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Does Physical Activity During School Relate to Classroom Behavior in Elementary School  
Children?

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## Abstract

The question as to whether physical activity during the school day relates to school achievement measures is timely and important. America's public school systems are currently battling health and obesity issues, which may be partially addressed by increased physical activity. Different states have looked at a number of different avenues for change such as cafeteria offerings, physical education (PE) classes, and the removal of vending machines. Kentucky's legislature has recently enacted an option for addressing physical activity during the school day, and according to the CDC moderate rates of physical activity are recommended for all ages. Not only has physical education been found to help control weight loss, children are also able to become more focused and as a result have less behavioral problems during the school day due to even small amounts of activity (Evans, 1981). The current study examined whether there was a relationship between participation in weekly physical activity in third graders from at risk schools during the school day and classroom referrals for behavioral problems. Behavior was also assessed by teacher ratings of behavior. Results from this study found a negative relationship between student behavior and physical activity. As total amount of physical activity increased, behavioral referrals decreased and teacher ratings reflected more positive behavioral outcomes. These findings have implications for classroom participation in physical activity and academic achievement, as well as support for state legislature on the implementation of physical activity.

## Does Physical Activity During School Relate to Classroom Behavior in Elementary School Children?

When studying behavior and classroom functioning, a range of variables must be taken into consideration. Past research has investigated a number of these variables such as attention, engagement, behavioral referrals and academic achievement. Researchers have also looked at variables such as achievement in general and factors that may mitigate or increase student achievement and motivation. The current study examines the relationship between physical activity and behavior, based on the supporting literature that behavior is related to increased academic achievement.

Classroom behavior and achievement outcomes have been shown to be strongly related (Finn, Pannozzo, & Voelkl, 1995; Truesdell & Abramson, 1992; Rock, 2005). Akey (2006) found that students' positive attitudes and behavior play a critical role in academic improvement, specifically in high-risk populations. Additionally, Pannozzo et al. (1995) found academic achievement to be strongly related to student attentiveness and behavior in the classroom. It seems that the better the atmosphere is within the classroom, and the more attentive the students are, the more likely it is for students to attain higher achievement outcomes. An additional study by Truesdell and Abramson (1992) examined the relationship between classroom behaviors and end of the year grades with a special focus on children with disabilities. Their study reported that written work and reading scores were higher for those students who had fewer overall behavior problems during class. Similarly, Rock (2005) examined students' engaged academic behavior in classrooms and found that high-achieving students were academically engaged 75% of the time, compared to 51% for low-achieving students. The longer students remain disengaged from tasks, the more likely it is that their academic performance will suffer.

There has also been significant support for the relationship between attention and behavior in the classroom (Wineberg, 1988; Harris, Friedlander, Saddler, Frizzelle, & Graham, 2005; Miller, Koplewicz & Klein, 1997). Harris et al. (2005) observed attention and performance monitoring in on-task behavior and spelling in elementary students with attention-deficit/hyperactivity disorder (ADHD) in relation to classroom behaviors. Both self-monitoring of attention and self-monitoring of performance had positive effects on students' on-task and spelling behaviors, and when on-task behaviors increased, spelling scores increased as well. Wineberg (1988) also examined the relationship between attention and on task behavior and reported that fifth-grade children with no diagnosable attention problems displayed more “on task” behavior when they were able to engage in physical activity during the school day. In fact, even small doses of physical activity have been shown to be positively related to desired classroom behaviors such as motivation and attention (Tkachuk & Martin, 1999).

Physical activity has further been shown not only to alleviate many kinds of psychological illnesses, but also to augment general feelings of well-being (Tkachuk & Martin, 1999). Many studies focusing on behavioral referrals have linked referrals to a lack of self-regulation in the form of and impulsive behavior and a lack of self-control. Literature that supports the idea that physical activity may lesson problems of impulsive behavior in the classroom comes in large part from the study of children with ADHD as these children show high rates of impulsive behavior. Baker (2005) reported that fifth grade children with ADHD who were given activity breaks demonstrated improvement in achievement and engaged in fewer disruptive behaviors.

Also related to behavior is motivation. Data suggests that physical activity is associated with mastery behaviors and positive motivational responses such as persistence and effort in

elementary school students (Xiang, Bruene, & McBride, 2004). Taken as a whole there is clear support for the idea that physical activity may have a positive impact on behavior, which, in turn, has a positive impact on academic achievement. The current study directly links increased physical activity to improved classroom behavior, which has been solidly linked to increased achievement. If it is the case that schools can increase academic achievement by increasing the time students spend engaged in physical activities, then school policy on PE and the inclusion of physical activity must change.

This study is particularly timely because of new legislature that continues to emerge in the U.S. concerning children's opportunities for physical activity. In Kentucky, Statute KRS 156.160, formerly known as Bill 172, permits physical activity to be considered as part of the instructional day; however, it may not exceed thirty minutes per day, or one hundred and fifty minutes per week. If the hypothesis of the current study is proven true, the implications will be broad because there will be evidence that suggests the importance of physical activity in the classroom as it relates to not only student health but also behavior and achievement. If behavioral referrals in the classroom decrease as the amount of physical activity increases, there is certainly a need for change in the current curriculum standards.

