

Chapter 3: The Relationship of Physical Fitness and Motor Competence to Physical Activity

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According to social cognitive theory, self-efficacy influences individual behaviors, such as physical activity engagement patterns (Bandura, 1977), and as a result influences the physical and cognitive benefits that are outcomes from engagement (Strong et al., 2005; U.S. Department of Health and Human Services [USDHHS], 1996; 2000). Children with higher self-efficacy are more likely to participate in physical activity than those with lower self-efficacy (Chase, 2001). For example, if an individual believes that he or she can successfully complete a motor task, such as a basketball dribble, that individual will be more likely to continue participating in that activity. This is important because patterns of regular participation in physical activity during childhood track into adulthood (National Association for Sport and Physical Education [NASPE], 2004).

Bandura's social cognitive theory has been consistently applied to the study of physical activity variables because it accounts for the interplay among environmental, personal, and behavioral factors (Bandura, 1977, 1997). Specifically, social cognitive variables such as self-efficacy and perceived motor competence can significantly predict physical activity participation (Dzewaltowski, Noble, & Shaw, 1990; Sallis, Prochaska, & Taylor, 2000).

A fundamental source of self-efficacy is performance accomplishment, or the gathering of information from various mastery experiences. For example, in the educational context, when students successfully achieve one or more of the NASPE physical education learning standards (2004), they are gathering positive information about their performance. As a result, they are likely to develop higher levels of self-efficacy and elect to continue participating in physical activity. In contrast, when students make inadequate progress toward one or more of the standards, they receive negative information about their performance. These individuals are likely to have lower levels of self-efficacy and to participate to a lesser extent than those who were successful.

The purpose of this study was to examine the influence of physical fitness, motor competence, gender, age, and ethnicity on physical activity engagement during the summer months with children enrolled in a community-based physical

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activity program. Specifically, this chapter examines the effects of physical fitness and motor competency on levels of physical activity in children from 16 school districts in the Midwest. Application of social cognitive theory enables researchers to investigate the link between psychomotor achievement and physical activity participation patterns in children.

Children's levels of physical activity engagement vary greatly. Although one investigation (Trost et al., 2002) found that children exceed the minimum standard of 60 min on most days of the week, another publication estimated that nearly half of young people are not vigorously active on a regular basis (USDHHS, 2000). These reported differences in activity levels can be based on demographics as well as enabling, reinforcing, and predisposing factors (Welk, 1999). Although such characteristics as gender, age, and ethnicity play a role in determining children's physical activity participation patterns (Corbin, Pangrazi, & Le Masurier, 2004; Grunbaum et al., 2004), there also are modifiable factors that contribute to engagement. Enabling factors, such as opportunity to be physically active (Faith et al., 2001), level of physical fitness (Graf et al., 2004), and motor skill competency (Okely, Booth, & Patterson, 2001), are related to physical activity levels in children. Additionally, reinforcing factors (i.e., teachers, parents, and siblings), as well as predisposing factors (i.e., perceived motor competence and enjoyment of the activities) also influence participation in physical activity (Sallis, Prochaska, Taylor, Hill, & Geraci, 1999).

The behavior of physical activity and the trait of physical fitness are reciprocally related and indirectly influence each other. Although the promotion of physical fitness remains a desired outcome of a quality physical education program (NASPE, 2004), its priority in relation to physical activity has sometimes been questioned. This is because of the difficulty in substantially improving physical fitness through physical training in prepubescent children. Specifically, cardiorespiratory training effects associated with increased physical activity in children are considered to be small (Payne & Morrow, 1993). It remains valuable, however, to assess physical fitness as a means of identifying children who may be at risk for disease associated with sedentary behaviors (Dennison, Straus, Mellits, & Charney, 1988).

In recent years, there has been a shift in focus from emphasizing motor skill development during elementary school physical education to providing students with more opportunities to be physically active during class. This is largely a result of the obesity epidemic and concern that the nation's youth are receiving inadequate amounts of daily physical activity. Although most scholars advocate for high levels of engagement in activity, many continue to advocate for the promotion of motor competency during physical education.

