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THE EFFECT OF SCHOOL SPORTS PROGRAMS ON OBESITY IN ADOLESCENTS

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### Effect of School Sports Programs on Obesity in Adolescents

In the Southeastern United States, healthcare issues related to obesity in adolescents ages 13-18 years have become a growing concern. Body mass index (BMI) is one biomarker of overweight and obesity. According to Srikantharajah, Mikkelsen, & Lee (2010), the four standard categories for BMI are: underweight ( $<18$ ), normal (18.1-24.9), overweight (25 and 29.9) and obese ( $\geq 30$ ). Body mass index greater than 30 among adolescents can lead to comorbidities, such as type 2 diabetes and heart disease (Hotu, Carter, Watson, Cutfield, & Cundy, 2004; Thunfors, Collins, & Hanlon, 2009). Obesity costs the nation millions of dollars annually in healthcare. North Carolina has identified this as a significant health care concern and is taking steps to address this issue, including increasing physical activity and healthy eating in schools (Park, 2007). According to the Centers for Disease Control and Prevention (CDC) (2010) almost one third of North Carolina's population is classified as obese (BMI  $> 30$ ), one of the highest percentages in the country. The rural areas of the country have even greater problems due to accessibility of recreational spaces and access to healthy foods (Lipman, Schucker, Ratcliffe, Holmberg, Baier, & Deatruck, 2011). The Institute of Medicine (2013) recommends engaging in regular physical activity as an effective way to control body weight in adolescents. It is believed that after-school sports programs can play a major role in reducing the obesity burden among adolescents.

### Review of Literature

#### The Importance of Physical Activity

Aerobic physical activity has been shown to have the greatest impact on controlling obesity. Aerobic activity has an inverse relationship on insulin resistance, abdominal circumference, and weight. One of the main points of access for adolescents to these aerobic

activities is school-based team sports (Jiminez-Pavon et al., 2013). Adolescents that receive regular education regarding the benefits of aerobic exercise are more prone to engage in this type of activity. Many of these adolescents concurrently participate in anaerobic activities such as weightlifting as well, but mainly cite aerobic physical activities for the health benefits (Fischetti, 2009). Along with the biological benefits of aerobic physical activity, adolescents who engaged in these activities also exhibited other healthy habits such as eating healthy and avoiding drug use and other risky behaviors (Delisle, Werch, Wong, Bian, & Weiler, 2010).

There is general agreement that any type of physical activity is beneficial in reducing or controlling weight gain. Colberg and colleagues (2010) have found positive benefits from resistance training. This is due to the highly metabolic tissues that are increased through resistance training. This demonstrates that any type of intervention that promotes physical activity among adolescents would be beneficial. However, researchers found that for positive effects resistance activities had to be regular and ongoing (Colberg et al., 2010).

### Barriers to Physical Activity

The primary barrier to participation in physical activity for rural populations is access to adequate facilities. This may be due to lack of facilities, unsafe facilities, or lack of access (Lipman et al., 2011). Transportation is a major factor in accessing facilities for rural adolescents. In one study of farm families, adolescents were required to work in agriculture and could not participate in school sports programs (Lynch, Martz, Eldrige, Bailey, Benke, & Paul, 2012). This study also found that farm families may not have the income to afford the cost of participating in school sports programs (Lynch et al., 2012). Furthermore, Lynch (2012) found that low socioeconomic status has been linked to poor dietary and physical activity habits, as parents put more emphasis on work (Lynch et al., 2012). Olsen (2013) found that in order to

address physical activity among rural adolescents, factors such as personal factors, socioeconomic factors, and the physical environment must be considered.

#### Physical Activity and Gender Differences

Preference for certain physical activities by adolescents, especially those living in rural areas, has been shown to be strongly influenced by gender. Females tend to prefer activities that promote social support and interaction. These activities include team sports such as soccer and basketball. These types of sports allowed girls to form social circles and gain acceptance by their peers. This social support encourages participation and increases the chances that these females will continue to participate (Eime, Payne, Casey, & Harvey 2010).

Gender differences have been identified with regard to controlling weight. Males tend to prefer to control their body weight using physical activity, while females tended to prefer dietary means of control (Thunfors et al., 2009). According to the Centers for Disease Control (2007) 55% of adolescents ages 13-18 did not meet the recommendations for physical activity. Of these, females were shown to be less active than males (Sanchez, 2007).

#### Physical Activity and Intrinsic Factors

Self-esteem has been shown to play a role in motivating adolescents to participate in physical activity. Researchers discovered that adolescents that engaged in regular aerobic physical activity and had healthy role models in the home reported an increased self-perception and rated their self-esteem higher than those that did not (Pascal, Sylvain, & Perrault, 2013). Adolescents are also more likely to participate in activities which they enjoy. In a longitudinal study, adolescents reported the most enjoyable activities were those they were exposed to

earliest. These adolescents were also more likely to continue to participate in these sports and activities into adulthood (Walia & Leipert, 2012).

