

**The Influence of an Afterschool Physical Activity/Academic Enhancement Program on Components of Physical Fitness and Self-esteem in 4th and 5th Graders**

*Abstract*

Childhood obesity negatively impacts the psycho-social and physical health of young children by increasing the risk for the development of a variety of chronic diseases/conditions at an earlier age. A multitude of after-school programs have been created to address decreasing levels of physical activity and physical fitness, one of several factors involved in overweight and obesity in children and adolescents. **PURPOSE:** In addition to assessing potential changes in physical fitness, the purpose of this study was to determine the effect of an afterschool physical activity and academic enhancement program for 4th and 5th graders on a variety of components of self-esteem, particularly physical self-efficacy. **METHODS:** A diverse cohort of 23 students participated in the tri-weekly program for a total of 12 weeks. Components of physical fitness, including body composition, aerobic fitness, muscle strength, and muscular flexibility, were assessed using *FITNESSGRAM*. Perceptions of competency in physical components, such as sport, body attractiveness, strength, physical self-worth, and global self-worth were determined using the Children and Youth Physical Self-Perception Profile (CY-PSPP) and the Children and Youth Perceived Importance of Physical Competence Profile (CY-PIP). **RESULTS:** Our results indicated a significant increase in sport/athletic competency (p<0.0005) and sport importance (p<0.06) over time. Furthermore, physical self-worth (physical self-efficacy) was shown to approach a significant increase over time (p<0.09).Regarding physical fitness, abdominal strength/curl-ups (p<0.0001) increased significantly while a gender effect existed; males scored higher than females in PACER (p<0.001) and curl-ups (p<0.05). **CONCLUSION:** Overall, the increase in competence levels and physical ability from pre-intervention to post-intervention indicate a positive change in perceptions for the students. Although subsequent studies should include a control group and be performed over a longer period of time, it can be concluded that the Stewart afterschool physical activity and academic enhancement program played a positive role in fostering positive changes in several aspects of both physical and psycho-social health in young children who participated in the program.

1. **INTRODUCTION**

In the United States, 17% of adolescents aged 2 to 19 years old are considered to be obese (Ogden et al., 2012). This percentage has more than tripled in the last 25-30 years (Strauss, 2000). Overweight and obesity in childhood has been shown to track into adolescence and adulthood, increasing the risk for developing chronic disease conditions (Sowers et. al, 2011). Childhood obesity is caused by a multitude of factors. These factors include an increase in total caloric and percentage of saturated fat intake, a host of sedentary behaviors, and decreased levels of physical activity/physical fitness (Ogden et al., 2012). Furthermore, obesity plays an influential role in the lives of children when considering their mental and social health.

Apart from impacting physical health, obesity influences the psychological well-being of individuals as well. During age’s six to eleven, children become capable of performing increasingly complex tasks and are highly influenced by the perceptions of their peers (Strauss, 2000). While success can lead to a sense of competence, failure in those tasks can lead to feelings of insecurity and low self-esteem. Failure to construct a proper self-belief is detrimental to the developmental well-being of the individual. One of the components within self-esteem is an individual’s physical self-efficacy. Physical self-efficacy is an individual’s conscious assessment of their own physical abilities to carry out basic tasks (Annesi, 2005). A low physical self-efficacy is considered to entail a lack of confidence in the ability for an individual to be physically active. Furthermore, children who have lower levels of physical self-efficacy are less likely to participate in more physical activities (Annesi, 2005). Physical self-efficacy and other physical competency components, such as sport/athletics, strength, stamina, attractive body, and global self-worth, are commonly assessed by the Children and Youth Physical Self-Perception Profile (CY-PSPP) and the Children and Youth Perceived Importance of Physical Competence Profile (CY-PIP) (Whitehead, 1995).

Physical self-efficacy is a factor that can be improved through the use of after-school activities (Tremblay et al, 2000). An estimated 6.6 million children are involved with after school programming, many of which include components of physical activity. An increase in physical activity involvement is associated with reduced risk factors for chronic disease, decreased blood pressure, and improved fitness and academic achievement (Tremblay et al., 2000). Physical self-worth, from the CY-PSPP questionnaire, is a measure that is equated to physical self-efficacy.