Motor competency refers to the mastery of physical skills and movement patterns that enable enjoyable participation in physical activities. Competence in fundamental movement patterns precedes the development of more-complex motor skills, such as using skills in combination with each other or in environments that are more dynamic. Even with quality instruction and practice, however, some children exit elementary school without developing sufficient technique in a variety of motor skills (Smith & O'Keefe, 1999). Because fundamental skill development is a prerequisite for the development of advanced sport-specific skills, acquiring competence at the fundamental level is critical for determining whether children will have the

ability to engage in activities that require a more advanced level of development. Without such skill, children will be limited in the activities in which they can engage.

Gender accounts for some of the differences in motor skill competency, as elementary-aged males surpass females in most motor skills as they progress through the grades (Morris, Williams, Atwater, & Wilmore, 1982; Singer, 1973). Males tend to perform better at manipulative skills such as throwing and catching; however, females are better at nonmanipulative skills such as balancing (Hovell, Sallis, Kolody, & McKenzie, 1999; Krombholz, 1997; McKenzie et al., 1995; Morris et al., 1982; Raudsepp & Paasuke, 1995). Sarkin, McKenzie, and Sallis (1997) posit that gender differences in motor performance are related to higher levels of physical activity among boys during free time.

Although Martin and Kulinna (2005) have examined teacher behavior in relation to activity levels during physical education, no investigations to date have examined the influence of physical fitness, motor competence, gender, age, and ethnicity on rates of physical activity engagement from a social cognitive perspective. Thus, the purpose of this study was to examine those variables during a community-based summer physical activity program.

Methodology

Participants recruited for this study were not from one program, school, or district, but were a representative sample of children living in the Midwest. The present study did not assess the quality or effectiveness of a single school-based physical education program; instead, it examined the psychomotor performance of children enrolled in a summer program who represented many different types of schools and teachers.

Despite the legislative mandate requiring daily physical education in the state in which the data were collected, none of the participants experienced daily physical education. In Illinois, elementary schools frequently receive waivers permitting fewer than 5 days of physical education per week. Additionally, physical education may be taught by a nonspecialist, and recess may be substituted for physical education. Regardless, when the national standards at the elementary level were written, decisions were based on what children should be able to achieve if provided with appropriate opportunities to learn (i.e., 150 min of physical education per week taught by a trained specialist [NASPE, 2004]).

Participants and Variables

Over a 4-year period, parental and child consent were secured from 230 children (males = 140), ages 7–12 years old ($M_{\text{age}} = 9.49$, $SD = 1.56$) who were enrolled in a summer activity program offered at a large university. The sample included 66% White/Not of Hispanic Origin, 13% Asian/Asian American, 9% African/African American, 6% Hispanic/Latino, and 6% other ethnicities. Data were collected during instructional units in basketball, striking with paddles, and throwing. Multiple assessments were utilized to examine physical activity, physical fitness, and motor competence and are summarized in Table 1.

Table 1 Description of Assessments

Standard/ Assessment	Testing protocol	Scoring criteria
Standard 1 Basketball	In pairs, to dribble and pass a basketball at a medium speed for 60–70 feet, four consecutive times.	Basketball assessment: (a) dribbling with control (b) using a chest or bounce pass with good technique (c) executing an accurate lead pass (d) receiving an accurate lead pass (e) maintaining adequate spacing
Paddles	In pairs, to use a short-handled implement to strike a hand-sized ball continuously over a low barrier.	Paddles assessment: (a) choosing the appropriate stroke to return the ball (b) appropriately executing the chosen strokes (c) moving to the ball to continue a rally (d) demonstrating the ability to rally
Throwing	Individually, throw a baseball-sized Incrediball to a wall with force to demonstrate a mature overhand throwing pattern.	Throwing assessment: (a) side to target (b) extended step forward with opposite foot (c) dominant throwing arm in laid-back L-shape (d) weight transfer with differentiated rotation
Standard 3	Parent 7-day physical activity report. Child self-report of 7-day physical activity. Pedometer step counts during instruction.	President’s Council on Physical Fitness and Sports
Standard 4	Fitnessgram.	Fitnessgram age and gender Healthy Fitness Zone

Note. South Carolina Physical Education Assessment Program [SCPEAP]. (2001). *Elementary school physical education program assessment manual*. Columbia, SC: Author.

Instruments

To obtain measures of overall levels of physical activity, parents and children were each asked to complete a 7-day physical activity recall of their child's physical activity engagement (Sallis, Haskell, & Wood 1985). In addition, children wore pedometers to count their steps during formal instruction. The 7-day physical activity recall was initially determined to be a valid and reliable instrument for young adults (Sallis, Buono, Micale, & Nelson, 1993). This instrument was subsequently validated and determined to be reliable when compared with accelerometer data for the children in this age group (Sallis, Condon, et al., 1993).

