups that received various forms of feedback all increased their performance by a larger amount

from pre-treatment trials to post-treatment trials compared to the no feedback group. Fredenburg, Lee, and Solomon suggest in their discussion that feedback is an important tool to for physical educators to use in order to have students increase performance (2001). This conclusion is also further supported by the results of the current study.

Although more students in the experimental group attained their goal than expected, it should be noted that both the experimental and control groups increased their mean lap scores from PACER pre-test to PACER post-test. This increase in the mean lap scores for both groups was expected since the participants in both groups were participating in the same moderate to vigorous physical activities during the four week period within physical education class in between the pre-test and post-test. Participation in such moderate to vigorous physical activities on a daily basis can help to increase fitness levels (PE4Life, 2007), which helps to explain these results.

The heart rate data gathered during the four week period between the PACER pre-test and PACER post-test also provided important information. The average amount of time spent in, above and below the target heart rate zone of the participants was approximately equal in both groups. This finding helps to ensure that participants in both testing groups participated in the same exact activities each day in physical education class and the average intensity at which the students participated in the physical activities was roughly the same as well. This was important given the range of lap scores on the PACER pre-test and the PACER post-test showed a span of fitness levels. Therefore, intensity can be eliminated as a confounding variable based upon the heart rate data, increasing the strength of the results regarding the effectiveness of the teacher-initiated reminders.

CONCLUSIONS

The results of this study also help to solidify the effect that goal attainment has on many psychosocial factors. In physical education, the holistic approach has become very popular and makes the case that the physical education teacher is responsible for educating the *whole* child across all 3 domains (psychomotor, cognitive, and affective), not just focusing on one or another. These positive psychosocial effects that goal attainment can have on students within physical education address the affective domain within the discipline. According to Sheldon and Kasser (as cited in Sheldon, Kasser, Smith, & Share, 2002), goal attainment can have a positive influence on individuals' self-confidence, open-mindedness, vitality and current mood. By providing reminders of the students' goals, teachers are helping to keep this goal in focus while increasing the students' chances of goal attainment and consequently, aiding students in their ability to improve upon the aforementioned psychosocial factors.

Although the external validity of this study is somewhat questionable due to the small sample size of the participants, the findings can offer important insight to physical education teachers. According to Weinberg (1994), the occurrence of goal setting in sport and exercise settings is increasing in number, including physical education. Even though goal setting is becoming increasingly used by physical education teachers, there is no guarantee that they are working towards best practice in the field. In other words, teachers may not be following the tenets of goal setting theory. The findings of this study, which stress the importance of keeping goals in constant focus through feedback to help increase attainment, can serve to help physical educators use an effective method of goal setting to increase the success of their students.

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