Volitional behaviors, such as physical activity, are largely associated with self-perceptions and/or perceptions of competence in competence motivation theory (Harter, 1982). A student’s competency with physical ability can positively predict autonomous motivation to participate in leisure-time physical activity (Standage et al., 2012). Previous use of physical activity in one afterschool program, Youth Fit For Life, showed improvements in overall physical and psychological health and increased physical activity behavior in its participants following the program (Annesi, 2005). Furthermore, inclusion of physical activity in the after-school setting is effective at enhancing general health, more specifically improved physical activity levels, physical fitness, body composition, and blood lipid profiles of children and young adolescents (Beets et al, 2009). In effect, finding a means to increasing one’s physical self-efficacy could result in a greater willingness to partake in physical activities for these individuals. This could be one of the underlying factors that lead to increased physical activity/fitness and a healthier lifestyle concerning physical activity and exercise. Thus, the intent of this study was to administer and deliver a unique 12-week afterschool physical activity and academic enhancement program to 4th and 5th graders and determine its influence on physical fitness and physical self-efficacy.

**2. METHODS**

**2.1 School and participant selection**

This study was performed at Stewart Elementary school, one of 8 elementary schools located in the Princeton City School District of Cincinnati, Ohio. Through an ongoing grant from the Bob Evans Foundation and the cooperation of the Stewart physical education teacher, the principal, and the Princeton City School District central administration, a physical activity and academic enhancement program was developed and implemented for fourth and fifth graders beginning in the fall, 2010. Consent forms were sent to the parents to be signed and returned in order for the students to participate in the afterschool program.

**2.2 Measurements**

All questionnaires were administered during the snack/homework section of the program during the first and last week of the program. In addition, students were explained the purpose regarding the questionnaires and the need for their personal opinions. It was stressed that there are no right answers. Multiple Miami University students, who were involved in the administration of the program, circulated around the room to help students who did not understand any particular question that was part of the questionnaires. The following assessments were administered:

2.2.1 The Children and Youth Physical Self-Perception Profile (CY-PSPP)

The Children and Youth Physical Self-Perception Profile (CY-PSPP) was used in order to gauge self-competencies in physical aspects. The questionnaire is made up of 36 items that address 6 different physical aspects relating to the child. These six components include the following (Whitehead, 1995):

1. Physical Conditioning - examined how students perceived their physical conditioning or stamina.
2. Strength – examined how strong students perceived themselves to be.
3. Sport/Athletic Competence – how skilled students perceive themselves to be in sports.
4. Body Attractiveness – how physically attractive students perceive themselves to be.
5. Global Physical Self-Worth – how students feel about their physical selves.
6. Global Self-Worth/Self-Esteem – how children feel about themselves as an individual.

Each question was set on a four point scale. A low score of 1 was associated with low perceived competence, while a high score of 4 was designated as high perceived competence. Half the items were reverse coded in order to enhance consistency of responses. Internal consistency for the subscale was determined to range from .77 to .91 (Eklund, Whitehead, & Welk, 1997).

2.2.2 The Children and Youth Perceived Importance of Physical Competence Profile (CY-PIP)

The Children and Youth Perceived Importance of Physical Competence Profile (CY-PIP) was administered in order to determine the importance of certain physical aspects to each child. This test usually accompanies the CY-PSPP assessment. A total of 8 questions were present on the questionnaire, examining the following four components:

1. Sport/Athletic Competence Importance
2. Condition/Stamina Competence Importance
3. Attractive Body Importance
4. Strength Competence Importance

In this questionnaire, reverse coding was once again employed. In addition, each question was scaled out of four points. A higher point value was designated as high perceived importance (Whitehead, 1995).