To measure levels of fitness related to achievement of NASPE (2004) Standard 4 (achieves and maintains a health-enhancing level of physical fitness), Fitnessgram testing was employed (Progressive Aerobic Cardiovascular Run [PACER], curl-ups, push-ups, sit and reach, and body mass index [BMI]). The Fitnessgram, developed by the Copper Institute, is also considered a valid and reliable measure of children's physical fitness (Welk, Morrow, & Falls, 2002).

Finally, in order to assess motor competence as it relates to NASPE Standard 1 (demonstrates competency in motor skills and movement patterns needed to perform a variety of physical activities), the South Carolina Physical Education Assessment Program (SCPEAP) testing protocols and scoring criteria were utilized. One invasion/team sport activity, one net/individual activity, and one target/individual activity, were selected for assessment. Data were collected using the fifth-grade motor skill testing protocol and scoring rubric for striking with paddles, basketball, and throwing. The SCPEAP motor skill assessments were selected for this investigation because pilot testing revealed that scoring criteria were attainable for the age group, and interrater reliability was above 80% (Graber, Woods, & Castelli, 2007, Chapter 1 herein; SCPEAP, 2001). Additionally, the NASPE National Assessments and Scoring Rubrics were under development and not yet available for use during this period of data collection.

Procedures and Data Analysis

Physical Activity Assessments

After informed consent was secured, children completed a 7-day physical activity recall. Further, a parent of each participant completed a 7-day physical activity recall on her or his child. Parents were asked to compare the child's reported physical activity with their actual levels of physical activity over the past 3 months and to describe potential seasonal activity changes. During the first week of the program, children completed the physical activity recall, physical fitness testing, and a brief interview. Since self-reported physical activity is not always accurate (Melanson & Freedson, 1996), the 7-day parent report of the child's physical activity was compared with the child's responses using a structured interview (Graber, Woods, & Castelli, 2007, see Chapter 1 herein). When the child did not demonstrate considerable agreement with the parent about the type or time of the activity, that child was excluded from analysis ($n = 3$).

To measure physical activity engagement during the summer activity program, pedometers were worn during basketball, striking with paddles (pickleball and

tennis), and throwing (softball/wiffleball) instructional periods. During the first week of the summer activity program, Accusplit pedometers were set to the child's stride length and subsequently used to record step counts over the 45-min period of instruction. The total number of steps and steps per minute were calculated for each individual by lesson, as well as across an entire instructional unit.

In order to analyze physical activity data, the criteria (number of days with 60 min of moderate-to-vigorous activity, number of days with at least 60 min of any activity, minutes per week) were examined collectively and then operationalized into groups designating low, medium, and high rates of participation. The President's Council on Physical Fitness recommends that children accumulate 60 min and up to several hours of physical activity each day (Corbin, Pangrazi, & Le Masurier, 2004). Therefore, children who were active for at least 5 days per week, for 60 min of moderate or vigorous physical activity were considered to be highly physically active. If one or more criteria were not met, the participant was identified as medium or low, respectively (see Table 2). Total step counts and steps per minute during instruction were also calculated as a means of quantifying step counts.

Physical Fitness Assessments

Physical fitness was assessed using the Fitnessgram protocols across a 3-day period during the first week of the program. On the first day, the children were familiarized with the testing protocols for the PACER, curl-ups, push-ups, and sit-and-reach tests. The PACER was a 20-m shuttle run at a specified pace that increased every minute. Results of the curl-ups and push-ups were based on the greatest number completed to a cadence. The children were allowed to practice a few repetitions of each fitness test and were informed of the purpose of each test. On the second day, after a brief warm-up, the children were randomly assigned to four fitness testing stations. To account for potential fatigue, the children were rotated from a high-intensity station (e.g., curls-ups) to a low-intensity station (e.g., height and weight converted to BMI). On the third day, the children completed the PACER test. The researchers were trained in Fitnessgram administration techniques.

Following the test, Fitnessgram software was used to determine whether each child met Healthy Fitness Zone (HFZ) criteria. The HFZ is specific to the fitness test type, age, and gender. Because the PACER test for children ages 9 and under is based solely on participation, these participants automatically scored in the HFZ.