Currently the Kentucky statute is optional however this study provides evidence for making this legislature mandatory. Behavioral referrals disrupt the entire classroom and pull the attention of students away from instruction. Previously discussed studies have demonstrated how important attention regulation and motivation are to achievement, and that these factors are likely related to and improved by physical activity throughout the day. The current study is interested in behavioral problems in the classroom as this has been clearly shown to be associated with poor achievement as well as a trajectory of lowered academic achievement

(Akey, 2006). An early study by Evans (1981), focused on emotionally handicapped adolescents, examined how exercise related to students' behavior using a number of scales related to behavioral referrals. The investigator measured the number of "talk outs" occurring per class session, teacher ratings, dean's reports, and the number of completed written assignments. Results showed a significant decrease in negative behaviors for those students in the exercise condition versus the students who implemented no exercise (Evans, 1981).

Considerable support has also emerged for the idea that exercise enhances perceived competence and self-esteem, specifically in elementary-aged students (Xiang, 2004; Sachs & Buffone, 1997; Parish & Treasure, 2003); and these factors are, in turn, related to positive classroom behaviors and positive school outcomes. A study by Kirkcaldy, Shephard & Siefen (2002) studied the regular practice of endurance exercise and found that it was related to a more favorable self-image. Additionally, there has been research to suggest that as little as ten minutes of physical activity per day is sufficient to obtain the mood-elevating effects of exercise (Doucette, 2004), and physical activity was further significantly related to scores for physical and psychological well-being. It is probable that by promoting physical fitness, increased physical performance, lessening body mass and promoting a more favorable body shape and structure, exercise will provide more positive social interaction which leads to improvement in an individual's self-image, and subsequently to increased academic achievement (Kirkcaldy, Shephard & Siefen, 2002).

A recent study by Xiang, Solomon, and McBride (2006) explored teachers' and students' conceptions of ability in physical education. Fourth grade students were asked in the fall and later in the spring of the same school year to indicate their thoughts and conceptions of their own abilities as well as their perceptions on physical activity. Results showed that physical activity

was related to more motivation, not only toward achievement in physical education, but also toward their own educational, achievement goals and overall motivation in school. Again it has also been shown that even small doses of physical activity are positively related to desired classroom behaviors such as motivation and attention, so there is no issue of practicality of implementation (Tkachuk & Martin, 1999).

Better classroom behavior has been linked to higher achievement, thus, if physical activity is correlated with better classroom behavior, it is also inherently tied to achievement (Way, 2003). Physical activity has been shown to be negatively related to negative classroom behaviors, which supports the idea that physical activity and achievement are related. The assumption that more hours of teaching leads to better test scores is now mitigated by the possibility that physical activity leads to better behavior, which in turn leads to more desirable achievement outcomes.

## Methods

### *Participants*

The target population in this study was children in 3<sup>rd</sup> grade classrooms from schools designated as high risk for low academic achievement based on economic factors. Information about these children was obtained from teacher reports and from school records. Participants in this study were 3<sup>rd</sup> grade elementary school teachers from eighteen classrooms. These classrooms were selected from a list of high risk schools with no provision for Physical Education classes.

### *Procedure*

Following IRB approval, principals were contacted and asked if their school would be willing to participate in the current study. Upon agreement, teachers were contacted and given an overview of the study and invited to participate. Participation involved completing a short questionnaire to

provide an overall classroom behavior rating, and also a tally of the behavioral referrals from the 2006-2007 school year.

### *Behavioral Assessments*

**Classroom Assessments of Behavior.** A questionnaire was developed to assess overall impulsive behavior in the classroom. The first part of this assessment was an adaptation of the hyperactivity scale from the BASC (Behavioral Assessment System for Children) and is shown in Appendix 1. The second part of this assessment was a general teacher rating of overall classroom engagement and the total number of referrals over the past school year.

**Physical Activities in Classroom.** Information concerning the amount of time spent in various types of activities, total amount of time doing physical activities, where the activity occurs (inside vs. outside) and time of day was also collected. This information is also shown in Appendix 1.

### *Referrals.*

Data on behavior was also gathered in the form of disciplinary referrals for students. Of a sample of eighty eight elementary schools (Grades K-5) with a total enrollment of 41,768 students, 14,213 in-school behavioral referrals were identified. As a result, .34 is the average for in-school behavioral referrals at the elementary school level.

### *Statistical Analyses*

Differences in behavior among students participating in various amounts of physical activity were compared using regression analyses. The teachers' overall rating of classroom behavior was investigated in relation to the total minutes of physical activity per week engaged in by the class. Also, investigated was the relationship between the classroom rate of referral and the total minutes of physical activity per week engaged in by the class.

Additional analyses were run to look at the effects of recess on behavior. Specifically, a t-test was used in order to compare classes who had recess and classes who did not in relation to the rate of behavioral referrals in these classrooms. Also, an additional t-test was performed in order to compare classes with and without recess in relation to teacher ratings of behavior on the BASC hyperactivity scale.

Lastly, the relationship between teacher ratings of behavior and number of classroom behavioral referrals was investigated using a regression analysis. All analyses were performed using SPSS.

## Results

### *Overview*

Data on physical activity and behavioral referrals were collected for 14 elementary school teachers, all of who instruct an average of 26 students. Physical activity was measured using teacher self report in the form of a questionnaire, as were behavioral referrals (see Appendix A).

The average number of minutes per week spent engaged in physical activity was 132 minutes with a standard deviation of 120.25 minutes. Further, as can be seen below, there was no clear distinction in the total amount of exercise between classrooms that did have recess versus classrooms that did not (see Table 1). The distribution of referrals for the 14 classroom cohort, shown below, showed a mean of 2.71 with a standard deviation of 1.68 (see Figure 1).

Additionally, the mean and standard deviation for the distribution of the 14 teachers overall rating of classroom behavior were 22.57 and 4.35 (see Figure 2).