2.2.3 *FITNESSGRAM* Assessment

Physical fitness was determined using the *FITNESSGRAM* assessment. The *FITNESSGRAM* assessed aerobic fitness (PACER test), body composition (BMI and percent body fat), muscle strength (Push-ups), and muscular flexibility (Trunk Lift). The program is appropriate for children ages 5 years or older. Correlation coefficients above .80 designated acceptable reliability and validity of the test (The Cooper Institute, 2007). Previous testing with fourth graders showed high reliability, as reliability of all physical activity measures were high, exceeding .97 (Ihmels et al., 2006). In addition, reliability and validity is higher when administers of the test are trained (rxx' ≥.81) (San Miguel et al., 2011). Assessments involved the use of a stadiometer to measure participants’ height (in centimeters) and digital scales to measure participants’ weight (in kilograms). The tests were performed during the first and last weeks of the after school program. The following measures were taken:

1. PACER (Progressive Aerobic Cardiovascular Endurance Run) – 20-meter multistage shuttle run that tests aerobic capacity.
2. Curl-up assessment – tested abdominal and upper body strength and endurance.
3. 90-degree push-up test – addresses upper body strength and endurance.
4. Backsaver Sit and Reach test – tests the flexibility of the hamstring muscles

**2.3 Intervention**

The afterschool physical activity program was implemented for twelve weeks. The program was held three days every week: Monday, Wednesday, and Friday from 4:00pm until 5:30pm. Furthermore, the afterschool program was divided into three different components. They included the following: small group physical activity, academic enhancement session, whole group physical activity game.

2.3.1 Physical Activity I: Small group sessions

During the first 25-30 minutes, students cycled around 5 different stations, spending 5 minutes at each location. At each station, students were exposed to a different activity that triggered various muscle groups and components of the body. The stations used were recycled every day. These stations included: gross motor skill development (i.e., throwing/shooting), total body aerobic fitness activities, coordination/agility and flexibility activities (i.e., unidirectional movements), kicking/foot skills, multidirectional agility, vertical jumping, object jumping, and muscular fitness activities (i.e., upper body exercise, and lower body exercise).

2.3.2 Academic Enhancement and Healthy Snack

Following the stations, students were taken to a class room to receive a snack and work on homework. The allotted time was 30 minutes. All students were required to complete their assignments or were given additional worksheets. Additional worksheets consisted of math problems that were at the level of the student. Snacks were healthy alternatives that varied from fruit to yogurt and granola.

2.3.3 Physical Activity II: Group game

After academic enhancement/snack time, students were taken back to the gymnasium for the final activity (25-30 minutes). The final activity consisted of a game involving all the students. This activity was meant to keep students engaged with their peers while remaining active; the emphasis of these activities was aerobic activities and energy expenditure. Common games that were used include tag, dodge ball, and other team-based games. Group leaders joined the students to encourage participation.

**2.4 Statistical Analyses**

Multivariate repeated measures analysis of variance and pre-planned contrasts procedures were used to determine if there were significant pre-intervention-to-post-intervention changes in the fitness and psycho-social dependent variables. In addition, regression analyses were used to determine which variables explained the significant pre-intervention-to-post-intervention changes in the fitness and psycho-social dependent variables.

**3. RESULTS**

A total of 36 students participated within the after school program, but only 23 (9.73 ± .54 years) were enrolled in the study with all research documents (questionnaires and fitness testing) present. The study group is made up of 15 females and 8 males. The average attendance was 80.3 ± 15.7% with no significant difference in attendance between males and females.

**3.1 *FITNESSGRAM* Physical Fitness Testing**

Descriptive statistics were pooled in the following tables below. In Table 1, the mean and standard deviations of physical test results for males, females, and the total cohort are shown. Both pre-intervention and post-intervention scores are depicted. Following this, a repeated-measures, multivariate analysis of variance was used. Scores from table 1 indicate that changes occurred from pre-intervention to post-intervention for some or all of the dependent variables (See Table 1).

Only curl-ups underwent a significant change over time (p<0.0001), increasing from pre-intervention (*M*=25.02, *SD*=17.6) to post-intervention (*M*=45.08, *SD*=23.7) for the total cohort. A gender effect did exist for PACER and curl-ups; males scored higher than females in PACER (p<0.001) and curl-ups (p<0.05). However, results from multivariate analysis of variance indicated no significant time by gender effect; the change in physical fitness over time was positive for both females and males. However, overall, no statistically significant changes in PACER, pushups, or BMI occurred.

