THE EFFECT OF A SUMMER FAMILY FITNESS PROGRAM ON THE FITNESS LEVELS OF CHILDREN WITH DISABILITIES

By

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ABSTRACT

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The purpose of this study was to test the effect a summer-long family fitness program on the physical fitness levels of children with disabilities. Obesity in children with disabilities is a major health concern. Incorporating the child's family, teaching them ways to stay active, and associating fun with physical activity was the focus of a summer-long family fitness program; FitFam. This study assessed the physical fitness levels of the participants, children ages six through twenty-one, using the standardized Fitnessgram assessment. Pre- and post- scores were used to determine the overall outcome of the participants' physical fitness. This study did not show any significant change in the children's pre- and post- test scores. However, there were some individuals who did show overall positive improvement in the Fitnessgram. The Fitnessgram Physical Fitness Assessment can be effectively used to assess the physical fitness levels of students with disabilities.

ACKNOWLEDGEMENTS

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INTRODUCTION

Obesity is a serious, life threatening concern throughout the United States that affects the overall health of many individuals, including younger children. Participating in physical activity for long durations has been proven to improve the overall health of an individual in terms of weight loss and a longer lifespan (Larsen, Huang, Larsen, Olesen, & Andersen, 2016). Individuals with disabilities have a tendency to be in the obese category due to their lack of involvement and participation in physical activity at a young age.

Review of Literature

Physical Fitness in Children with Disabilities

The World Health Organization states that children between the ages of six and seventeen should be participating in physical activity every day for at least sixty minutes. Researchers have demonstrated that when children are more active, they have a decreased risk of developing cardiovascular disease and illnesses as well as a lower chance of developing anxiety and depression (Eather, Morgan, & Lubans, 2011). When comparing children with and without disabilities, children with intellectual disabilities are prone to have more concerns with their body weight and motor development (Davis, Zhang, & Hodson, 2011). Children with disabilities have 38% higher obesity rates than children without disabilities (Klein & Hollingshead, 2015). Often times, children with disabilities are not active when they are young and as a result, a sedentary lifestyle carries with them

as they enter adulthood (Rimmer & Rowland, 2008). As children with disabilities become adults, their rate of obesity increases substantially from 38% to 58% (Klein & Hollingshead, 2015).

Children with disabilities are often interested in physical activities, but when compared to their peers without disabilities, they participate less often (Bedell, Coster, Law, Lilijenquist, Kao, Teplicky, & Khetani, 2013). More physical activity programs have developed for individuals with disabilities, however the activities in these programs alone are not enough to maintain exercise participation (Willis, Nyquist, Jahnsen, Elliott, & Ullenhag, 2018). Children with disabilities are often faced with many restrictions when trying to access physical activity just because they have a disability (Bedell, et al., 2013). Some of the restrictions that affect a students' accessibility to physical activity are environment, lack of trained staff, and negative attitudes towards students with disabilities participating in community leisure activities (Willis, et al., 2018). In order to provide accessibility for individuals with disabilities, The Americans with Disability Act (ADA) has created standards that all buildings and businesses must follow to ensure accessibility to all both inside and out (Tripp & Zhu, 2013).

Motivation plays a key role in the promotion of physical activity into someone's daily life. Extrinsic motivators such as winning a trophy and intrinsic motivators such as enjoying oneself are the main two types of motivators. A study on athletes from the Special Olympics discovered that a majority of the athletes were extrinsically motivated, meaning they participated in the Special Olympics to earn a medal (Hutzler, Oz, &

Barak, 2013). The cognitive deficit due to an intellectual disability has proven to be a factor in the lack of motivation towards maintaining a physically active lifestyle (Hutzler & Korsensky, 2010). Physical activity and fitness needs to be associated with something that is enjoyable and motivating, so the child will continue participating over time (Porretta & Winnick, 2017).

Fitnessgram

The Fitnessgram is an assessment tool that is commonly used to help track health-related fitness in children and youth, in areas such as aerobic capacity, flexibility, muscular strength and endurance, and body composition (Morrow et al., 2013). While participating in the Fitnessgram, children can learn the importance of physical fitness and the value of living a healthy lifestyle (Welk, Going, Morrow, & Meredith, 2011). The California Department of Education requires the use of the Fitnessgram by schools. Schools use the Fitnessgram to assess physical fitness in these categories; aerobic capacity, abdominal strength and endurance, upper body strength and endurance, body composition, trunk extensor strength and flexibility, and flexibility. California requires fifth, seventh, and ninth graders to complete the testing and schools are to report the Fitnessgram scores. Once a child receives their score based on a specific category, they are then placed in one of these three zones; Healthy Fitness Zone (HFZ), Needs Improvement (NI), and Needs Improvement Health Risk (NI-Health Risk) (Plowman & Meredith, 2013). Keeping in mind that inclusion is necessary to allow all to succeed, the Fitnessgram creates opportunities for students with disabilities to participate in physical fitness testing alongside their peers. Not all of the components of the Fitnessgram need to

be used when assessing a student. It depends on what the educator wants the child to work on. Pre- and post- tests may be redundant if the child has already proven that he/she has met that state standard (Plowman & Meredith, 2013).

Many children with disabilities are able to partake in exercise with little to no modifications, however some children may need additional rest and or additional supports (Porretta & Winnick, 2017). When testing children with disabilities it is important to take into account what needs to be modified or added to allow the child to be successful (Tindall & Foley, 2011). If a child with a disability needs assistance or a modification to the exercise they are asked to perform, then these modifications need to be made without negatively affecting the child's capabilities (Plowman & Meredith, 2013). For example, a study on twenty-five elementary school students with intellectual disabilities modified the PACER shuttle run and the curl up component of their assessment to fit the developmental level of the participants (Davis, Zhang, & Hodson, 2011).

Program Assessment Methods

Collins and Staples (2017) examined the physical fitness levels of 35 children with disabilities, ages 7-12 years old, in a 10 week physical activity program using the Brockport Physical Fitness Test to assess their physical fitness both pre- and post-program. The components of the Brockport Physical Fitness Test that were selected for the assessment were the body mass index, 20m PACER run, modified curl up, isometric push up, and modified sit and reach. This study did not find any significant improvements from pre- and post- test, however there were some individual improvements in the

modified curl ups, 20m shuttle run, isometric push-ups, and the sit and reach on the left leg (Collins & Staples, 2017). The Brockport Physical Fitness Test (BPFT) was also used in an eight week program meeting five times a week for 30 minutes, to increase the physical fitness levels of 25 children with disabilities (Davis, Zhang, & Hodson, 2011). This study utilized the 16 meter PACER run, body mass index, modified curl-up, medicine ball throw, and the back saver sit and reach test to assess the children both pre- and post- program. Overall, all of these fitness components increased from pre- and post-test. Each of the children's scores were compared to the Healthy Fitness Zone Standards from the Fitnessgram as well as the BPFT (Davis, Zhang, & Hodson, 2011).