Further, there was a general trend toward more negative behaviors (as rated by the teachers) as physical activity decreased. In general, teachers who reported incorporating less

physical activity into the school day also reported that each negative behavior (from the BASC hyperactivity scale) occurred more often (See Table 2).

### *Findings*

Regression analysis showed that teachers composite ratings of student behavior on the BASC scale were significantly correlated with the total amount of physical activity in the classroom, ( $p=.038$ ,  $r\text{-squared} = .24$ ). (See Figure 3).

Similarly, the relationship between the number of minutes spent engaged in physical activity and behavioral referrals was also shown to be significant ( $p = .031$ ,  $r\text{-squared} = .26$ ). (See Figure 4).

### *Additional Analyses*

Significant differences were also found in the number of referrals for classes with and without recess ( $p = .026$ ). Specifically, classes without recess (mean= 3.57,  $SD=1.512$ ) averaged approximately twice as many referrals as classes with recess (mean=1.86,  $SD= 1.46$ ). (See Table 3).

Conversely, no significant difference was found between classes who participated in recess and classes who did not in relation to the overall teacher rating of behavior ( $p = .093$ ), (see Table 4).

Importantly, our two measures of behavior (number of behavioral referrals and teacher rating on the BASC hyperactivity scale) did tend to fluctuate in relation to one another. The regression analysis below returned a statistically significant relationship ( $p = .043$ ,  $r\text{-squared} = .23$ ). (See Figure 5).

## Discussion

This study hypothesized that more participation in weekly physical activity during the school day, aside from participation in physical education classes, would lead to fewer referrals for behavioral problems and better overall classroom behavior among elementary school students. As hypothesized it was found that teacher ratings of behavior and the number of minutes spent engaged in physical activity were related, , as were physical activity and behavioral referrals. Additionally, the rate of behavioral referrals for those classrooms that participated in recess was significantly lower than for those classrooms that did not. Taken together these findings strongly support the hypothesis that physical activity during the school day may lead to better overall behavior in the classroom.

The relationship between the number of minutes spent exercising and the number of behavioral referrals shows that as the amount of physical activity increases the number of referrals or major disruptive behaviors decreases. Similarly, the relationship between teacher ratings of behavior and the number of minutes spent engaged in physical activity suggests that as physical activity increases during the school day, negative behaviors decrease. It seems that students who spend more time per week out from behind their desks are less disruptive when actual instructional time is occurring.

These measures of behavior are important not only because they are an indicator of classroom behavior as a whole, but also because they are related to student learning. Directly, if students are not present in class, because they have been referred to the office, the chance that they are learning the material goes down dramatically. Indirectly, behavioral disruptions break the flow of the lesson and take instructional time away from the entire class. It seems to follow

then that more time in the classroom may decrease direct instructional time due to increased behavioral interruptions. If these negative behaviors can be avoided by adding physical activity to the curriculum there are likely related positive outcomes for the overall classroom environment and, thus, student learning. Further, the total number of minutes spent engaged in physical activity per week was correlated with less screaming during the school day ( $p = .04$ ) and fewer loud noises ( $p = .02$ ). This finding alone seems to suggest that, at least for third graders, physical activity has important, desired effects on classroom behavior.

This discovery that physical activity seems to *facilitate* reaching learning objectives by decreasing negative behaviors has wide-ranging implications. Current teaching philosophies in the United States revolve around testing, and physical education is being left by the wayside more and more frequently. These findings, however, give us the chance to reconcile and integrate learning time and physical activity by no longer seeing them as mutually exclusive. Some amount of physical activity seems to make instructional time more effective by virtue of the fact that physical activity is important to classroom environment (behavior) and, thus, important in reaching learning objectives.

Notably, engagement in physical activity does not mean that children went outside or even left the classroom. Although we asked teachers how many minutes per week they spent in different activities (i.e. sit ups, running outside, walking inside, activity video, etc.) the number used in analyzing the data was the sum of the minutes in all of these activities. Teachers do not necessarily need access to a park or a playground, in fact, they do not even need to leave their classrooms in order to provide time for their students to engage in physical activity; and it seems, not only in the students, but also in the teacher's best interest to do so.

*Recess, Physical Activity, & Classroom Behavior*

Additional analyses supported the inclusion of recess, during the academic day. Many schools have, in addition to physical education, also phased out recess in support of increased instructional time. However, it seems that students are better able to self regulate when they are allowed some physical activity during the course of the day. In particular, overall classroom referrals were divided in half when students participated in recess. Of note is the finding that the time of day recess and/or physical activity occurred did not seem to affect the students' overall behavior. Thus, the simple inclusion of physical activity during the day seems to produce the desired behavioral effects independent of when this activity takes place.

According to teacher ratings the two behaviors most affected by the presence of recess were students' increased ability to wait to take turns ( $p = .01$ ), and abstaining from hurrying ( $p = .049$ ). In effect, students who had recess were generally more likely to wait to take their turn as well as hurry less. Again, this finding alone seems to suggest that physical activity has important, desired effects on third grade students' classroom behavior.

A significant difference was also found in the total amount of physical activity between two particular groups: those students who participated in recess and those who did not ( $p=.023$ ). This seems to suggest that there may be a compounding effect. It seems that children who had recess were also more likely to have a teacher who incorporated physical activity into the class day. Children who were getting more physical activity during the day may have been more likely to see a decrease in negative behavior because they were also more likely to have recess. Thus, when we compared the behavioral data to the number of minutes of physical activity (not including recess) we may also be seeing the joint effect of recess. However, this does not undermine the significance of our findings because both (recess and total minutes of physical activity) represent physical activity engaged in by the students.