**Table 1. Descriptive statistics on physical testing study variables for males, females, and total cohort.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | MALE (n=8) | | FEMALE (n=15) | | TOTAL (n=23) | |
| Fitness variables | Pre  Mean ± SD | Post  Mean ± SD | Pre  Mean ± SD | Post  Mean ± SD | Pre  Mean ± SD | Post  Mean ± SD |
| Height (m) | 1.44 ± .05 | 1.45 ± .05 | 1.43 ± .09 | 1.45 ± .10 | 1.43 ± .08 | 1.45 ± .08 |
| Weight (kg) | 40.73 ± 9.0 | 41.74 ± 9.6 | 44.27 ± 18.8 | 46.15 ± 19.6 | 43.04 ± 15.9 | 44.47 ± 16.3 |
| BMI | 19.42 ± 3.2 | 19.53 ±3.2 | 20.78 ± 6.0 | 20.87 ± 5.7 | 20.31 ± 5.2 | 20.41 ± 4.9 |
| PACER ⁰  (# of laps) | 29.50 ±11.3 | 29.62 ±10.9 | 13.40 ± 5.5 | 16.53 ± 5.6 | 19.00 ± 11.0 | 21.08 ± 9.9 |
| Curlups (#)\*⁰ | 34.37 ± 21.8 | 55.25 ± 28.2 | 20.03 ±13.2 | 39.66 ±19.8 | 25.02 ± 17.6 | 45.08 ± 23.7 |
| Pushup (#) | 10.87 ± 7.5 | 13.62 ± 9.8 | 8.33 ± 5.1 | 8.67 ± 5.6 | 9.21 ± 6.0 | 10.39 ± 7.5 |

\* Significant overall time main effect (p<0.05); Curl-ups: pre << post (p<0.0001)

⁰ Significant gender main effect (p<0.01); PACER: M>F (p<0.001); Curl-ups: M>F (p<0.05)

**3.2 The Children and Youth Physical Self-Perception Profile (CY-PSPP)**

Table 2 below indicates the physical competence levels of males, females, and the total cohort following administration of the CY-PSPP questionnaire. Both pre-intervention and post-intervention values are given. Using a repeated-measures, multivariate analysis of variance test, a significant time intervention effect on Sport/Athletic competence was found to exist (p<0.005). For the total cohort, Sport/Athletic competence scores increased significantly from 2.99 to 3.18 points. Physical self-worth (physical self-efficacy) was found to also increase over time, but the change was not as significant (p<0.09). A significant time (intervention) by gender effect did occur with the Sport/Athletic scores (p<0.02). Males were found to increase more than their female counterparts during the intervention.

**Table 2. Descriptive statistics on competence levels of male, female, and total cohort after administering the CY-PSPP questionnaire.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | MALE (n=8) | | FEMALE (n=15) | | TOTAL (n=23) | |
| CY-PSPP Components | Pre  Mean ± SD | Post  Mean ± SD | Pre  Mean ± SD | Post  Mean ± SD | Pre  Mean ± SD | Post  Mean ± SD |
| Sport/Athletic \*⁰ | 3.06 ± .54 | 3.54 ± .42 | 2.95 ± .55 | 2.99 ± .62 | 2.99 ± .54 | 3.18 ± .61 |
| Condition/Stamina | 2.95 ± .37 | 2.88 ± .52 | 2.82 ± .50 | 2.84 ± .72 | 2.86 ± .46 | 2.86 ± .65 |
| Attractive Body | 3.19 ± .51 | 3.21 ± .63 | 2.77 ± .81 | 2.92 ± .73 | 2.91 ± .74 | 3.02 ± .70 |
| Strength | 3.29 ± .70 | 3.18 ± .63 | 2.61 ± .64 | 2.96 ± .77 | 2.84 ± .73 | 3.04 ± .72 |
| Physical Self-Worth \* | 3.37 ± .39 | 3.43 ± .47 | 2.93 ± .67 | 3.15 ± .66 | 3.08 ± .61 | 3.25 ± .60 |
| Global Self-Worth/Self-esteem | 3.41 ± .41 | 3.52 ± .53 | 3.21 ± .72 | 3.33 ± .58 | 3.28 ± .63 | 3.39 ± .56 |

