

Running Head: Can early childhood activity affect future fitness?

Can early childhood activity have an effect on positive long-term fitness outcomes and how can youth programs promote these outcomes?

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HEHD 8010

April 30, 2015

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## **Introduction**

Childhood obesity is a major issue in America today. As with any major issue that affects children and youth, youth development leaders are responsible for contributing to solutions that assist in childhood obesity. About ten years ago, I assisted a colleague in starting an athletic-based youth serving organization called Crossover Athletics. Crossover athletics was designed to help students reach their God-given athletic potential and counteract obesity and inactivity in youth. Studies show that less than half of high school students participate in the recommended amount of physical activity recommended by the Center for Disease Control (Hauser-Cram, Nugent, Thies, & Travers, 2014, p. 531). Crossover originally focused on flag football and basketball. However, in more recent years, the focus of the organization has shifted to endurance sports, like running. To capitalize on the interest in running programs, Crossover created Run Hard Running Teams. Run Hard is an eight-week afterschool program for elementary and middle school kids. Each week, students learn a running skill and a life skill. At the end of the program, students participate in a local 5K event. The board members at Run Hard believe that if students are introduced to running at a young age, they will develop an interest and love for the sport that will continue into adulthood, thus helping to counteract obesity. I am interested in finding out if this belief has a basis in scientific research and if there are ways that Run Hard can optimize its programs to help reach this goal.

## **Related Adolescent Development Theory**

Firstly, the Center for Disease Control (CDC) recommends that schools adopt a health plan for their students (Hauser-Cram et al., 2014, p. 425). This plan is called a Coordinated School Health Program (CSHP). A complete CSHP includes eight components to reach its goal of developing healthy students, one of which is physical education. This component recognizes the link between early education and skill development and a lifelong participation in physical activity. Studies show that when teenagers participate in healthy activities they are likely to continue those healthy habits later in life (Hauser-Cram et al., 2014, p. 526).

Additionally, studies show that one's destiny is not only determined by biology, but also experience (Hauser-Cram et al., 2014, p. 573). The brain structure can actually be modified through experiences. If this is true, perhaps introducing activity-based experiences to youth could modify the brain in such a way that habits could be carried into adulthood because of brain modification.

### **Presentation of Relevant Empirical Studies**

#### **“Does Early Physical Activity Predict Body Fat Change Throughout Childhood?”**

This study was based on the assumption that a decline in physical activity has an effect on childhood obesity. Using motion sensors, researchers monitored activity and body fat between preschool and adolescence. The research showed that children with higher levels of activity ranked lower in the areas of BMI, triceps, and the sum of five skinfolds.

**“Tracking of Obesity and Physical Activity from Childhood to Adulthood: The Physical Activity Longitudinal Study”**

This study tracked Body Mass Index (BMI) and physical activity for 22 years. Using statistical analysis, researchers tried to predict adult obesity based on youth BMI. Research showed that the majority of youth that were overweight remained overweight into adulthood. Also, the majority of overweight adults were not overweight as youth.

**“Tracking of Physical Activity from Early Childhood through Youth into Adulthood”**

This study tracked physical activity through early childhood, youth, and adulthood. The researchers tracked six male and female cohorts. They measured physical activity, which was reported via mothers and the participants themselves. The study showed that physical activity develops very early in childhood and the stability of physical activity highly or moderately continues through adulthood.

Most importantly, these articles were chosen because of their relation to the topic. Many studies focus on childhood obesity, but these studies additionally focus on the long-term effects of youth activities and choices that create specific outcomes into adulthood. Additionally, I chose studies that focus on children that fall into the categories of early and middle childhood. While it may not be strictly necessary, based on the topic, I also chose studies that are current. All but one of the articles is less than ten years old.

### **Pattern of Findings**

All of the studies reference the fact that childhood obesity is increasing and most of them believe that there is a link between obesity and a decrease in activity levels among children. Beyond the encouragement of the studies to increase amounts of physical activity, children are also encouraged to decrease the amount of sedentary time. Most studies also showed that physically active lifestyles begin at a very young age. Parents are encouraged to focus on physical activity in early childhood to assist in higher levels of activity in later-life. Additionally, children that are overweight in early and middle childhood have a greater chance of becoming overweight adults; however physical activity may not have as lasting an impact as healthy eating habits over longer periods of time.