### *General Engagement*

Also assessed by the teachers were engagement trends of the students at different times during the day. What was observed was that engagement continues downward over the course of the day independently of whether students exercise midmorning, midday or in the afternoon. Thus, physical activity does not seem to counterbalance the pervasive trend of decreasing engagement throughout the school day.

### *Implications*

Likely, the most important implication of our finding that physical activity was negatively related to negative classroom behaviors is the effect of physical activity on achievement. The assumption that more hours of teaching leads to better test scores is mitigated by the possibility that physical activity leads to better behavior, which in turn leads to better achievement. Better classroom behavior has been linked to higher achievement (Way, 2003; Finn, Pannozzo, & Voelkl, 1995; Truesdell & Abramson, 1992; Rock, 2005; Akey, 2006), thus, if physical activity is correlated with better classroom behavior, it is also inherently tied to achievement. Since physical activity seems to lead to better behavior and better behavior seems to lead to increased achievement, the current focus on testing can be *supported* by the inclusion of physical activity into the school day as opposed to removing it from the curriculum.

The loss of Physical Education classes in public schools coupled with rising obesity rates have also led to a push for increased awareness of children's physical fitness. It has been shown that increased physical activity helps in health and weight loss, and many of America's young children are affected by policy relating to public schools. It is clear that the current trend toward increased academics has not left public school settings very well-rounded. "The percent of school-age children 6 - 11 that are overweight more than doubled between the late 1970s and

2000, rising from 6.5% to 15.3%.” (Walk on Ohio County, 2007). Thus, two major positive outcomes seem to arise from the incorporation of physical activity into the school day, and there is a need to prove empirically the importance of physical activity in relation to testing and class performance, so that it does not become a non sequitur in the realm of academic life and related public policy.

Current legislature is leaning toward the introduction of school wellness policies to increase student health. A push for the exclusion of vending machines and the inclusion of healthier foods in the cafeteria are the first important steps currently underway. A few states at the forefront of this movement to implement physical activity have already enacted legislature to help address these problems. Kentucky’s Statute KRS 156.160, also known as Bill 172 permits physical activity to be considered as part of the instructional day; however, it may not exceed thirty minutes per day, or one hundred and fifty minutes per week. Similarly, New York has mandated 120 minutes of physical education per week for school children. Schools that offered at least the mandated 120 minutes of physical education per week had significantly lower rates of student obesity than schools that did not provide the required physical education, even after adjusting for differences in socioeconomic status.

A recent article quoted Wendy Wolfe, Cornell University's Nutritional Sciences expert, speaking about the Childhood Obesity Prevention Act, as saying, “Recent research suggests a correlation not only between physical activity and obesity but also between physical activity in children and improved learning.” (Anonymous, 2003). Several studies indicate that academic achievement improves even when increased time for physical education reduces the number of hours spent in direct instruction of materials (Somerset, 2007; Siegel, 2006; Sallis, McKenzie, Kolody, Lewis et al., 1999). Even the Centers for Disease Control and Prevention are

recommending daily physical education on a national basis, due to the plethora of research showing the obvious benefits.

### *Limitations*

A serious limitation to the statistical power of this study is the population sample size (n=14). Also, in relation to the questionnaire teachers may have included recess when reporting total number of minutes engaged in physical activity. Similarly, teachers were specifically asked for the number of minutes per week spent in each activity; however, there is some reason to believe that a few teachers may have reported the total number of *daily* minutes in each activity as opposed to a weekly total. Further, although part of the questionnaire was the BASC scale for hyperactivity, there is still an inherent problem due to the fact that teachers responses are highly individualized to both the individual questionnaire factors (i.e. bothers others when working, talks too loudly, etc.) and response (i.e. never, sometimes, often, almost always).

### *Clinical Implications*

The results of this study will contribute to the literature on physical activity as it relates to classroom behavior and academic achievement. Little attention has been paid to this particular area of research in regards to behavior. Although physical activity and academic achievement have been linked, this study suggests that behavior may be an intervening factor. If physical activity does decrease negative behavior in the classroom then there is good reason for teachers to ensure that their students get some sort of physical activity in their daily routine. Further, if children are more often and more strongly encouraged to become physically active then they are also less likely to be overweight, which is a current national initiative.

It is also worth noting that children who are in good health are less likely to suffer from depression, low self-esteem and other negative *mental* consequences of obesity and poor physical health.

## References

- Akey, T.M. (2006). School Context, Student Attitudes and Behavior, and Academic Achievement: An Exploratory Analysis. MDRC online publication.
- Anonymous. (2003). Preventing childhood obesity at school, at home, and in the community. *Human Ecology*, 31, 2, 23.
- Baker, Teresa C. (2005) The use of mini-exercise breaks in the classroom management of ADHD-type behaviors. Ph.D. dissertation, Capella University, United States -- Minnesota.
- California Department of Education. (2003). California Physical Fitness Testing: Report to the Government and Legislature. Retrieved 2007 April 4 from [www.cde.ca.gov/ta/tg/pf/documents/rptgov2002.pdf](http://www.cde.ca.gov/ta/tg/pf/documents/rptgov2002.pdf).
- Doucette, P.A. (2004). Walk and Talk: An Intervention for Behaviorally Challenged Youths. *Adolescence*, 39, 373-388.
- Evans, William H. (1981) The effects of exercise on selected classroom behaviors of emotionally handicapped adolescents. Ph.D. dissertation, University of Florida, United States -- Florida.
- Finn, J.D., Pannozzo, G.M., & Voelkl, K.E. (1995). Disruptive and inattentive- withdrawn behavior and achievement among fourth graders. *The Elementary School Journal*, 95, 5, 421- 434.
- Harris, K.R, Friedlander, B.D., Saddler, B., Frizzelle, R., & Graham, S. (2005). Self-Monitoring of Attention Versus Self-Monitoring of Academic Performance: Effects Among Students with ADHD in the General Education Classroom. *The Journal of Special Education*, 39(3), 145-156.
- Kirkcaldy, B.D, Shephard, R.J. & Siefen, R.G. (2002). The relationship between physical activity and self-image and problem behavior among adolescents. *Social Psychiatry and Psychiatric Epidemiology*, 37, 11, 544-
- Miller, L.S., Koplewicz, H.S., & Klein, R.G. (1997). Teacher ratings of hyperactivity, inattention, and conduct problems in preschoolers. *Journal of Abnormal Child Psychology*, 25, 2, 113- 120.
- Parish, Loraine E. & Treasure, Darren C. (2003). Physical activity and situational motivation in physical education: Influence of the motivational climate and perceived ability. *Research Quarterly for Exercise and Sport*, 74, 2, 173-182.