\*Significant time/intervention effect (p<0.05); Sport/Athletic: pre < post (p<0.005),

Physical Self-worth: pre < post (p<0.09)

⁰ Significant time by gender intervention effect (p<0.02); Sport/Athletic (p<0.02), Males scored significantly higher than females

No Significant Overall Gender Main Effects

**3.3 The Children and Youth Perceived Importance of Physical Competence Profile (CY-PIP)**

Table 3 below indicates the physical importance levels of males, females, and the total cohort following administration of the CY-PIPP questionnaire. Both pre-intervention and post-intervention values are given. Using a repeated-measures, multivariate analysis of variance test, a time intervention effect was found on Sport/Athletic importance levels (p<0.06). Sport/Athletic importance levels decreased from pre-intervention (*M*=3.30, *SD*=0.76) to post-intervention (*M*=3.13, *SD*=0.75). No components of the questionnaire changed significantly over time or between genders.

**Table 3. Descriptive statistics on importance levels of CY-PIPP components for male, female, and total cohort.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | MALE (n=8) | | FEMALE (n=15) | | TOTAL (n=23) | |
| CY-PIPP Components | Pre  Mean ± SD | Post  Mean ± SD | Pre  Mean ± SD | Post  Mean ± SD | Pre  Mean ± SD | Post  Mean ± SD |
| Sport/Athletic Importance \* | 3.12 ± 1.02 | 3.00 ± 1.03 | 3.40 ± .60 | 3.20 ± .58 | 3.30 ± .76 | 3.13 ± .75 |
| Condition Importance | 3.18 ± .65 | 3.25 ± .75 | 2.96 ± .76 | 3.13 ± .58 | 3.04 ± .72 | 3.17 ± .63 |
| Attractive Importance | 3.37 ± .79 | 3.00 ± 1.03 | 2.90 ± .66 | 3.20 ± .72 | 3.06 ± .72 | 3.13 ± .82 |
| Strength Importance | 3.06 ± .67 | 3.06 ± .97 | 2.80 ± .64 | 3.00 ± .77 | 2.89 ± .65 | 3.02 ± .83 |

\* Time/intervention effect; Sport Importance: pre > post (p<0.06)

**4. DISCUSSION**

The purpose of this study was to determine if a tri-weekly after-school program, which focused on physical activity and academic enhancement, could positively influence self-esteem and physical self-efficacy of fourth and fifth graders. A diverse range of students enrolled in the 12-week afterschool program, and physical fitness was determined using *FITNESSGRAM* testing. Only those who had completed all questionnaires and physical testing were used in the statistical analyses of the data.

Physical fitness was found to positively change over the 12-week period for males and females. Both genders were shown to increase in all of the health-related components of fitness that were assessed with the FITNESSGRAM. However, the number of completed curl-ups, as seen in Table 1, was the only component of health-related fitness that significantly increased from pre-intervention to post-intervention for both males and females. Such increases are indicative of greater upper body strength, particularly in the abdominal or core area. Yet, in all categories of fitness that were assessed, males exhibited greater absolute levels of physical fitness than females. Such a gender effect was evident in the PACER test (aerobic fitness), paced push-ups and paced curl-ups. These results are typical of this age group, as males have been shown to participate in more aerobic and strength requiring activities, leading to higher fitness and activity levels (Sallis et al., 1997). There was no time by gender effect, so the direction of change was similar for females and males. In addition, no differences were found based on grade level. Thus, these data suggest that the afterschool intervention played a positive role in the increase of physical ability for the participants.

The Children and Youth Physical Self-Perception Profile (CY-PSPP) questionnaire was used to determine the competencies of students in physical aspects, such as sport, body attractiveness, strength, physical self-worth, and global self-worth. Physical self-worth was used to determine physical self-efficacy. In all components, males scored higher than their female counterparts. However, sport/athletic competence and physical self-worth scores increased significantly from pre-intervention to post-intervention. Increases in sport/athletic competence scores may indicate greater levels of comfort with sports and physical activity due to the physical activity intervention. Increases in physical self-worth, although not as statistically significant, indicate a positive change in physical self-efficacy for many students due to the intervention. As students become more involved with activity, they may feel more comfortable with their own physical bodies and ability to perform physical tasks. This was further compounded by a significant time by gender intervention effect for sport/athletic competence. Males were shown to increase more significantly than their female counterparts, likely indicating that males may have higher expectations to succeed in competitive sports and physical activity due to their peers.

