

8-2000

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Publication Info

Published in *Pediatric Exercise Science*, Volume 12, Issue 3, 2000, pages 293-299.

Trost, S. G., Morgan, A. M., Saunders, R., Felton, G., Ward, D. S., & Pate, R. R. (2000). Children's understanding of the concept of physical activity. *Pediatric Exercise Science*, 12(3), 293-299.

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Children's Understanding of the Concept of Physical Activity

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This study evaluated 4th-grade students' understanding of the concept of physical activity and assessed the effects of two interventions to enhance the students' understanding of this concept. Students were randomly assigned to 1 of 3 conditions: the video group ($n = 40$) watched a 5-min video describing physical activity; the verbal group ($n = 42$) listened to a generic description of physical activity; the control group received no instruction ($n = 45$). Students completed a 17-item checklist testing their understanding of the concept of physical activity. Compared to controls, students in the verbal and video group demonstrated significantly higher checklist scores, with the video group scoring significantly higher than the verbal group. Only 35.6% of the controls, compared to 52.4% and 70.0% of the verbal and video groups respectively, could classify ≥ 15 of the checklist items correctly. The results indicate that, without intervention, children have a limited understanding of the concept of physical activity.

Promotion of lifelong physical activity among children and adolescents has become a priority area for public health authorities (2, 9, 10). Accordingly, there is a need for precise, well-validated measures of youth physical activity (10, 15). To date, a wide range of methods have been used to quantify physical activity behavior in children and adolescents. These include self-report questionnaires, direct observation, heart rate monitoring, motion sensors, and doubly labeled water (5). However, due to their low cost and ease of administration, self-report questionnaires are the most commonly used method for assessing physical activity behavior in population-based research (5, 16).

While less burdensome than objective measures, assessing physical activity behavior via self-report is recognized to be more difficult for children than adults (13). In addition to problems associated with recall limitations and social desir-

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ability (12, 13, 16), it is unclear whether young children fully understand the concept of physical activity. In the research literature, the term *physical activity* is operationally defined as any bodily movement produced by skeletal muscle that results in energy expenditure (8). However, because of the prominent role of individual fitness activities and organized sports in schools, homes, and the mass media, it is conceivable that many children associate the term physical activity with participation in organized sports such as soccer and basketball and/or fitness activities such as calisthenics, weight training, and aerobic dance (6, 7). Consequently, when children are asked to recall their past physical activity behavior or respond to items questioning their attitudes and beliefs about physical activity, it is possible that potentially important sources of physical activity such as playing active games, walking to school, and household chores are not taken into account. In addition, because many youngsters may not adequately understand the concept of physical activity, sedentary activities such as playing video games and working on a computer may erroneously be considered to be physical activity.

Despite the seriousness of such errors, the extent to which young children understand the concept of physical activity has not been previously examined. Furthermore, it remains unclear whether simple interventions such as verbal explanations of physical activity or more elaborate measures such as instructional videotapes depicting physical activity are effective in enhancing children's understanding of the concept of physical activity. Hence, the aims of this study were to: (a) evaluate the completeness of fourth-grade students understanding of the concept of physical activity; and (b) assess the effects of two interventions designed to enhance the students' understanding of the concept of physical activity.

Methods

Subjects

The study group consisted of 127 fourth-grade students from two elementary schools in rural South Carolina. The sample was 45% female and 40% African-American. Prior to participation in the study, written informed consent was obtained from each participant and his or her primary guardian. Protocol requirements established by the University of South Carolina School of Public Health Ethics Committee were satisfied prior to data collection.

Experimental Design

Participants were randomly assigned to one of three experimental conditions: a video group ($n = 40$), a verbal group ($n = 42$), and a control group ($n = 45$). Students in the video group watched a 5-min instructional video showing various forms of physical activity including competitive sports (basketball, football, baseball, volleyball), fitness activities (jogging, cycling), fun activities (skateboarding, playing in the playground, dancing), transportation activities (walking and riding a bike to school), and household chores (vacuuming, mowing the lawn, raking leaves). The video did not provide examples of sedentary activities. Students in the verbal group were read the following description of physical activity: "Physical activity is any play, game or sport that gets you moving, breathing faster, and your heart beating faster." While such an abbreviated description has obvious shortcomings, it was chosen because it approximates the description of physical activity appearing on

most questionnaires used with children and adolescents (4, 17–19). Students in the control group received no instruction as to the definition of physical activity. This experimental condition was included to: (a) provide a means of assessing the relative efficacy of the video and verbal interventions, and (b) explore children's "natural" level of understanding of the concept of physical activity.