- Rock, M.L. (2005). Use of Strategic Self-Monitoring to Enhance Academic Engagement, Productivity, and Accuracy of Students With and Without Exceptionalities. *Journal of Positive Behavior Interventions*, 7,1, 3-17.
- Sachs M. L. & Buffone, G. W. (1997). *Running as Therapy: An integrated approach*. Lincoln, Neb: University of Nebraska Press.
- Sallis, James F., McKenzie, Thomas L., Kolody, Bohdan, Lewis, Michael, et al. (1999). Effects of health-related physical education on academic achievement: Project SPARK. *Research Quarterly for Exercise and Sport*, 70, 2, 127-134.
- Siegel, Donald. (2006). Physical Fitness and Academic Achievement. *Journal of Physical Education, Recreation & Dance*, 77, 2, 9.
- Somerset, Beth Sigman. (2007). Relating Physical Education and Activity Levels to Academic Achievement in Children. *Journal of Physical Education, Recreation & Dance*, 78, 1, 10.
- Tkachuk, Gregg A. & Martin, Gary L. 1999. Exercise therapy for patients with psychiatric disorders: Research and clinical implications. *Professional Psychology : Research and Practice*, 30, 3, 275-283.
- Truesdell, L.A., & Abramson, T. (1992). Academic Behavior and Grades of Mainstreamed Students with Mild Disabilities. *Exceptional Children*, 58, 5, 393-400.
- Walk on Ohio County. Statistics for Childhood Obesity. (2006). Retrieved 4 April 2007 from [www.ohio.k12.ky.us/Walk/statistics.htm](http://www.ohio.k12.ky.us/Walk/statistics.htm).
- Way, S.M. (2003). For their own good? The effects of school discipline and disorder on student behavior and academic achievement. Ed.D. dissertation, The University of Arizona, United States—Arizona.
- Wineberg, Mark Douglas (1988) The relationship between physical fitness development and on-task behavior in the fifth grade classroom. Ed.D. dissertation, University of Cincinnati, United States -- Ohio.
- Xiang, P., Bruene, A., & McBride, R.E. (2004) Using Achievement Goal Theory to Assess an Elementary Physical Education Running Program. *Journal of School Health*, 6, 220-225.
- Xiang, P., Solomon, M.A., & McBride, R.E. (2006). Teachers' and Students' Conceptions of Ability in Elementary Physical Education. *Research Quarterly for Exercise and Sport*, 77, 2-10.

Table 1: 3<sup>rd</sup> Grade Teacher Questionnaire

Students in my class commonly:

|     |                                                          |       |           |       |
|-----|----------------------------------------------------------|-------|-----------|-------|
| 1.  | Bother others when they are working<br>Almost Always     | Often | Sometimes | Never |
| 2.  | Call out in class<br>Almost Always                       | Often | Sometimes | Never |
| 3.  | Cannot wait to take turn<br>Almost Always                | Often | Sometimes | Never |
| 4.  | Scream<br>Almost Always                                  | Often | Sometimes | Never |
| 5.  | Seek attention while doing schoolwork<br>Almost Always   | Often | Sometimes | Never |
| 6.  | Interrupt others when they are speaking<br>Almost Always | Often | Sometimes | Never |
| 7.  | Hurry through assignments<br>Almost Always               | Often | Sometimes | Never |
| 8.  | Make loud noises when playing<br>Almost Always           | Often | Sometimes | Never |
| 9.  | Tap foot or pencil<br>Almost Always                      | Often | Sometimes | Never |
| 10. | Talk too loudly<br>Almost Always                         | Often | Sometimes | Never |

Please rate the behavior of your class as a whole at the following times, with 1 being not at all engaged and 7 being highly engaged. (By *engaged* here we mean that the students' attention and efforts are focused on the lesson.)

|                     |   |          |   |        |   |   |   |
|---------------------|---|----------|---|--------|---|---|---|
| A) Morning (8-10)   | 1 | 2        | 3 | 4      | 5 | 6 | 7 |
|                     |   | somewhat |   | mostly |   |   |   |
| B) Midday (10-12)   | 1 | 2        | 3 | 4      | 5 | 6 | 7 |
|                     |   | somewhat |   | mostly |   |   |   |
| C) Afternoon (12-3) | 1 | 2        | 3 | 4      | 5 | 6 | 7 |
|                     |   | somewhat |   | mostly |   |   |   |

If your class does engage in physical activity, please circle which option best estimates the time of this activity.