Physical activity programs utilizing the parents and children are proven to be beneficial for all (Kargarfard, Kelishadi, Ziaee, Ardalan, Halabchi, Mazaheri, . . . Hayatbakhsh., 2012). During a fifteen week family-focused program for typically developing children and their parents, the 20 meter Beep test, sit and reach test, handgrip strength test, and the sit up test were all used to assess the physical fitness levels of the individuals both pre- and post- test. (Bronikowski, Bronikowska, Pluta, Maciaszek, Tomczak, & Glapa, 2016). There was a significant increase in the children's scores for both the sit ups and 20 meter Beep Test whereas the hand grip strength test saw a significant decrease (Bronikowski, et al., 2016). A 12 week study done by Kargarfard (2012), selected the one mile walk test from the Fitnessgram to assess the cardiorespiratory fitness for female children in 7^{th}-10^{th} grade and their mothers. The one mile walk test is an appropriate measurement tool for students who are older or are less

able bodied (Kargarfard et al., 2012). Researchers found significant improvement in the participants' cardiorespiratory fitness (Kargarfard et al., 2012).

Participation in physical activity tends to be far lower in individuals with disabilities because of the tendency to have a higher body mass index (BMI) and obesity rate (Hutzler, Oz, & Barak, 2013). Children who have higher a body mass index may find physical activity challenging compared to children with high amounts of lean body mass. BMI is often utilized in youth physical activity programs to compare a child's overall current health status using the equation "weight (kg)/height (m2)" to children of the same age and sex (Davis, Zhang, & Hodson, 2011). Forty-five percent of children with Down Syndrome between the ages of eight and sixteen were considered obese whereas 34% of children with Autism between the ages of six and eleven were considered in the obese category (Collins & Staples, 2017). A study that created a two ten-week elementary school-based physical activity program with the involvement of parents, found that over this period of time there was no significant increase in the children's BMI (Hopper, Munoz, Gruber, & Nguyen, K., 2005). A physical activity program has the potential to reduce the BMI scores, however children's bodies are constantly growing and may show resistance to change.

PURPOSE OF STUDY

The purpose of this study was to determine whether the FitFam summer-long program would improve the cardiorespiratory endurance, muscular strength and endurance, flexibility, and body mass index for students with disabilities. The hypothesis of this study was that the 10 week summer-long program would positively affect the specific components of fitness in the children who participate in this study.

DEFINITIONS

Physical Fitness: the ability to participate in exercise related tasks for durations at a time. The components are cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and body composition. (Winnick & Poretta, 2017)

Physical Activity: any movement produced by the skeletal muscles that results in the body expending energy (Kim, 2008).

Individual with a disability: an individual who has a cognitive or physical impairment that affects their activities of daily living. (Winnick & Poretta, 2017)

Cardiorespiratory endurance: how the heart, lungs, and muscles utilize oxygen during physical activity over time. (Winnick & Poretta, 2017)

Muscular Strength: how forceful your muscles are when asked to perform one repetition. (Winnick & Poretta, 2017)

Muscular Endurance: the amount of repetitions your muscles perform over an extended time. (Winnick & Poretta, 2017)

Body Composition: the percentages of what your body is made up of in terms of fat, bone, muscle, etc. (Winnick & Poretta, 2017)

METHODS

Participants

Children ages six to twenty-one, with or without disabilities, both female and male, and their families were recruited from the local physical activity program HSU Fit at Humboldt State University in Northern California. Families were recruited into the FitFam program via word of mouth and through flyer distribution. Twenty-one children participated in this study. Out of these twenty-one children, fifteen had a disability and six were siblings who did not have a disability. Seven children had Down Syndrome, eight had Autism, and two had Fragile X Syndrome as well as Autism. The ages of the participants are as follows; three six-year-olds, three seven-year-olds, two eight-year-olds, three ten-year-olds, one eleven-year-old, two twelve-year-olds, one fourteen through sixteen-year-old, one eighteen-year-old, one twenty-year-old, and one twenty-one-year-old. Of the twenty-one individuals, five were female and sixteen were male. Five of the children's parents also participated in the summer program. Parents completed a written consent form for their children's participation in the program. Children who were capable of signing, also signed an assent form agreeing to participate in the program during the one week in June and also throughout the entirety of the summer. All family members and students signed a written consent form stating they were aware of the program's guidelines

Program Description

The five day FitFam program was held on Humboldt State University's Campus in Arcata, California where children participated in a wide range of physical activities including games, sports and fitness activities, see Appendix A for full schedule outline. A focus of the program was teaching skills and activities that could be continued throughout the summer vacation. Once the five days were over, participants and their families continued to engage in physical activity throughout the Humboldt County community for the entirety of the summer.

The FitFam program was broken up into two components; a five-consecutive day organized physical activity program in June and a three-month long family focused physical activity program. During the family summer program, parents assisted their child to continue a physical activity program to meet physical fitness levels.

The five-day program consisted of age and developmentally appropriate activities that were modified and tailored to fit the needs of all of the students that participated. The participants attended this program for five consecutive days during the summer for three hours a day to work on motor skill development and their physical fitness. Activities were led by Humboldt State University's teaching credential candidates who were working on their added authorization in Adapted Physical Education. To ensure the highest quality of learning and safety, students were placed in groups based on age and developmental level. Instructional strategies such as behavioral management, evidence-based practices, and social skill development were implemented to provide participants

with multiple opportunities to succeed. On the first day of this five day period, participants were assessed on their physical fitness levels using the Fitnessgram Assessment. The Fitnessgram is the official state of California's physical fitness instrument used to determine the fitness levels of students in fifth, seventh, and ninth grade therefore test results can be used in comparison of local, regional and state-wide scores and this is the reason why it was chosen as the assessment tool for this program. On the first day of the program, participants were assessed on the following items; one mile walk, curl ups, push-ups, trunk lift, and sit and reach. Modifications were made to each exercise depending on the students' current abilities and were scored based on the Healthy Fitness Zone standards. Two items had modifications available the curl up and push-ups. If children had difficulty performing the sit up with their hands on the ground, they could put their hands on their thighs and sit up until their hands touched their knees. If children had difficulty with the push-ups, they could either perform the push up on their knees or hold a plank for as long as they could. On the last day of the five-day program, parents were given a hard copy of their child's current physical fitness scores based on criterion referenced scores of the Fitnessgram. If a student was unable to complete the exercise based on the standards, parents were informed on what modification was made to allow for more practice during the summer. Parents were given suggestions as to what exercises their child should practice during the remainder of the summer to improve their fitness concerns. To ensure privacy and confidentiality throughout the program, parents only had access to their own child's current fitness levels.