Physical Activity Checklist

Following each treatment, students completed a physical activity checklist that asked them to classify 17 commonly performed activities as physical activity or not physical activity. Scores were expressed as the total number of correct responses. All treatments and checklists were administered by the same research assistant. The physical activity checklist and descriptive statistics for each item are shown in Table 1.

Development of the Physical Activity Checklist

Items appearing on the checklist were generated from a qualitative pilot study in which 25 fourth-grade children were asked to write down what they thought was physical activity and what was not physical activity. From these written responses, a preliminary checklist consisting of 28 activities was constructed and administered to an independent sample of 205 demographically similar students. Following the calculation of descriptive statistics for each item and assessment of item to total score correlations, the number of items on the checklist was reduced from

Table 1 Descriptive Data for Items Appearing on the Physical Activity Checklist

Item	Correct response	Percentage of correct responses		
		Control	Verbal	Video
Walking to school is physical activity.	Yes	86.7	73.8	100
Riding the school bus is physical activity.	No	86.7	100	100
Running around the yard is physical activity.	Yes	97.8	100	97.5
Reading a book is physical activity.	No	62.2	97.6	82.5
Raking the leaves is physical activity.	Yes	84.4	71.4	100
Working on the computer is physical activity.	No	62.3	97.6	74.4
Baseball is physical activity.	Yes	100	97.6	100
Sitting in class is physical activity.	No	88.9	100	97.5
Cleaning my room is physical activity.	Yes	71.1	69.1	97.5
Singing a song is physical activity.	No	62.2	97.6	79.5
Playing video games is physical activity.	No	66.7	85.2	77.5
Vacuuming the carpet is physical activity.	Yes	68.9	45.2	92.5
Doing homework is physical activity.	No	64.4	85.7	74.9
Climbing trees is physical activity.	Yes	93.3	85.7	97.5
Doing household chores is physical activity.	Yes	80.0	73.8	97.5
Eating dinner is physical activity.	No	68.9	95.2	71.8
Sweeping the floor is physical activity.	Yes	71.1	52.4	92.5

28 to 17. Eight of the 17 items included on the checklist were sedentary activities as defined by the Compendium of Physical Activities (1). For the present study, the internal consistency of the Physical Activity Checklist as measured by Cronbach's alpha was 0.84.

Statistical Analysis

Differences in the number of correct responses on the physical activity checklist across the three treatment conditions were tested using a one-way ANOVA. Upon a significant *F*-ratio, a Student-Newman-Keuls multiple range test was used to determine the location of significant pairwise differences. In addition, the percentage of students in the control, verbal, and video groups with ≤ 10 correct responses, 11 to 14 correct responses, and ≥ 15 correct responses were compared using a chi-square test. Statistical significance for this study was set at an alpha of 0.05.

Results

On average, students in the video group (15.3 ± 1.6) classified significantly more checklist items correctly than those in the verbal (14.4 ± 2.3) and control groups (13.1 ± 2.9). Checklist scores for the control group were significantly lower than either the video and verbal groups. The percentage of students in each group with ≤ 10 correct responses, 11 to 14 correct responses, and ≥ 15 correct responses on the checklist is shown in Figure 1. Students in the video group were significantly more likely than students in the verbal or control groups to score ≥ 15 on the checklist. Conversely, students in the control group were significantly more likely than students in the video or verbal groups to score ≤ 10 on the checklist. In fact, no students in the video group scored ≤ 10 on the checklist.

Discussion

Presently, the cognitive processes underlying the recall of past physical activity behavior in children and adolescents remain poorly understood (4, 11). A key issue which remains inadequately explored is whether or not elementary school-aged children adequately understand the concept of physical activity (6, 7). That is, in addition to traditional sports and recreational activities, do young children think of walking or bicycling to school and household chores such as sweeping the floor as physical activity? Our findings suggest that, without prior intervention, fourth-grade students demonstrate a limited understanding of the concept of physical activity as currently defined by researchers and health practitioners. On average, students who received no instruction as to the definition of physical activity were able to correctly classify approximately 13 of the 17 items appearing on the physical activity checklist, which was significantly lower than students receiving either the video or verbal interventions. Moreover, only 35.6% of the students in the control group, compared to 52.4% and 70.0% of the students in the verbal and video groups, were able to classify 15 or more of the checklist items correctly. Of note, 37.8% of the children in the control group indicated that working on the computer was physical activity, while approximately 30% thought sweeping the floor was not physical activity. For those receiving the verbal explanation, just over 30% thought sitting in class was physical activity, while more than 50% thought