- 9:00 AM                      12:00 PM
- 10:00 AM                    1:00 PM
- 11:00 AM                    2:00 PM

Does your class participate in recess?

- Yes                                      No

How many minutes on average per week, does your class engage in the following physical activities during the school day:

- Walk inside \_\_\_\_\_
- Walk outside \_\_\_\_\_
- Stretch at their desk \_\_\_\_\_
- Do sit ups/push ups \_\_\_\_\_
- Run inside \_\_\_\_\_
- Run outside \_\_\_\_\_
- Watch an activity video \_\_\_\_\_
- Other: \_\_\_\_\_ (please list) \_\_\_\_\_

Total Behavioral Referrals for 2006/2007 school year: \_\_\_\_\_

Table 1

Total amount of physical activity and participation in recess

| Teacher ID | Physical Activity Total | Recess |
|------------|-------------------------|--------|
| 6          | 450                     | Y      |
| 9          | 335                     | Y      |
| 8          | 165                     | Y      |
| 4          | 145                     | N      |
| 14         | 120                     | N      |
| 5          | 110                     | Y      |
| 2          | 110                     | Y      |
| 7          | 100                     | Y      |
| 1          | 95                      | N      |
| 10         | 65                      | Y      |
| 3          | 60                      | N      |
| 11         | 30                      | N      |
| 12         | 30                      | N      |
| 13         | 30                      | N      |

Table 2

Physical activity totals and individual ratings on the BASC scale by teacher

| Physical Activity Total | Bother Others when they are working | Callout in class | Cannot wait to take turn | Scream | Seek Attention while doing schoolwork | Interrupt others when they are speaking | Hurry through assignments | Make Loud Noises when playing | Tap foot or pencil | Talk too loudly |
|-------------------------|-------------------------------------|------------------|--------------------------|--------|---------------------------------------|-----------------------------------------|---------------------------|-------------------------------|--------------------|-----------------|
| 450                     | 2                                   | 2                | 2                        | 1      | 2                                     | 2                                       | 2                         | 2                             | 2                  | 2               |
| 335                     | 2                                   | 2                | 2                        | 1      | 2                                     | 2                                       | 2                         | 1                             | 2                  | 2               |
| 165                     | 2                                   | 2                | 2                        | 1      | 2                                     | 2                                       | 2                         | 2                             | 2                  | 2               |
| 145                     | 2                                   | 2                | 3                        | 2      | 2                                     | 3                                       | 3                         | 2                             | 3                  | 3               |
| 120                     | 2                                   | 2                | 2                        | 1      | 2                                     | 2                                       | 3                         | 2                             | 3                  | 2               |
| 110                     | 2                                   | 3                | 2                        | 2      | 2                                     | 2                                       | 2                         | 3                             | 2                  | 2               |
| 110                     | 2                                   | 2                | 2                        | 1      | 2                                     | 2                                       | 2                         | 2                             | 2                  | 2               |
| 100                     | 3                                   | 4                | 2                        | 2      | 2                                     | 4                                       | 4                         | 4                             | 3                  | 3               |
| 95                      | 2                                   | 3                | 2                        | 2      | 2                                     | 2                                       | 2                         | 2                             | 2                  | 2               |
| 65                      | 2                                   | 2                | 2                        | 1      | 2                                     | 2                                       | 2                         | 2                             | 2                  | 2               |
| 60                      | 2                                   | 2                | 2                        | 1      | 2                                     | 1                                       | 3                         | 2                             | 2                  | 2               |
| 30                      | 3                                   | 2                | 4                        | 2      | 3                                     | 3                                       | 3                         | 4                             | 2                  | 2               |
| 30                      | 2                                   | 2                | 4                        | 2      | 3                                     | 2                                       | 3                         | 4                             | 3                  | 3               |
| 30                      | 3                                   | 2                | 4                        | 2      | 2                                     | 2                                       | 3                         | 4                             | 2                  | 3               |

Table 3  
 Comparison of Referrals and Recess

|           | Recess | N | Mean | Std. Deviation | Std. Error Mean |
|-----------|--------|---|------|----------------|-----------------|
| Referrals | No     | 7 | 3.57 | 1.512          | .571            |
|           | Yes    | 7 | 1.86 | 1.464          | .553            |

|           |                             | Levene's Test for Equality of Variances |       | t-test for Equality of Means |        |                 |                 |                       |                                           |       |
|-----------|-----------------------------|-----------------------------------------|-------|------------------------------|--------|-----------------|-----------------|-----------------------|-------------------------------------------|-------|
|           |                             | F                                       | Sig.  | t                            | df     | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |       |
|           |                             | Lower                                   | Upper | Lower                        | Upper  | Lower           | Upper           | Lower                 | Upper                                     | Lower |
| Referrals | Equal variances assumed     | .137                                    | .718  | 2.155                        | 12     | .052            | 1.714           | .795                  | -.019                                     | 3.447 |
|           | Equal variances not assumed |                                         |       | 2.155                        | 11.988 | .052            | 1.714           | .795                  | -.019                                     | 3.448 |