Table 2 Operationalized Physical Activity (PA)

Physical activity	High PA	Medium PA	Low PA
Number of days with at least 60 min of moderate-to-vigorous PA	At least 5 days	3 or 4 days	Less than 3 days
Numbers of days with 60 min of any activity	At least 5 days	3 or 4 days	Less than 3 days
Minutes/week	At least 300 min	Less than 300 min	Less than 300 min

The total number of fitness tests in which the child was in the HFZ was calculated and used as an overall measure of fitness.

Motor Competence Assessments

On the first day of an instructional unit, the children received approximately 40 min of instruction regarding the assessment criteria for that activity (e.g., executing a lead chest pass and striking a ball with proper forehand technique). The children were also familiarized with the testing protocols and were allowed to practice the task with a partner. During the unit, the children were videotaped in pairs (basketball and paddles) or individually (throwing) while they completed the assessment task.

Specifically in basketball, two participants of similar age and ability were paired and asked to dribble and pass back and forth traveling the length of the basketball court. The pass could be a chest or bounce but had to exhibit characteristics of an accurate lead pass. Under control, a participant would dribble two to three times and then pass the ball to his or her partner, who had moved slightly down court. This exchange between partners continued for two full trips down the length of the basketball court. For paddles, participants were paired in the same manner and were asked to rally a wiffleball over a low net (i.e., 12 inches) for 5 min. The throwing test required throwing an Incrediball to a wall 50 feet away. The children were instructed to throw the ball “as hard as they could” toward the wall. After a brief warm-up, five throws were recorded. All motor assessments were videotaped.

To reduce the motor competence data, scores were tallied for each activity and a summative score was calculated across the three activities. After completion of the unit, each child was scored by two separate researchers who used specifically defined criteria. For each criterion, a researcher assigned a number from a scale with intervals from 0 to 3, to identify consistency or how often the child executed a criterion. The researchers also assigned an overall level using the same scale. In the case of scoring disagreement, a third researcher reviewed the data and assigned a score. Interrater reliability met or exceeded 80% for each assessment task (basketball 87%, paddles 96%, and throwing 80%).

All data were initially analyzed by individual assessment and by individual participant using descriptive statistics. Additional analyses, which included Pearson product-moment correlations, independent *t* tests, and a hierarchical regression, were used to identify the relations between the three psychomotor variables, as well as to predict physical activity engagement. An alpha level of .01 was used for all analyses.

Results

Physical Activity

On average, children were active 4.18 ($SD = 1.75$) days per week with at least 60 min of moderate-to-vigorous physical activity. When physical activity was operationalized, there was an even distribution across the high (36%), medium (37%), and low (27%) physical activity levels. The majority of children (64%) fell short of the President’s Council on Physical Fitness and NASPE recommendation of accumulating 60 min and up to several hours of physical activity each day. Nine

participants reported no physical activity during the week preceding participation in the activity program.

Number of days per week with at least 60 min of physical activity were reported as similar among boys and girls ($M_{\text{girls}} = 4.37, SD = 1.63; M_{\text{boys}} = 4.06, SD = 1.81$). According to independent t tests, these data were not significantly different from one another, $t(227) = 1.33, p = .19$. Findings were similar for the level of physical activity ($M_{\text{girls}} = 2.10, SD = .80; M_{\text{boys}} = 2.08, SD = .79$), with no significant difference between genders, $t(227) = .21, p = .83$.

During formal activity program instruction, the children averaged 1,539 steps at a rate of 34 steps per minute, suggesting a reasonably high level of engagement. Like the physical activity recall data, boys ($M_{\text{period}} = 1,582.25, SD = 506.35; M_{\text{minute}} = 35.16, SD = 11.25$) averaged a number of steps similar to that of girls ($M_{\text{period}} = 1473.41, SD = 491.80; M_{\text{minute}} = 32.74, SD = 10.93$), and there was no statistically significant difference, $t(227) = -1.60, p = .11$.

Physical Fitness

The results from the administration of the Fitnessgram indicated that 41% ($N = 94$) of the children were in the Healthy Fitness Zone (HFZ) for all five fitness tests (PACER, curl-ups, push-ups, sit and reach, and BMI). The majority fell short of the noted expectation that they be in the HFZ for all five tests (Chilcott, 2000); 34% met the criteria for only four tests, 12% met only three tests, 7% met only two tests, 3% met only one test, and 3% did not meet the criteria for any test. Three quarters of the children met the age and gender HFZ for at least four of the physical fitness tests, suggesting that most children have a single fitness component that needs improvement.