Each day the parents of the participants completed an hour-long class which educated them on how to stay active with their child. The class offered activities, community outlets, and ways to keep their child engaged in physical activity throughout the summer. At the conclusion of the program, the parents were expected to exercise with their child for the entire summer and track their activity for each day.

The three-month long summer program started the week after the five day program ended and continued until the end of August. During this time participants and their families engaged in physical activity while implementing strategies taught to them during the five day program. Parents and children kept track of their physical activity through weekly logs either electronically or through a hard copy. At the three month mark, participants were asked to return to Humboldt State University where they were reassessed on their physical fitness levels using the Fitnessgram Assessment. All assessments were conducted by trained personnel who were HSU teaching credential candidates.

Instruments/Measurements

Participants were assessed on the first day of the week-long instructional camp and at the end of the summer using the Fitnessgram Assessment. They were assessed on the following exercises; one mile walk, sit and reach, push-ups, sit-ups, and trunk lift (see Appendix A). These components were selected from each fitness component; aerobic capacity, flexibility, muscular strength, and muscular endurance. Body composition is another major component of fitness, and this too was recorded throughout the study.

Body mass index (BMI) was calculated via online BMI calculator which is weight in kilograms divided by height in meters squared. These items were selected to appropriately fit the ability levels of the children and the modifications assured that children could complete the task. Scores were compared based on pre- and post- scores to determine the effect the program had on the child. The actual scores were recorded based on student performance in number of repetitions or time in minutes and seconds. Scores were then recorded and could be assessed based on the Healthy Fitness Zone. Although all of the participants performed the same skills, there are separate Healthy Fitness Zone scores for males and females. The Fitnessgram is used across the nation and is the state standard for physical fitness and is trusted by many physical educators because the test is valid and reliable due to the fact that it assesses the specific areas of fitness with criterion referenced scores based on age and gender.

Analysis

Pre- and post-program scores were compared using a t-test to determine the effectiveness the program had on the child's level of physical fitness. Participants were also given feedback on their scores including whether they are in the Healthy Fitness Zone for their age and gender. Areas of concern were highlighted for continuing physical activity.

RESULTS

Data was analyzed using SPSS. Paired t-tests were used to evaluate pre- and post-scores based on each component of fitness as seen in Table 1 which reports the mean and significance level for each category. A more detailed explanation of each individuals' pre- and post- scores based on fitness component can be seen in Figures 1-7. Twenty-one individuals participated in this study, however out of those twenty-one only nine returned for the post assessment with ages that ranged from 8 to 21 (n=13 years old). Of these nine participants eight were male and one was female. Six participants had disabilities and three participants, who were siblings of those with a disability, did not. Two participants were non-verbal; one with Autism Spectrum Disorder and Fragile X Syndrome and the other with Down Syndrome. Four participants in total had Down Syndrome and two participants had Autism. Each of the participants' pre- and post- scores are broken down into the exercise categories; one mile walk, sit and reach with their right and left leg, push-ups, trunk lift, and curl ups. Each participants' BMI was also recorded and calculated. Participants one and two were unable to perform the pre-and post- test in the categories of trunk lift, sit and reach for both legs, sit ups, and push-ups due to multiple factors.

Table 1: Descriptive statistics of components of physical fitness

Physical Fitness Components	N	Minimum	Maximum	Mean	Mean Difference Pre&Post	SD
Height Pre	9	48.00	68.00	57.50		6.18
Height Post	9	50.00	68.50	58.16	0.66	5.99
Weight Pre	9	55.00	154.00	95.44		31.74
Weight Post	8	60.00	150.00	96.63	1.19	33.92
BMI Pre	9	16.80	24.90	20.58		2.62
BMI Post	8	16.90	24.50	20.83	0.25	2.73
Trunk Lift Pre	7	7.00	12.00	9.64		2.09
Trunk Lift Post	7	4.00	12.00	8.86	0.12	3.18
Sit&Reach R Pre	7	6.00	20.00	11.50		4.87
Sit&Reach R Post	7	2.00	14.50	8.57	2.62	4.00
Sit&Reach L Pre	7	6.00	20.00	11.07		4.64
Sit&Reach L Post	7	3.00	17.00	9.14	1.75	4.30
Push Up Pre	7	2.00	20.00	8.86		6.64
Push Up Post	7	0.00	30.00	6.86	-0.25	10.83
Sit Ups Pre	4	7.00	50.00	20.25		19.90
Sit Ups Post	7	6.00	25.00	14.71	6.00	6.94
Mile Time Pre	7	1.00	1.00	0.87		0.06
Mile Time Post	3	1.00	1.00	0.87	-2.68	0.09

Table 1 describes the overall change in data from the pre- and posttest scores. The participants' height increased by .66 inches and their weight increased by 1.19 pounds. These two scores led to an increase in the overall BMI by 0.25. The trunk lift, both sit and reach, and sit up scores all increased. However, the push-up scores decreased in repetitions. The mile time scores also decreased, but since the mile is recorded in time,

this means that the participants completed the mile quicker than before by 2.68 minutes. These mean differences can also be seen in Table 2 under the mean category.