Previous research with older adolescents and high school students has shown that males generally score significantly higher than females on all CY-PSPP components except body attractiveness (Eklund et al, 1997). Lower levels of body attractiveness competence could result in the differences of physical self-worth between males and females. Correlational analyses from this study indicated that an increase in BMI was negatively correlated with global self-worth/self-esteem (Pearson Correlation= -.498; p<0.02) and attractive body competence (Pearson Correlation= -.602; p<.003). Tremblay et al., reported data like this previously; children with higher BMI values exhibited lower levels of global self-worth/self-esteem (Tremblay et al., 2000).

The Children and Youth Perceived Importance of Physical Competence Profile (CY-PIP) questionnaire was employed in order to determine the importance in attaining competency in sport/athletics, condition/stamina, attractive body, and strength domains. Higher scores on this questionnaire indicated a domain to be very important to the participant. Only sport/athletic importance changed significantly as it decreased from pre-intervention to post-intervention; a significant time (intervention) effect. Greater involvement with physical activity programs may influence students to perceive their ability to perform in sports or athletics in comparison to their peers as less important. Continued participation in the physical activity aspect of the program could have led to positive reinforcement, success, and/or confidence for the child. Thus, feelings of competence in sports/athletics, physical activity games would further encourage the child to participate in physical activity. Moreover, subtle, insignificant positive changes in the other domains of the CY-PIPP and CY-PSPP questionnaires suggest that feelings of movement competence may result in the sport/athletic realm holding less importance.

The average attendance rate for this program was 80.3 ± 15.7% with no significant difference in attendance between males and females. The high attendance rate strengthens conclusions that the intervention played a pivotal role in inducing changes in physical fitness and physical competency levels, as measured by the CY-PSPP and CY-PIP. Previous studies indicate a dose-response effect due to high attendance levels, indicating an attendance rate of 40% or more show greater improvement in physical fitness compared to control students (Beets et al, 2009). High attendance rates (>70%) in the Youth Fit for Life 12-week physical activity program were positively associated with improvement in physical variables (Annesi & Westcott, 2005).

1. **CONCLUSIONS**

Overall, the change in physical fitness and physical competence levels from pre-intervention to post-intervention indicate a positive change in perceptions of physical self-worth as evidenced by the nearly statistically significant improvement in physical self-efficacy. Also, this alludes to the fact that a longer afterschool activity program may lead to more significant improvements in physical fitness and perceptions of physical competence. Further studies need to be performed that include a larger number of participants and a longer intervention. In addition, studies should be performed with a control group by administering the questionnaires and fitness tests to students not enrolled in the after-school physical activity/academic enhancement program. Such studies could further highlight the importance of physical activity after school for elementary school-aged children.

It is of importance to address possible issues with administration and participant comprehension of the CY-PSPP and CY-PIP questionnaires. Such issues could potentially influence results of the study. In order to prevent the influence of others while taking the exam, students could take the questionnaires in a classroom setting, with each having a desk separate from their surrounding peers. Finally, further steps need to be taken to ensure that all of the students enrolled in the afterschool program complete all of the pre- and post- tests. Out of the 36 students enrolled within the program, 13 students could not be included within the statistical analyses due to the lack of pre-intervention and/or post-intervention physical tests and/or CY-PSPP and CY-PIP assessments. By performing the physical fitness tests and physical competency questionnaires multiple times throughout the intervention, all participants may be more likely to complete all aspects of assessment.

A benefit of this program was that it was free for all participants and provided physical activity, a healthy snack, and time dedicated to academics. The high attendance rate (80.3 ± 15.7%) suggests that the program was desirable amongst students and their parents. Of most importance, however, participation in the physical activity and academic enhancement intervention led to significant improvements in abdominal/upper body strength, lesser improvements in aerobic fitness and other measures of muscular fitness, maintenance of BMI, and enhanced perceptions of physical self-efficacy over a short period of time.

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