Table 4

Comparison of recess and composite teacher rating

|          | Recess | N | Mean    | Std. Deviation | Std. Error Mean |
|----------|--------|---|---------|----------------|-----------------|
| BASC Sum | No     | 7 | 24.1429 | 3.76070        | 1.42141         |
|          | Yes    | 7 | 21.0000 | 4.58258        | 1.73205         |

|          |                             | Levene's Test for Equality of Variances |       | t-test for Equality of Means |        |                 |         |                 |         |                       |         |                                           |       |
|----------|-----------------------------|-----------------------------------------|-------|------------------------------|--------|-----------------|---------|-----------------|---------|-----------------------|---------|-------------------------------------------|-------|
|          |                             | F                                       |       | t                            |        | Sig. (2-tailed) |         | Mean Difference |         | Std. Error Difference |         | 95% Confidence Interval of the Difference |       |
|          |                             | Lower                                   | Upper | Lower                        | Upper  | Lower           | Upper   | Lower           | Upper   | Lower                 | Upper   | Lower                                     | Upper |
| BASC Sum | Equal variances assumed     | .009                                    | .924  | 1.403                        | 12     | .186            | 3.14286 | 2.24063         | 1.73905 | -                     | 8.02476 |                                           |       |
|          | Equal variances not assumed |                                         |       | 1.403                        | 11.560 | .187            | 3.14286 | 2.24063         | 1.75974 | -                     | 8.04546 |                                           |       |

Figure 1. Distribution of referrals.

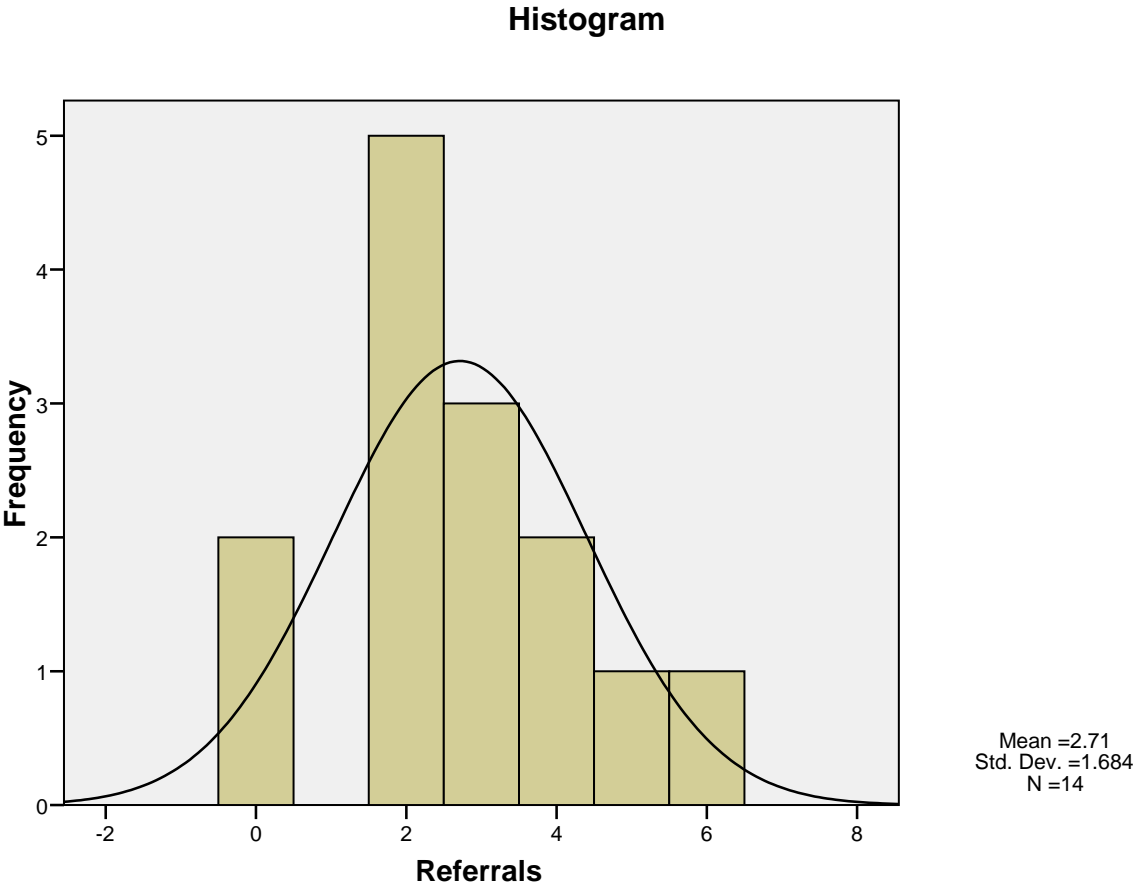


Figure 2. Distribution of BASC composite scores.