### **Limitations of Research**

One of the limitations in the studies that I chose was the reporting method. In some cases, self-reporting or parent-reporting was used, which may not be as accurate as one would like. Also, when measuring children's activity levels and how they develop body fat in later years, it is possible that genetic factors play a significant role in how much body fat a child will eventually incur. There is no way for a study to factor in this variable or measure the effect it could have on the outcome.

### **Suggestions for Future Research**

There seems to be a need for lasting education and promotion of physical activity that extends from childhood into adulthood. It would be a long study, but there could be some benefit in measuring the difference in physical activity of adults between children that receive solid physical education and participate in a specific minimum amount of physical activity and stop at the end of middle childhood and children that continue to receive those things into adolescence. One could then measure the differences in physical outcomes when education and physical activity programming extends toward adulthood and measure the benefit.

### **Application for Youth Developers**

Due to the importance of childhood obesity and its negative effects, there is a significant amount of research surrounding this topic. For youth developers, there is much to learn from this body of research that can influence how youth programs should be created and modified to respond to this research. One of the more significant findings is the predictability of obesity in adulthood, based on the weight of a child. Approximately 83% of overweight youth grew up to become overweight adults (Herman, Craig, Gauvin, & Katzmarzyk, 2009). This statistic speaks to the importance of developing youth programming in early childhood that can counteract obesity. Stopping a child from becoming obese seems to have a major affect on that child remaining so into adulthood. In one study, 42% of youth in the lowest BMI quintile remained in that quintile as an adult. Considering this information, youth developers should make sure that they are introducing physical activity into programming as early as possible as to prevent obesity, instead of to correct obesity. Some youth developers and parents have

a tendency to rationalize obesity by describing it as baby fat and assuming that children will grow out of obesity, but youth developers should take obesity seriously at a young age. Introducing structured playtime that promotes physical activity is a key factor to combatting early childhood obesity. Studies show that children in childcare are too often sedentary and need more structured physical activity (Schneider & Lounsbery, 2008). When developing curriculum and programming for children, youth developers need to make sure that the need of the child comes first in this area instead of the easiest way to offer programming. Often times, youth developers choose the easiest or less staff-intensive methods for passing time to the detriment of the child.

When considering physical activity for children, space and equipment may also pose an issue (Schneider & Lounsbery, 2008). In order for children to adequately participate in physical activity, space is needed. This lack of space can become an issue for youth serving organizations, especially in areas where populations are dense and space can be expensive. Youth developers should consider partnering with organizations, like churches, that may have extra spaces during the week that is not being used for normal operating functions. Many churches also have a desire to serve youth and may be more willing to donate space than a for-profit organization. Youth organizations may also need to consider limiting youth attendance in order to provide more per-child space. Considering the small financial margins in youth development, this can be a difficult decision to make. However, as much as possible, youth developers should consider the well being of the child, as it relates to space, if it is financially feasible. Similarly, youth development organizations need adequate

equipment to promote activity among children. Again, this could present a financial problem for organizations with lacking budgets, but organizations should work to acquire donations and increase revenue to serve children in this area. If the organization is a non-profit, the community could be encouraged to donate lightly used sporting and playground equipment for a tax deduction.

It has been shown that higher levels of physical activity during early childhood years lead to children with less body fat in early adolescence (Moore et al., 2003). Many times youth serving organizations do a good job providing activities for participants, but counteract the caloric benefit of activity by serving unhealthy snacks and meals. Youth organizations should be careful to pair positive physical activity with healthy food options as to not rob children of the benefits of the activity.

While youth developers play a direct part in physical activity for the youth they serve, they must partner with parents in order to maximize their effectiveness. For instance, youth developers can do a good job minimizing sedentary time during their programming, but if parents allow kids to have large amounts of sedentary time at home, then the benefits of the programming will not reach its full potential. For this, and other reasons, youth developers need to engage parents in goal setting for children and work in tandem to reach those goals for the benefit of the child.

There seems to be some times in early childhood where children are more susceptible to the development of obesity than other times in their life. For instance, around age five, body fat typically reaches a low point and then moves into a critical

point for fat gain (Moore, et al., 2003). This could be a critical point in a child's life for determining if that child will be an obese adult. Youth developers should consider this, and similar time periods, when children can be most at-risk and develop programming and parent partnership plans that are careful to monitor physical activity and food intake during these critical times. Additionally, youth developers should create educational materials for parents that explain why these times are critical for the future health of children with solutions and recommendations for helping children navigate these critical time periods.