The greatest number of participants who met the age and gender guidelines were for the curl-ups (82%) and flexibility (85%) fitness tests. The lowest scoring among the fitness tests was observed in aerobic capacity (PACER) and attaining the HFZ in the area of body composition (BMI). PACER findings estimated that 64% of the children met the age and gender criteria. Similarly, 64% of the children were in the HFZ for BMI. It is important to realize that when the BMI score falls in the “needs improvement” ranges, as opposed to the HFZ, it indicates that a child is too heavy or too light for their height. In this study, 14% of the children were considered to be below the HFZ (too light) and 22% were above the HFZ (too heavy and at risk for obesity).

Motor Competence

Analysis of the motor competence data revealed some variation on task performance across the activities (basketball $M = 1.73, SD = .80$; paddles $M = 1.37, SD = .83$; and throwing $M = 1.28, SD = .80$). In basketball, 59% of the children were considered to be competent according to the cutoff scores established by the physical education teachers (Graber, Castelli, & Woods, 2007; see Chapter 1 herein). Having proper spacing was the criterion most often met, as 78% of the children were able to execute this skill. Overall, there was no significant difference between boys ($M = 1.77, SD = .81$) and girls ($M = 1.67, SD = .79$) in basketball, $t(228) = -.97, p = .34$.

In striking with paddles, 47% of the children met or exceeded the criteria. Unlike basketball, one criterion, the ability to rally, clearly influenced performance in this sport activity. If the child did not demonstrate an ability to rally the ball during the 5-min testing period, it was unlikely that she or he would experience success beyond the formal instructional setting. There were no performance differences in striking with paddles by gender ($M_{\text{boys}} = 1.37$, $SD = .81$; $M_{\text{girls}} = 1.37$, $SD = .79$; $t(228) = -.04$, $p = .97$).

The task of throwing to the wall with proper technique proved to be the most difficult motor task, as only 42% of the children met or exceeded the expectations. Surprisingly, all of the throwing criteria, even side to the target, were challenging for the children. There were no significant differences between boys ($M = 1.28$, $SD = .76$) and girls ($M = 1.27$, $SD = .86$) in throwing, $t(228) = -.06$, $p = .95$.

Overall, 24% ($N = 55$) of the children did not score a 2 or 3 (denoting competence) in any of the three sport activities. This signifies poor progress toward the attainment of motor competence.

Physical Activity Engagement in Relation to Motor Competence and Physical Fitness

Table 3 displays the Pearson product-moment correlation analyses, which were conducted on two dependent variables (physical activity level and steps during instruction) as well as on age, gender (coded as 1 = female, 2 = male), ethnicity (coded as 1 = White/Not of Hispanic Origin, 2 = Non-white), individual Fitnessgram scores (PACER, curl-ups, push-ups, sit and reach, and BMI), and motor competence (total score). Only the variables that correlated with operationalized physical activity level (Table 2) or steps during instruction were included in the regression analysis. Because age was significantly ($p < .01$) related to PACER, to total number of fitness tests in the HFZ, and to total motor competence, it was included in the regression equation. Gender was also included in the regression analysis because it was significantly ($p < .01$) related to curl-ups and sit and reach (flexibility). Because ethnicity had no significant relationship with any of the variables, it was not included in the regression analysis. PACER was significantly ($p < .01$) related to all variables except flexibility. Curl-ups and push-ups were significantly ($p < .01$) related to all variables. Body mass index was negatively related ($p < .01$) to all variables, with the exception of a positive correlation with age ($p < .01$) and no relation ($p = .80$) to ethnicity, gender, and total motor competence. The variable of steps taken during instruction was significantly related to PACER, curl-ups, push-ups, total number of fitness tests in the HFZ, and total motor competence.