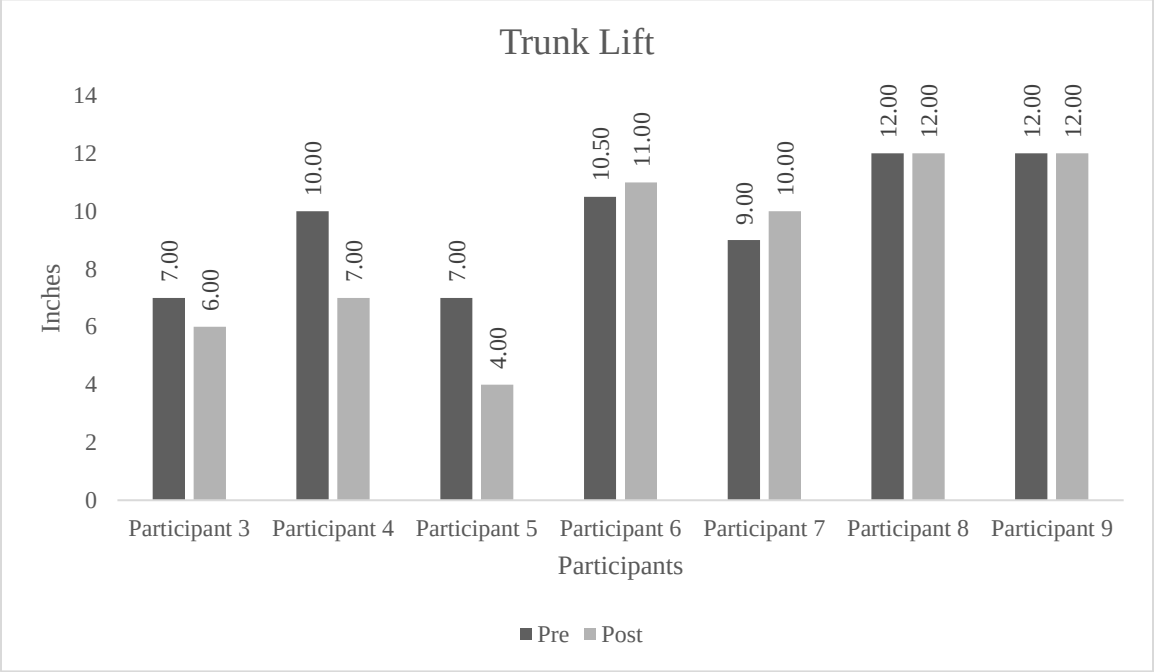

Figure 1: Descriptive statistics by participant for lumbar flexibility

The trunk lift component of the Fitnessgram assesses a student's trunk flexibility. The maximum height from floor to chin that an individual can perform in the trunk lift is twelve inches regardless of the individual's gender. Some of the participants were able to lift their chin higher than twelve inches, but since the maximum requirement for the Healthy Fitness Zone is twelve, only that was recorded. Participant one and two were unable to perform the trunk lift in both the pre- and post- sessions, so only data for Participants 3-9 was recorded (n=12 years old). As seen in Figure 1, two of the participants saw an increase in their trunk lift whereas three saw a decrease in score. Two participants stayed the same. Based on their current age and Trunk Lift scores, Participants 3 and 5 did not score in the Healthy Fitness Zone based on the Fitnessgram.

The remaining participants are all in the Healthy Fitness Zone for both their pre- and post- scores.

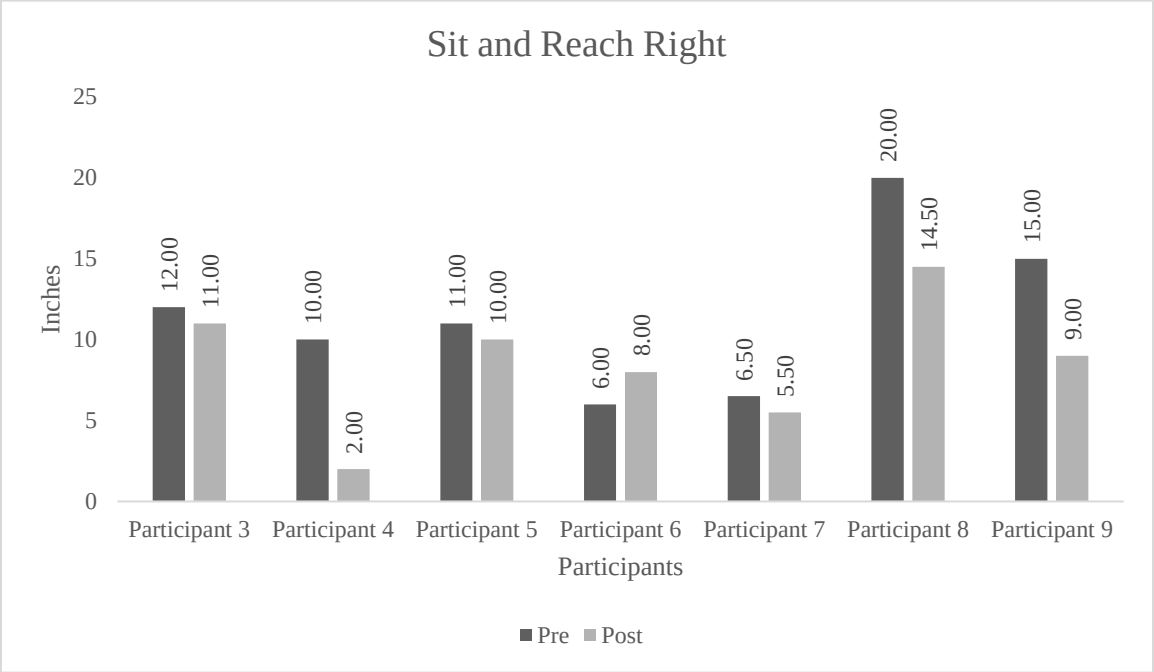

Figure 2: Descriptive statistics by participant for right lower extremity flexibility

The sit and reach category of the Fitnessgram assesses a students' overall lower limb flexibility measured in inches. The Healthy Fitness Zone for the sit and reach component of the test is eight inches for the males regardless of the participants' age and anywhere from nine to ten inches depending on age for the females. Participant 9 is the only female in the group and based on her age, 8 years old, the Healthy Fitness Zone is nine inches. The sit and reach component of this assessment was broken up into the participants' right leg score and left leg score. Figure 2 describes the participants' scores from their right leg flexibility. Participant 4 started in the Healthy Fitness Zone yet received a score in the post test that placed this individual in the Needs Improvement category. Participant 6 improved from the Needs Improvement category to the Healthy Fitness Zone whereas

Participant 7 remained in the Needs Improvement category for both their pre- and post-scores.