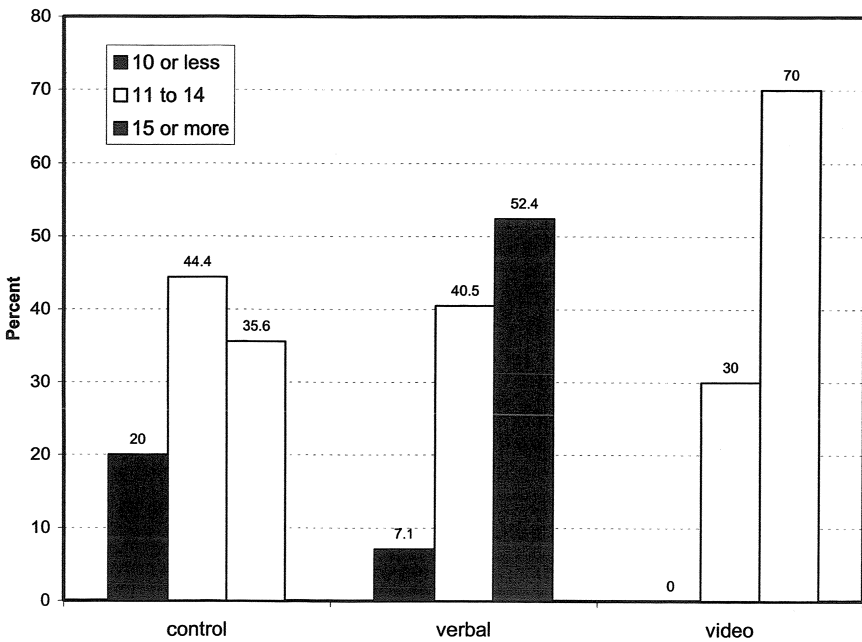


Figure 1 — The percentage of students in each group with ≤ 10 correct responses, 11 to 14 correct responses, and ≥ 15 correct responses on the physical activity checklist ($\chi^2 = 10.07$, 2 *df*, $p < .01$).

vacuuming the carpet was not physical activity. Clearly, such errors pose a threat to validity in studies assessing energy expenditure and/or the personal, social, and environmental factors associated with participation in physical activity.

A key question in this study was whether or not interventions designed to enhance children's understanding of the term physical activity were effective. Our results indicate that both the generic verbal description and instructional video were effective in helping students understand the meaning of physical activity, with the instructional video being more effective than the verbal description. This finding has important implications for physical activity-related research involving elementary school-aged children. When quantifying individual physical activity behavior, or alternatively, assessing the personal, social, and environmental factors associated with participation in physical activity, it is important that the concept of physical activity be adequately defined for students. While our data confirm that a very brief verbal description will help youngsters understand the concept of physical activity, a more specific, visually oriented presentation such as an instructional video appears to be more effective at helping students understand the broad concept of physical activity.

This study had several limitations that warrant consideration. First, because of the small sample size, we were unable to examine racial/ethnic or gender differences in physical activity checklist scores. Second, because the verbal and video interventions differed greatly in "prep time" and level specificity, we were unable to determine whether differences in the medium alone accounted for the observed

differences between the intervention groups. Yet, within these limitations, our results provide important information as to children's understanding of the term physical activity. Our findings may have particular significance to researchers and practitioners wishing to promote physical activity in young children via mass-media campaigns (e.g., television and radio advertisements).

In conclusion, the results of this study suggest that fourth-grade students demonstrate a limited understanding of the concept of physical activity. Simple interventions such as showing a 5-min video depicting different forms of physical activity appear to be effective in helping students understand the concept of physical activity. Future studies should examine the efficacy of longer, more detailed verbal descriptions that include group discussions about the term physical activity, as well as explore potentially important gender and race/ethnicity differences in children's understanding of the concept of physical activity.

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Acknowledgements

This research was funded by the National Institutes of Health RO1 NR 03634-01.