The analysis regressed the physical activity level on the variables of physical fitness, motor competence, and personal characteristics. Because of the interactions between the physical fitness variables, a two-step hierarchical regression was performed. The first step included physical fitness and the second step included those variables as well as the addition of total motor competence and personal characteristics (i.e., age, gender). Results from the first step indicated that the PACER ($\beta = .31$) and the total number of fitness tests in the HFZ ($\beta = .32$) were the only significant predictors of physical activity level, $R^2 = .30$, $F(6, 213) = 15.37$, $p < .01$. The second step of the regression equation was performed in order to identify the role of physical fitness, motor competence, age, and gender in predicting level

Table 3 Intercorrelations Between Variables for All Participants

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Age (years)	—											
2. Gender	-.05	—										
3. Ethnicity	-.09	.06	—									
4. PACER	.31*	.00	-.10	—								
5. Curl-ups	.18*	-.33*	-.10	.45*	—							
6. Push-ups	.04	-.08	-.13	.52*	.50*	—						
7. Sit and reach	-.10	-.28*	-.02	.16	.33*	.35*	—					
8. BMI	.16	.07	.01	-.28*	-.25*	-.29*	-.24*	—				
9. Number in HFZ	-.20*	-.18*	-.06	.42*	.36*	.47*	.50*	-.35*	—			
10. Total MC	.37*	.04	-.10	.57*	.39*	.36*	.14	.00	.34*	—		
11. MVPA days	-.05	-.09	.03	.42*	.31*	.38*	.32*	-.23*	.55*	.52*	—	
12. PA level	.10	-.01	.00	.46*	.30*	.34*	.28*	-.17	.45*	.55*	.82*	—
13. Steps/ instruction	.12	.11	-.03	.36*	.19*	.26*	.15	-.15	.27*	.54*	.46*	.51*

Note. PACER = Progressive Aerobic Cardiovascular Endurance Run; HFZ = Health Fitness Zone; Total MC = overall motor competence; MVPA = moderate-to-vigorous physical activity; PA = physical activity.

* $p < .01$.

of physical activity. This step revealed significant effects for the total number of fitness tests in the HFZ ($\beta = .26$) and total motor competence ($\beta = .44$), $R^2 = .41$, $F(9, 210) = 16.00$, $p < .01$, on predicting level of physical activity engagement.

A second regression analysis was performed to determine which variables were the best predictors of step counts during formal instruction. A two-step regression analysis was conducted with the physical activity variables regressed on the variables of physical fitness, total motor competence, and personal characteristics. A sequence similar to that of the first regression analysis was used, with physical fitness (except flexibility and BMI) variables included in the first step, and the other variables of total motor competence and personal characteristics (i.e., age, gender) added in the second step. Results from the first step revealed that only the PACER significantly contributed to the prediction of the average number of steps during instruction, $R^2 = .16$, $F(4, 214) = 9.94$, $p < .01$, $\beta = .30$. In the second step of the regression equation, there were significant effects, $R^2 = .34$, $F(7, 211) = 15.83$, $p < .01$, $\beta = .60$, for total motor competence.

Discussion

Findings from this study suggest that performance outcomes, such as those identified in the National Physical Education Standards, are interrelated. Specifically, physical fitness and motor competence are predictors of physical activity, thus confirming other research studies that suggest these are enabling factors that influence physical activity participation in children (Graf et al., 2004; Okely et al., 2001). These data support the notion that physical educators and other physical activity directors should continue to address the performance outcomes of health-enhancing physical fitness and motor competence because they may lead to regular participation in physical activity.

Active children become active adults (Janz, Dawson, & Mahoney, 2000). Unlike the findings by Trost et al. (2002), the majority of children did not display the high levels of physical activity participation that would result in substantial health-related benefits. Engagement among children of this sample was most likely influenced by the individual's aerobic fitness, overall physical fitness, and motor competence. Similar to other findings (Erwin & Castelli, in press), children who were in the HFZ for cardiorespiratory fitness were likely to be among the most physically active. Children who had medium or low levels of physical activity were likely inhibited by their aerobic fitness or lack of motor competence. These findings suggest that the attainment of the HFZ, particularly aerobic fitness, as well as the achievement of motor competence, may be important moderators of regular engagement in physical activity.

Although the value of fitness testing versus the promotion of physical activity in formal instructional settings has been questioned (Pangrazi & Corbin, 2000), fitness assessments can serve two purposes: (a) identification of strengths and weaknesses for personal goal setting and (b) detection of risk factors associated with cardiovascular disease as a predictor for life-long physical activity engagement.

Children who have an awareness of their physical traits can begin to work within their own unique capabilities. Particularly with the advent of heart monitor technology, children can be active at intensity levels that are appropriate for increasing self-efficacy related to their unique genetic potential. Fitnessgram, the physical fitness assessment utilized in this study, was designed to inform parents and their children about the health benefits of physical activity and to endorse continued participation in the home environment by converting the test scores into color graphics and positive, but critical, feedback statements.