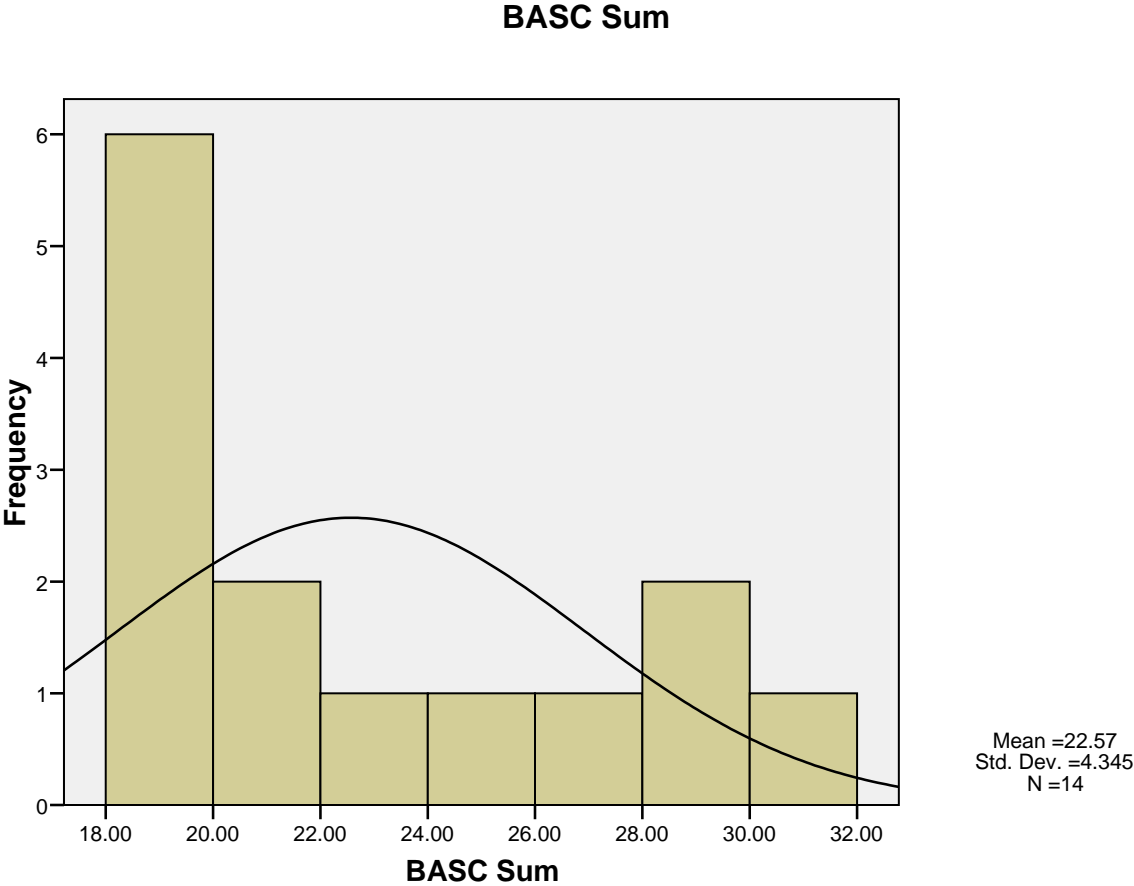


Figure 3. Regression showing BASC composite scores in relation to total physical activity.

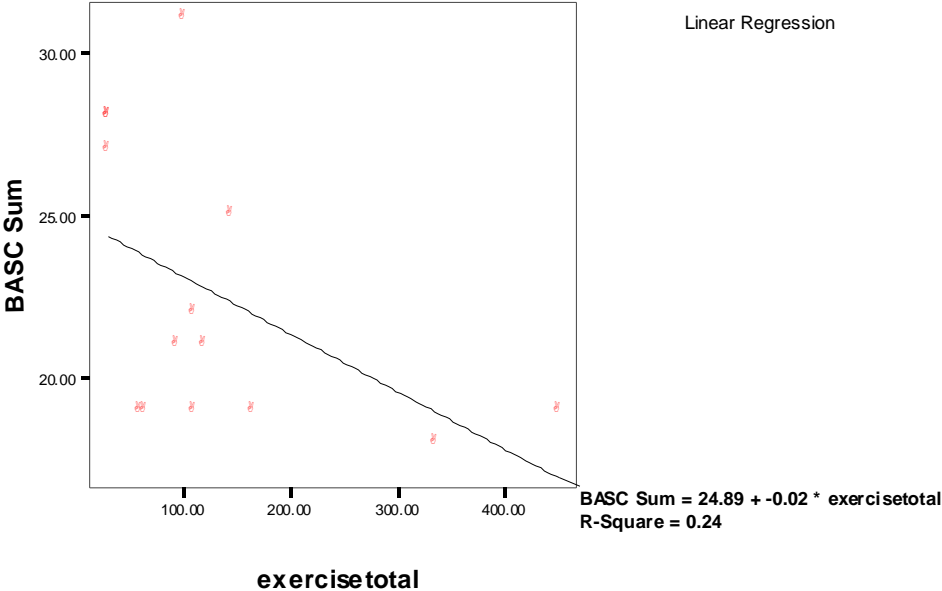


Figure 4. Regression showing rate of referrals in relation to total amount of physical activity.

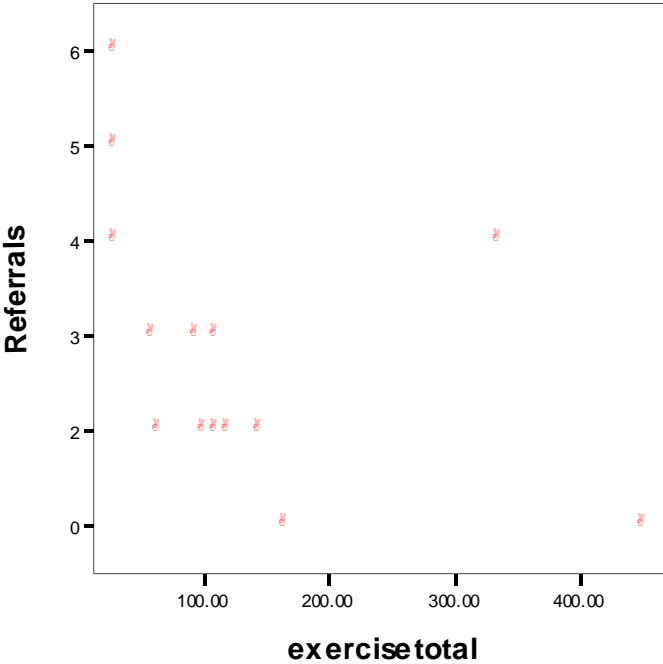


Figure 5. Regression showing rate of referrals in relation to BASC composite scores.