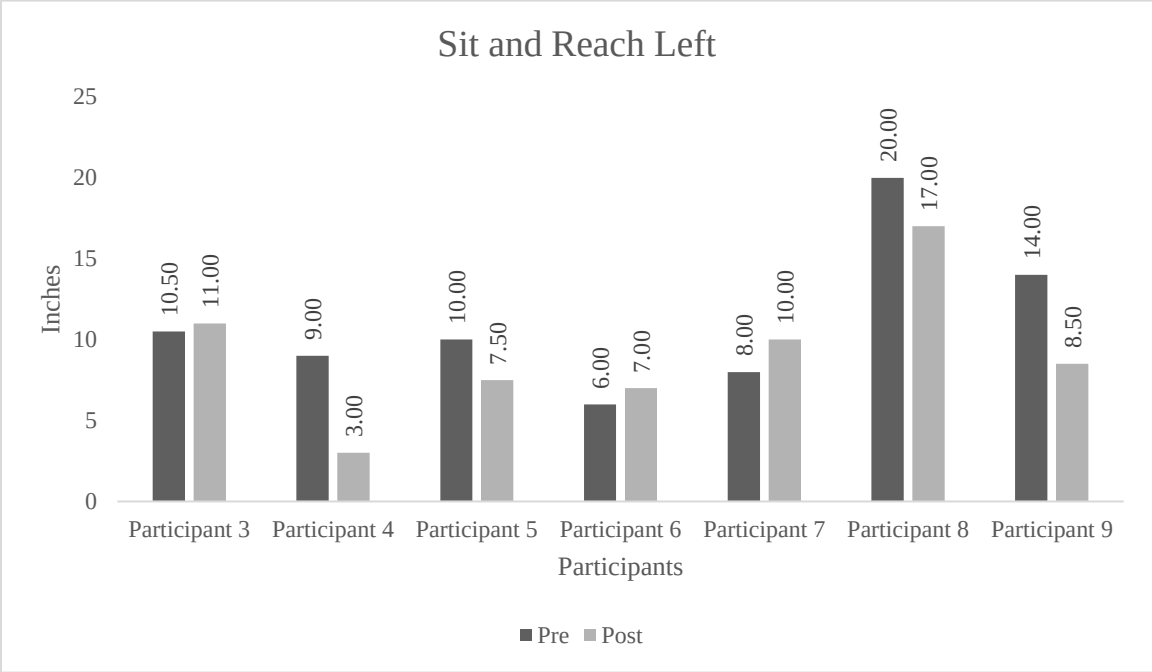

Figure 3: Descriptive statistics by participant for left lower extremity flexibility

Figure 3 compares the participant's pre- and post- left leg sit and reach scores. Three participants increased their score whereas four participants' scores decreased. Participants 3, 7, and 8 are all in the Healthy Fitness Zone for males. Participants 4 and 5 started in the Healthy Fitness Zone, but are now considered in the Needs Improvement category based on their posttest score. The female, Participant 9's score decreased and due to the posttest score is now considered in the Needs Improvement category. Participant 9, performed in the Healthy Fitness Zone for the pre-test, yet fell into the Needs Improvement Zone for the post test. In order to be in the Healthy Fitness Zone for a female, the posttest score needed to be at least 9 inches.

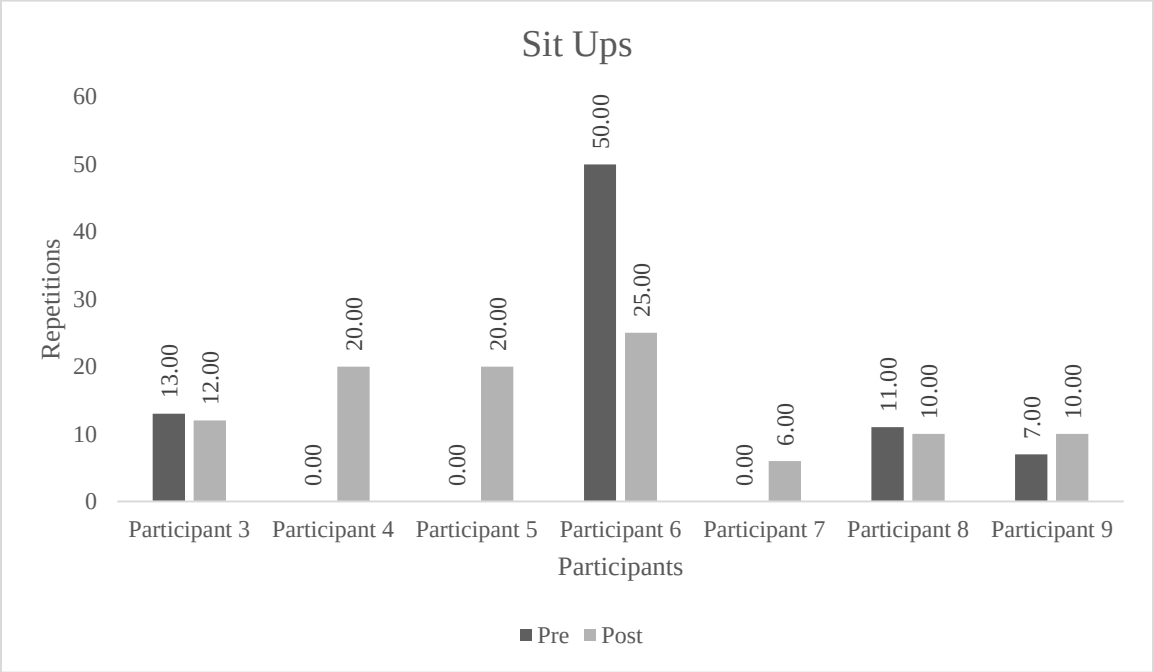

Figure 4: Descriptive statistics by participant for muscular endurance

The Fitnessgram states that in order for a female to be considered in the Healthy Fitness Zone at the age of 8, they must be able to perform six sit ups. Participant 9 met this requirement for both trials with an overall growth of three sit ups. Participants 3 and 8 saw a decrease in scores and are considered in the Needs Improvement category of the Fitnessgram. In order to be in the Healthy Fitness Zone, Participant 3 had to complete 18 repetitions and Participant 8 had to complete 24 repetitions. Although Participants 4 and 5 did not complete their pretest due to their inability to be tested on this day, they were able to compete 20 sit ups during the post test, placing them in the Healthy Fitness Zone for their age. Participant 6 had the highest performance level and their pretest score is an outlier compared to the other pretest scores. There is a possibility of measurement error associated with that score, yet they are still in the Healthy Fitness Zone for their age.