Surprisingly, physical activity engagement was not influenced by gender, which is contrary to many other findings (Sallis et al., 2000; Sarkin, McKenzie, & Sallis, 1997) that boys are more active than girls. In the present study, there were no significant gender differences for activity levels during formal instruction, nor did boys have significantly higher levels of motor competence.

The researchers hypothesized that there may be differences in physical activity levels based on ethnicity, yet there were no relationships among these variables. This could be related to the lack of equal representation across the ethnic groups because the sample was predominantly White/Not of Hispanic Origin. Additionally, differences in physical activity participation across ethnicities are most commonly documented in the adolescent, not child, literature (Sallis, Prochaska, & Taylor, 2000).

In this study, total motor competence, which was based on 13 criteria across three modified sport activities, influenced the level of engagement in physical activity. As evidenced by the moderate relationships between total motor competence and physical activity, those who were motor competent were more physically active in various physical activity settings. Based on the bidirectional nature of the relationship between these variables, it is probable that those who are physically active are more likely to display motor competence. This is a major finding because such a relationship has not been previously documented through such a comprehensive evaluation of motor performance.

Those participants who scored higher on the motor rubrics displayed greater proficiency in basic fundamental movements. Specifically, locomotive, manipulative, spatial orientation, and body position in relation to goals or boundaries were addressed in these rubrics. These qualities of movement are reflected in many sport activities and, therefore, could lead to higher engagement in physical activity in later life if refined. These findings suggest that the promotion of physical activity as a means of disease prevention should include refinement of motor performance.

One might rationalize that the children in the summer activity program would show more advanced motor proficiency because of the extra movement opportunities and instruction afforded to them. Yet, some of the older children struggled to demonstrate adequate progress in the refinement of their motor skill, thus potentially limiting engagement opportunities in sport-related activities throughout their lifespan. As such, the 10- to 12-year-old children could be more inclined to drop out of physical activity participation during adolescence because motor competence is commonly correlated with physical activity during this stage of development (Sallis, Prochaska, & Taylor, 2000).

As children develop, they gain experience in a variety of activities (Fairclough & Stratton, 2006) and develop greater awareness of their perceived motor competence (Woods, Bolton, Graber, & Crull, 2007; see Chapter 5 herein). Those who exhibit sedentary or irregular physical activity behaviors should be provided with instruction and exposed to programs in which they can develop skills, improve fitness, and experience enjoyment and success (Pate et al., 1995; USDHHS, 2000). Both physical education and community activity programs, such as the program examined in this study, can provide opportunities that enhance the probability of motor competence.

Implications for Physical Education Teachers Addressing Sedentary Behaviors

Childhood participation in physical activity has the potential to encourage the development of lifelong activity patterns, consequently improving quality of life and reducing risk factors related to metabolic syndrome and cardiovascular disease (Janz et al., 2000), as well as improvement of cognitive health (Castelli, Hillman, Buck, & Erwin, 2007). Effective physical education programs track student progress toward attainment of performance outcomes (Castelli & Rink, 2003). The present data suggest that monitoring student progress is valuable and is an important responsibility of the teacher because schools are a primary venue for educating children in the adoption of a physically active lifestyle.

Given the overall demands placed on schools in all academic areas, incorporating additional time into the curriculum beyond the NASPE recommended standard of 150 min per week at the elementary level (NASPE, 2004) is unlikely. In order to meet the daily recommendations for physical activity engagement, it is critical to consider ways in which children can receive supplemental activity. Ennis (2006), for example, recommends a formal extension of the physical education curricula into summer community programs. Thus, our study provided an initial analysis of participants who were enrolled in formal physical education during the school year and elected to remain active in the summer.

Many parents rely on community programs, such as the physical activity program described in this study, to provide opportunities for children during the summer months (Castelli & Erwin, 2007, see Chapter 4 herein). Extending physical education programming into community programs provides physical activity opportunities during those periods of time in which children are not in school receiving formal instruction in physical education. Investigations into school–community linkages are limited. Since the early 1990s, however, there has been growing recognition of the importance of including quality physical activity opportunities in community contexts for children.