In order to address obesity among a high school population, this Honors Project collaborated with school personnel in a school-based health center located at a public high school in eastern North Carolina. The ethnic/racial demographics of this school was 95% African American students, who resided in a low income inner-city neighborhood.

### Methods

This senior honors project was a program evaluation designed to compare the BMI of students who participated in school sports programs to a group of students who did not participate in school sports. The methodology for this program evaluation began with a review of literature regarding the topic of adolescent obesity. Then, an environmental assessment was conducted to understand the context of the community. The environmental assessment included observations of the health and social resources, the vitality of the community, demographics, commercial sectors, and communication avenues. Secondary data was also reviewed to form a comprehensive view of the community. In the target county the major ethnic/racial groups were White (55%), Black (32%) and Hispanic (10%) (U.S. Census, 2012).

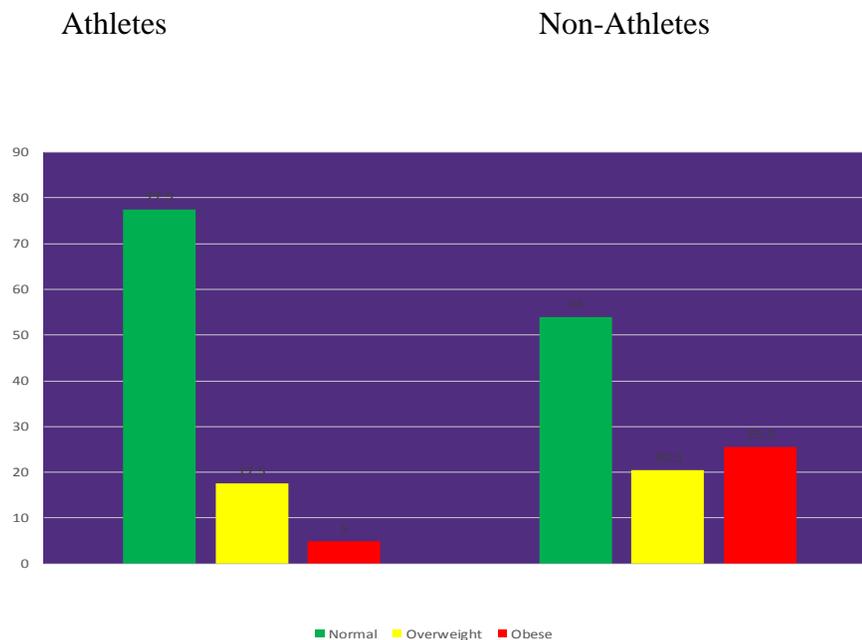
Next, the honors student worked with the school nurse preceptor 1-2 days each week over a 7-week period, assisting with health assessments and primary care concerns. During this time, students who were enrolled in the school-based health center, and who had height and weight data, were reviewed by the nurse preceptor and student nurse and the BMI was calculated. The first 186 students who had this information were selected for this record review. In collaboration with the Athletic Director, 40 students of the 186 students in the selected record review were identified as participating in school sports. . The BMI of the students participating in school

sports were then compared to the BMI of the students who were not involved in school sports. The BMI categories were defined as normal (18.1-24.9), overweight (25 - 29.9) and obese (30 or greater).

## Results

There were two major findings for this project. The first finding of this program evaluation was that students participating in school sports programs showed a lower occurrence of obesity than did those who did not participate in school sports programs (see Table 1). Among the sample of 40 athletes, 77.5 % had a BMI in the normal range; 17.5 % had a BMI that in the overweight range; and 5% had a BMI indicating obesity. For the 146 students that did not participate in school sports, 54 % had a BMI in the normal range, 20.5 % were in the overweight range, and 25.5 % were obese. The increased occurrence of obesity in the non-athlete category suggests that school sports programs help to decrease obesity in adolescents.

Table 1



A second finding was that almost two-thirds of the student athletes played more than one sport. School sports programs at the high school were focused on the health and development of many of the same group of adolescents.

### Discussion

This program evaluation suggests that school sports programs are an effective management technique for maintaining a healthy body weight. However, the school sports program may be unintentionally focusing on the same group of adolescents and possibly limiting participation of other students. These results were shared with the school nursing staff, Athletic Director, the principal of the high school, and the board members for the school-based health center. Recommendations were suggested for increasing participation in physical activity for the entire student body. These recommendations included incorporating a wider variety of choices during physical education classes and increasing opportunities for inclusion of other students in school sports programs.

These results support the Institute of Medicine recommendation that physical activity is an effective way to control body weight in adolescents. The strength of this project was the opportunity to collaborate with an interdisciplinary team and evaluate an important strategy to reduce obesity. The limitation of the project were lack of time to develop strategies for inclusion of all adolescents in school sports programming, although this information will assist school staff in future planning.

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