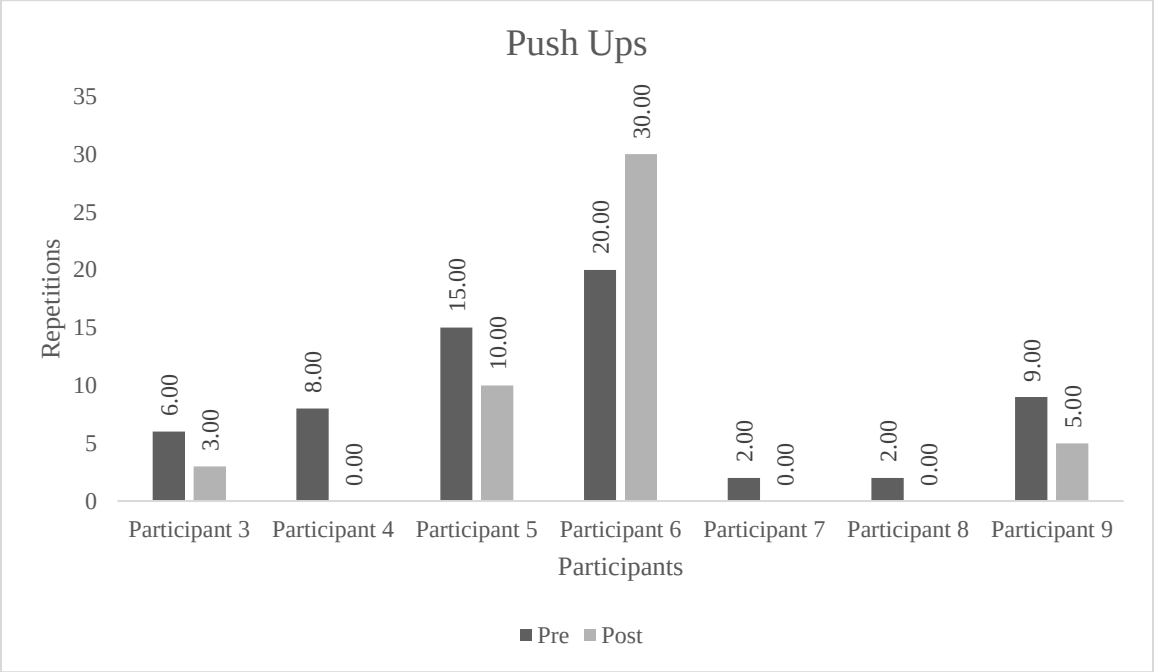

Figure 5: Descriptive statistics by participant for muscular strength and endurance

All but one of the participants saw a decrease in their pre- and post- scores. Participant 9, the only female, saw a decrease in her score but stayed within the Healthy Fitness Zone for her age. Participants 5 and 6 also fall into the Healthy Fitness Zone for males at their age for both the pretest and the posttest. Participant 4 started out in the Healthy Fitness Zone, but was unable to complete the push up section during the post test. Participants 3, 7, and 8 all fall into the Needs Improvement category based on the Fitnessgram's criterion referenced scores.

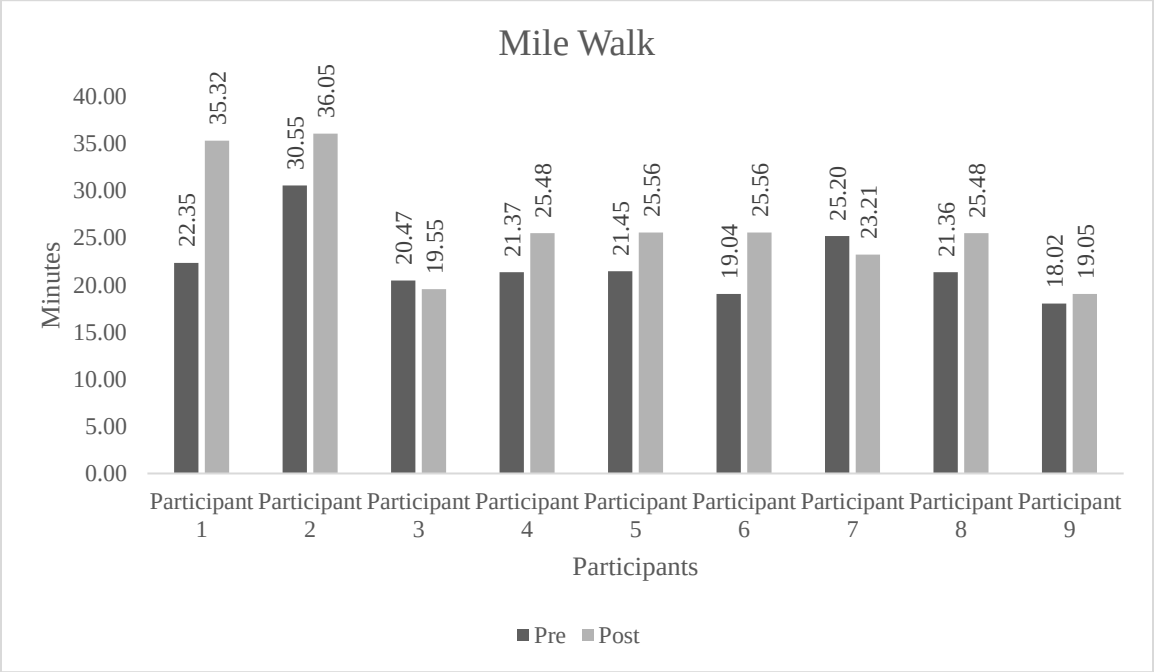

Figure 6: Descriptive statistics by participant for cardiorespiratory endurance

Unlike the other assessments, seeing an increase in score during the Mile Walk means that it took longer to complete than the first time. Participant 1 and 2 were able to complete the Mile Walk for both the pre- and post- test and saw an increase in score. Participants 4, 5, 6, 8, and 9 also saw an increase in their mile walk time. Only two participants saw a decrease in score and thus improved their mile time; Participant 3 and Participant 7.