Many community programs are becoming more school-like (Vadnell, Pierce, & Dadisman, 2005). These programs are most effective when appropriately matched with the child's social and cognitive needs. For example, parents should consider the level of sport competition promoted in the community program in relation to the needs of their child(ren). Further, based on the results of the present investigation, parents should attempt to enroll their child(ren) in programs that go beyond simple recreation and emphasize high levels of physical activity *and* motor skill development, particularly through age-appropriate, mastery-oriented tasks.

Physical education teachers are in ideal roles to connect students with quality supplemental physical activity opportunities in the community (Castelli & Beighle, 2007). They can provide information about programs they believe have the greatest likelihood of increasing motor competence and providing high levels of activity. They also can collaborate with other teachers, parents, and community members to organize neighborhood events that transcend yet showcase physical education (e.g., family fun runs, sport skill clinics, walking school bus). By making children aware of their options beyond school, students may be more likely to continue to pursue activities learned during physical education.

Summary

Approximately one-third of preschool-aged children are overweight as they enter schools (Mason et al., 2006). Physical education is well situated to play a pivotal role in the development of motor competence and physical fitness and can influence engagement in physical activity across the lifespan (Tappe & Burgeson, 2004). Physical education teachers are in an ideal position to take the lead in establishing school–community partnerships that may enhance a child’s opportunity to be active outside the physical education setting, particularly during summer vacation when children do not have access to physical education instruction (Castelli & Beighle, 2007; Christodoulos, Flouris, & Tokmakidis, 2006).

Findings from the present study suggest that regular engagement in physical activity (a national physical education performance outcome) is related to the attainment of other NASPE standards addressing motor competence and physical fitness. Understanding and focusing on these variables in physical education, as well as in quality community-based programs, is of critical importance in addressing many public health issues and improving modern-day physical education. Finally, competence in the NASPE physical education standards may be a proxy of performance accomplishment that relates to higher levels of self-efficacy and, as a result, increased levels of engagement in physical activity.

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Specifically, this chapter examines the effects of physical fitness and motor competency on levels of physical activity in children from 16 school districts in the Midwest. Application of social cognitive theory enables researchers to investigate the link between psychomotor achievement and physical activity participation patterns in children. (Contains 3 tables.) Descriptors: Epistemology, Self Efficacy, Physical Fitness, Physical Activities, Physical Activity Level, Age Differences, Gender Differences, Psychomotor Skills, Child Development, Ethnicity, Racial Differences, Program Effectiveness. Human Kinetics, Inc. 1607 North Market Street, Champaign, IL 61820. Chapter 3: The Relationship of Physical Fitness and Motor Competence to Physical Activity. Save to Library. by Darla Castelli. Children's Environmental Access in Relation to Motor Competence, Physical Activity, and Fitness. CAB Direct is the most thorough and extensive source of reference in the applied life sciences, incorporating the leading bibliographic databases CAB Abstracts and Global Health. Save to Library. PHYSICAL ACTIVITY AND FITNESS EDUCATION At the completion of this module participants will:

- Understand the benefits of regular physical activity for children;
- Know how much physical activity is recommended for children and youth;
- Explore ways of increasing physical activity opportunities throughout the school day;
- Understand where physical activity fits into the Health and Physical Education domain;
- Know how to increase opportunities for physical.

The diagram below provides a visual example of the types and recommended frequency and intensity of physical activity for children. (see appendix 3 for a blank student physical activity pyramid). Source: http://www.classbrain.com/artread/publish/article_31.shtml. Page 4 of 24. Motor competence relates to the development and performance of human movement [8]. In the literature, MC has encompassed a wide variety of terms such as fundamental motor skill or movement, motor proficiency or performance, motor ability and motor coordination [9]. In this study, and as proposed by the theoretical framework developed by Gallahue and colleagues [10], MC will be defined as. Additionally, MC has been found to be an important predictor of physical activity in childhood [22] and adolescence [23]. Motor competence. MC was evaluated with a valid quantitative instrument developed by Luz and colleagues [12]. This instrument is composed of two tests for each MC category (stability, locomotor, and manipulative). Intelligence-Based Physical Activity, Ethically and Aesthetically Based Physical Activity, Flexibility and Adaptability of Physical Activity, and Ability to Improve Performance Through Planned Experience. What factors influence our decisions regarding what physical activities we shall engage in and how physically active we shall be? The two factors that influence our decisions regarding what physical activities we shall engage in and how physically active we shall be include: our social environments and our personal circumstances. In terms of social environment, the people closest to you (parents, peers, coaches and teachers) are major influences in physical activity.