Lastly, there is helpful research regarding what types of activities are most helpful and how to implement those activities in youth programming. Youth developers need to educate themselves as to what types of activities will be most effective for their children and how to implement them. Differing activities require different resources to implement. Some activities require higher staff levels or more equipment. Youth developers need to identify the activities that best meet the needs of their children and also align with their available resources. Also, youth developers need to understand that activities are age-specific and should consider this before implementation. Like reading and writing, motor skills should be taught intentionally in a curriculum (Moore, et al., 2003). Too often, youth developers do not take physical activity and motor skills development as seriously as traditional scholastic skills. Youth developers should teach and assess these skills so that they can be improved for the child's benefit.

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### **Abstracts**

#### **“Does early physical activity predict body fat change throughout childhood?”**

**Background.** Declining levels of physical activity in the population at large may be responsible in part for the rising rates of childhood obesity. Studies to date, however, have not consistently demonstrated such a protective effect. We used longitudinal data from the Framingham Children’s Study (FCS) to address this important question.

**Methods.** We used 8 years of activity monitoring (Caltrac electronic motion sensors) and repeated anthropometry measures for 103 children to examine the effect of activity on body fat change from preschool to early adolescence. Longitudinal data analysis methods were employed to account for the use of repeated measures on these children.

**Results.** Children in the highest tertile of average daily activity from ages 4 to 11 years had consistently smaller gains in BMI, triceps, and sum of five skinfolds throughout childhood. By early adolescence (age 11), the sum of five skinfolds was 95.1, 94.5, and 74.1 for the low, middle, and high tertiles of activity, respectively (P for trend = 0.045).

This protective effect of activity was evident for both girls and boys. **Conclusion.** This longitudinal study adds strong support for the hypothesis that higher levels of physical activity during childhood lead to the acquisition of less body fat by the time of early adolescence.

#### **“Tracking of obesity and physical activity from childhood to adulthood: The Physical Activity Longitudinal Study”**

**Objective.** Body mass index (BMI) has shown moderate to strong stability through childhood into adulthood, while physical activity (PA) tracks less well. Tracking studies have often had limited follow-up lengths. The aim was to investigate BMI and

PA tracking over 22 years from youth to adulthood. Methods. Subjects included 374 participants aged 7 to 18 years in the 1981 Canada Fitness Survey, who were re-evaluated in 2002\_04. The stability of BMI and leisure-time PA energy expenditure (AEE) was assessed by inter-age correlations, maintenance of extreme quintiles and BMI status, and the prediction of adult overweight from youth BMI. Results. BMI tracking was moderate to strong ( $r_{0.42-0.65}$ ) in females, and moderate ( $r_{0.29-0.53}$ ) in males. Approximately 38% and 42% of youth in the highest and lowest BMI quintiles, respectively, remained in these quintiles as adults. About 83% of overweight youth remained overweight as adults, while 85% of overweight adults were not overweight youth. Almost all healthy weight adults had been healthy weight youth. The odds of being overweight in adulthood was 6.2 times greater (95% CI: 2.2\_17.2) in overweight compared with healthy weight youth. PA tracking over 22 years was low and non-significant, but moderate over the final 15 years. Only 16% and 18% of youth in the highest and lowest PA quintiles, respectively, remained in these quintiles as adults. Conclusions. BMI, but not PA, tracked well over 22 years in this sample. The majority of overweight youth remained overweight as adults; however, the majority of overweight adults were not overweight youth.

### **“Tracking of Physical Activity from Early Childhood through Youth into Adulthood”**

Purpose: The aim of the study was to investigate the tracking of physical activity (PA) from preschool age to adulthood in six age cohorts of males and females.

Methods: A random sample of 3596 boys and girls age 3–18 years participated in the Cardiovascular Risks in Young Finns Study in 1980. The follow-up measurements were

repeated in 1986, 1992, 2001, and 2007. The PA was measured by mother's report in 3- and 6-yr-olds and self-report in 9-yr-olds and older. Tracking of PA was analyzed using the Spearman rank-order correlation and a simplex model. Results: Mother-reported PA at age 3 and 6 year significantly predicted self-reported PA in youth and in young adulthood, and there was a significant indirect effect of mother report on adult PA 2007 in males. Simplex models that fitted the data very well produced higher stability coefficients than the Spearman rank-order correlations showing moderate or high tracking. The tracking was higher in males than that in females. Conclusion: This study has shown that physically active lifestyle starts to develop very early in childhood and that the stability of PA is moderate or high along the life course from youth to adulthood.