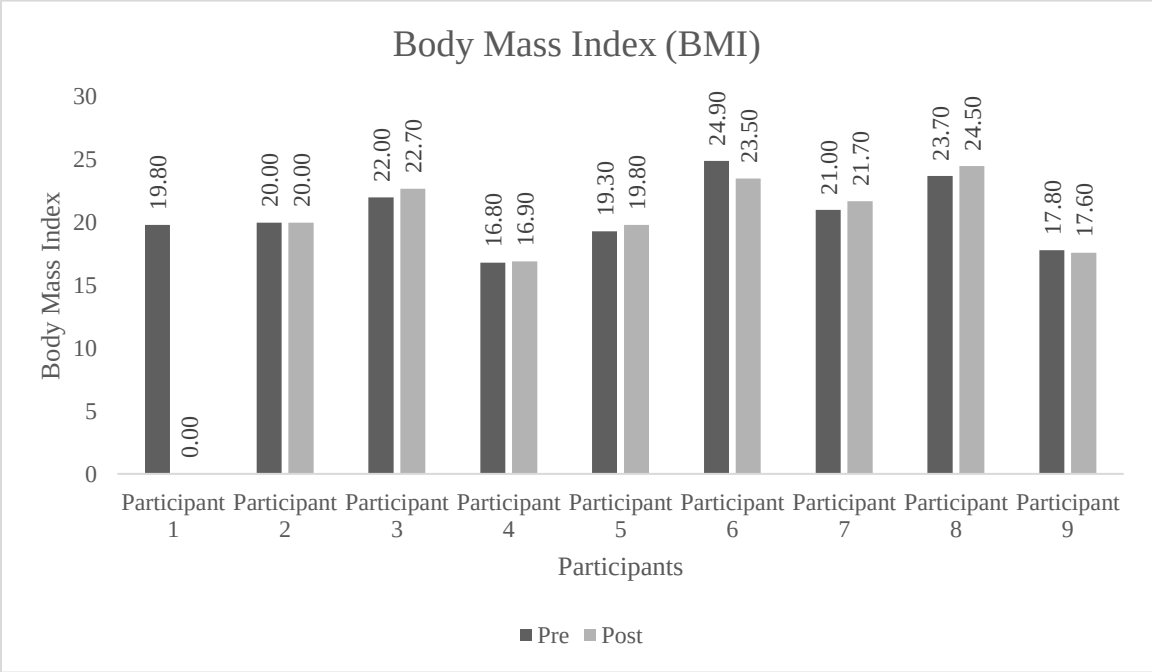

Figure 7: Descriptive statistics by participant for body mass index

The average pretest BMI for the males (Participants 1-8) was 20.90 whereas the average posttest BMI was 18.0 for a difference of 2.30. The average pretest BMI for the females (Participant 9) is 17.80, whereas the posttest BMI was 17.60 for a difference of 0.20. For all nine participants, the average pretest BMI was 20.60 whereas the overall posttest BMI was 20.80 for a difference of 0.20. Participant 1 only has pretest scores for BMI due to their inability to participate during the posttest. However, their BMI for the pretest is in the Healthy Fitness Zone for their age. Participant 3 and 7 are in the Needs Improvement category for both their pre- and post- scores. Participant 5 is in the Healthy Fitness Zone, but is right on the cutoff for the Needs Improvement Zone. The remaining participants are all in the Healthy Fitness Zone.

Table 2: Bootstrap for paired samples t-test pre- and post- test comparisons.

Exercises Pre/Post	Mean Change	Bias	Std. Error	Sig. (2-tailed)	95% Confidence Interval Lower	95% Confidence Interval Upper
BMI pre/post	0.03	-0.00b	0.43b	0.86b	-0.75b	0.88b
Trunk Lift pre/post	0.13	0.01c	0.26c	0.66c	-0.38c	0.75c
Sit&Reach R pre/post	2.63	0.02b	1.62b	0.25b	-0.50b	5.75b
Sit&Reach L pre/post	1.75	0.02b	1.29b	0.32b	-0.75b	4.25b
Push Ups pre/post	-0.25	0.04b	2.78b	0.80b	-6.75b	3.50b
Sit Ups pre/post	6.00	0.18d	5.47d	0.42d	-2.00d	19.00d
Mile Walk pre/post	-2.69	0.02b	1.38b	0.14b	-5.32b	-0.06b

As seen in Table 2, there is no significant changes in the individuals' pre- and post-scores in any fitness category. The area of fitness that was closest to a significant difference was the one mile walk test with a significance level of 0.14. A Bootstrap paired samples t-test takes the small set of data that is included and runs it one thousand times to get a normal curve for the data. The confidence intervals tell where the data should lie on a graph and when the data is bootstrapped with a bias corrected, it ensures that the confidence interval contains the true value.

DISCUSSION

There was no significant change from the pre- and post- test from any of the physical fitness components based on the t-test analysis. There were some improvements from pre- to post- in the areas of sit and reach for both the right and left leg, sit ups, and trunk lift for all participants. However, these findings were not significant. There was an overall four-minute increase in the mile walk scores from pre- to post- test. On average, the one mile walk score had an increase in time from 22 minutes to 26 minutes. The mile walk scores increased, but since they were recorded in time, an increase means it took the participants longer to complete. Overall, the participant's height and weight also increased pre- and post- test and consequently the BMI scores increased slightly. The BMI increased due to a higher increase in the children's weight from pre- and post- test. However, children in this age range are still developing so height and weight changes frequently.

Of the nine participants, there was variability across the group in terms of changes of individual scores. One participant showed an overall positive trend in pre-and post-scores. In comparison, three participants had an overall negative trend in scores whereas three more participants had an even amount of positive and negative trends in their data. Participants 1 and 2 only had complete pre- and post- data for the mile walk because of a variety of factors such as communication barriers and lack of one on one individualized instruction. Both individuals had an increase in scores meaning it took them longer to complete. Participant 6, the only individual with consistent pre- and post- gains, was also

the most physically developed in the population and one of the older students. Participant 6 was also in the Healthy Fitness Zone for all components except sit and reach on the left leg as they were just below the cutoff. This participant was able to complete more repetitions than the other participants in every category and thus may have influenced the overall data.

There were several limitations throughout this study. Before the five day FitFam program started, it was unclear how many students were going to sign up and the nature of their disabilities. There were some administrative complications with the pretest due to a high number of assessors, therefore there may have been a lack of consistency across multiple tests. In a testing situation when dealing with large numbers of children who are not familiar with the testing process, it is important to allow for appropriate practice time to administer the tests and accuracy of the scores for both the pre- and post- test. However, this was not known until the test began and the students were performing at different levels. Some of the students would have benefitted from one on one instruction with multiple opportunities to practice rather than showing them the skill once and having them perform.

In this study, there were no significant improvements in the group on any fitness measurement. The Collins and Staples (2017) study also did not find a significant improvement in physical fitness due to the wide range of scores with a small number of participants. However, the Collins and Staples (2017) study did find an increase in individual differences in the physical fitness components such as the 20 meter shuttle run, modified curl ups, isometric push-up, and sit and reach test for the left leg in working

with children with intellectual disabilities. However, in the Collins and Staples (2017) study, the Brockport Physical Fitness Assessment was used to assess the participants both before and after a 10-week physical fitness program. In this study, the intervention was a one week program followed by a 10-week family program. In the family program, activities were suggested and overall there were probably very limited amounts of physical activity.

There are no other studies using the Fitnessgram as an outcome measure of physical activity in a program with individuals with Intellectual Disabilities. Future studies should examine changes in physical fitness using the Fitnessgram because it is the gold standard of physical fitness throughout schools in America.

Limitations

Some students depending on their disability were not able to perform during the assessment due to the fact that only specific components of the Fitnessgram had been chosen to assess. The Fitnessgram itself was a limitation in this aspect. There was a language barrier in terms that some of the students did not understand what was expected of them and potentially performed lower than their actual abilities. Members of the FitFam program were properly trained on how to score the individuals based on the Fitnessgram guidelines, however when the test was administered, there were large numbers of children waiting to be tested which affected the reliability and validity of the scores. Different members of the program that were assessing the students during the pre-test were not assessing during the post test.

Delimitations

Children ages six to twenty-one with or without disabilities participated in this study. The students without disabilities were the siblings of those with disabilities. The physical fitness components assessed were delimited to one mile walk, sit and reach, push up test, curl up test, and trunk lift.

Assumptions

The assumptions of this study were that children and parents consistently participated in physical activity throughout the summer following the guidelines set up through the FitFam program.

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APPENDICES

APPENDIX A

Components of Fitnessgram

Sit and Reach Assessment
Materials Needed: Sit and reach box

Figure 1: Participant sat with left leg straight up against the sit and reach box. The right leg is bent. Participant placed left hand on the measuring stick in a relaxed position and then right hand on top. The participant would switch everything if they were doing the right side.

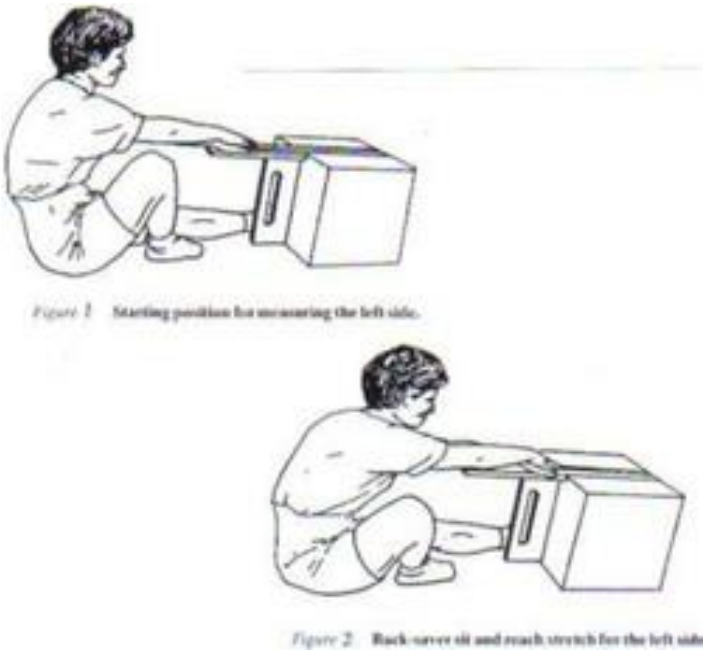

Figure 2: With foot still pressed up against the box and right leg bent, participant then reached as far as they could on the measuring stick to determine their range of hamstring flexibility. They must have been able to hold it so their score could be recorded.

Curl Up Assessment

Materials needed: 3 ½ inch wide measuring strip for participants ages 5-9, 4-inch-wide strip for older students and audio with the appropriate cadence which is 20 curl ups in one minute.

Figure 1: Participants laid flat on their back with their knees bent. The strip needed to be just at the tip of their fingers. The assessor was there to count and check for any miscues.

Figure 2: When the assessor said up the participant moved into the up position keeping their hands and feet on the ground. The participant needed to reach the other side of the measuring tape in order for the repetition to count. The max number possible was 75.

Push-Up Assessment

Materials Needed: proper cadence which is twenty 90 degree push-ups per minute, cone for the participant to lower their chest to insure they are down at 90 degrees (optional).

Figure 1: Participants started with hands on the mat under their shoulders. Legs should be straight with toes facing forward. The back and bottom should be in a straight line and should be flat.

Figure 2: Participant then lowered their body until their arms are at 90 degrees. If they needed assistance to reach 90 degrees then the cone was placed under them to help. Students stopped when a second form correction was made to their push up.

Trunk Lift
Materials Needed: ruler

Figure 1: Participants laid flat in the prone position (on their stomach), toes facing forward, with their hands placed under their thighs.

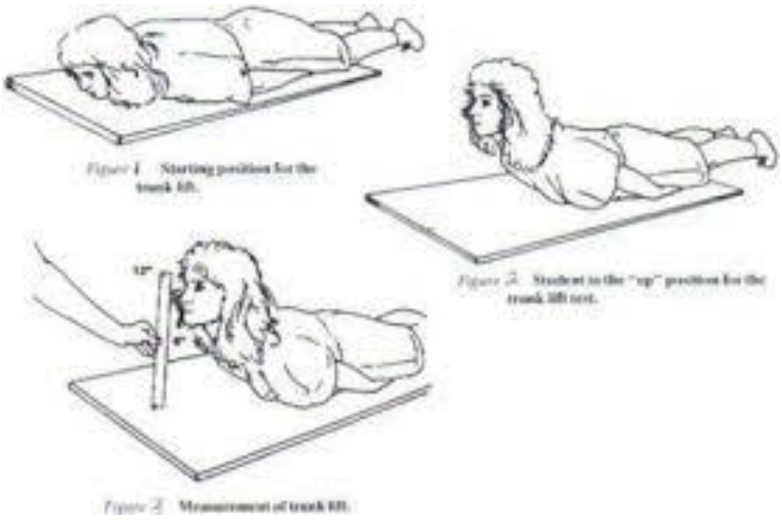

Figure 2: Participants then lifted their upper body off the floor in a controlled way.

Figure 3: Assessor then measured the participants' lift careful not to place the ruler directly under their chin. The maximum score for this assessment was 12 inches.

One Mile Walk Assessment
Materials Needed: track, timer, clock to measure heart rate

Figure 1: Participants walked one mile around the track (4 laps) as quick as they could.

Assessors were keeping track of the student's total time using a stopwatch.

APPENDIX B

Schedule of Activities

DAY 1	**DESCRIPTION**
1:30 – 2:00	Introductions
2:00 - 2:35	Fitnessgram Stations
2:35 – 3:10	TGMD Game Stations
3:10 – 3:45	Fitnessgram Mile Walk
3:45 - 4:15	Free play
4:15 – 4:30	Relaxation Time
DAY 2	**DESCRIPTION**
1:30 – 1:45	Introduction/Warm-Up
1:45 – 2:25	Walk Around Campus
2:25 – 3:45	Sport Specific Skills- Basketball & Soccer. Relay Race
3:45 – 4:15	Agility Activity
4:15 - 4:30	Relaxation Time
DAY 3	**DESCRIPTION**
1:30 – 1:45	Introduction/Warm-Up
1:45 – 2:25	Scavenger Hunt/Water
2:25 – 3:45	Obstacle Course –Flexibility, Aerobic Capacity, Muscular Strength & Endurance
3:45 - 4:15	Whole Group Activity

4:15 - 4:30	Relaxation Time
DAY 4	**DESCRIPTION**
1:30 – 1:45	Introduction/Warm Up
1:45 – 2:25	Stations- Jump Rope, Parachute, Hula-Hoops.
2:25 – 3:45	Obstacle Course –Flexibility, Aerobic Capacity, Muscular Strength, Muscular Endurance
3:45 - 4:15	Whole Group Activity
4:15 - 4:30	Relaxation Time
DAY 5	**DESCRIPTION**
1:30 – 1:45	Introduction/Warm-Up
1:45 – 2:25	Olympic Games Obstacle Course
2:25 – 3:45	Olympic Games Stations – Pool Noodle Javelin, Gopher Ball Shot Put, Long Jump, Frisbee Discus, Sprints, Scooter Boards
3:45 - 4:15	Whole Group Activity
4:15 - 4:30	Relaxation Time