ABSTRACT: Obesity remains a growing health issue in the United States for both adults and children. Obese children are likely to remain obese into adulthood, putting them at risk for developing chronic health issues. Many communities, public health officials, and others have begun to fight against childhood obesity, yet weight-loss camps remain largely overlooked as a potential method of intervention. While some studies suggest camps have short-term benefits in weight-loss and self-esteem, few studies have looked at long-term effectiveness of these camps. This study aims to determine the effectiveness of weight-loss camps for non-Hispanic black and Hispanic obese youth. If camps are shown to be successful in leading to sustained weight-loss and healthy living, they could be useful in helping to reduce childhood and adolescent obesity rates.
Introduction

Over the years, obesity has become a prominent public health issue within the United States. The percentage of people with obesity has increased for many sectors of the population, including children. In children, obesity is defined as having a body mass index (BMI) at or above the 95th percentile for a child’s age and sex\(^1\). For children specifically, obesity rates rose from 10.0% between 1988-1994 to 17.1% between 2003-2004, but have remained stable at 17.2% as of 2013-2014\(^2\). Within the state of California, the percentage of children ages 10-17 with obesity is 31.2% as of 2016\(^3\). While the national percentage of obese children has remained stable, there are notable disparities between racial groups. According to the National Center for Health Statistics (NCHS), 19.5% of Non-Black Hispanic and 20.9% of Hispanic youth ages 2-19 were obese\(^4\). Most obese children, including non-Hispanic Black and Hispanic children, do not come from low-income families\(^5\); however low socioeconomic status may still be a risk factor in developing obesity\(^6\). In adults, obesity is a risk factor for many health diseases and chronic health conditions, including sleep apnea, diabetes, cardiovascular disease, and some cancers\(^2\). In the same way that there are disparities within obesity, there are also disparities within access to the health care necessary to treat those conditions. Research has shown that children and adolescents who are obese are more likely to remain obese as adults, which puts them at risk for developing


the aforementioned diseases and chronic health conditions\textsuperscript{7}. As it is more beneficial to prevent the development of such health issues than to spend money treating them, preventing and intervening in childhood obesity would possibly help to reduce the prevalence of adult obesity and health issues that come with obesity. In addition, helping children to form healthy lifestyles while young may help to ensure that these habits last throughout their lifetime.

To combat the prevalence of childhood obesity, many communities, public health and medical officials, and politicians have come together to advocate for and design various ways of intervention or prevention. Many public health officials have looked to school, communities, and families as a means of staging interventions for obese children. However, one option for intervention, especially in older children and teens, are weight loss camps. They claim that they are not “fat camps,” but camps focused on instilling habits that promote healthy living while losing weight, making friends, and having a lot of fun. These camps appeal to children and teens by containing the stereotypical activities found in summer camps, such as climbing, hiking, water activities, crafts, and other fun activities. However, they also prominently display testimonials from former campers about the life-changing effects on weight that the camps can lend their campers. For example, the website to Camp Pocono Trails, a weight loss camp located near New York City and Philadelphia, contains testimonials from nine different campers who not only thank the camp for helping with weight loss during the camp, but also afterwards. As one former camper named Lisa writes, “I made friends and had the best summer of my entire life, all while being taught how to eat healthy and exercise properly. After two months of being at Camp Pocono Trails, I left 45 lbs lighter with a confidence I had never had before. When I went home I

used the skills I learned at camp and lost a total of 100lbs\textsuperscript{8}. It is clear that for Lisa, the camp has helped to make long-lasting life changes that have resulted in a lower weight and living a healthier lifestyle. However, the fact that she describes it as “the best summer of her entire life” and left the camp “with a confidence I had never had before” shows that the benefit of these camps may not just be limited to physical change, but also mental and self-esteem changes that enable the sustainment of long term weight-loss.

\textit{Background Related Work & Motivation}

Evidence of whether or not the benefit of weight loss camps can be sustained by former campers in the long-term is lacking. Stephanie Saul, a writer for \textit{The New York Times}, notes that according to Dr. Pories, who runs East Carolina’s Metabolic Institute, the failure rate for the camps was about 67\% in 2008, which is very high\textsuperscript{9}. Scientific studies have looked at weight-loss camps and adolescent obesity have focused on their short-term impact on health. One group found that 11-13 year old children who participated in a weight loss day camp that included components addressing diet, activity, behavior, and parental involvement in weight-management had reduced BMI levels compared to those who did not go to the camp one-year after the camp ended\textsuperscript{10}. Another study noted how adolescents who went to weight-loss camps saw improvements in self-esteem regarding their athletic performance, physical appearance, and

overall self-worth while becoming less dissatisfied about their body shape without increasing their worry about their weight\textsuperscript{11}. From research done regarding weight-loss camps and the powerful testimonials from campers, it is clear that they may have some potential for becoming tools for weight loss intervention. However as Saul notes in her article, the cost of weight-loss camps prevents many families from being able to send their children to camps, including families of low economic status\textsuperscript{9}. In addition, without long-term evidence, the true measure of the effectiveness of weight-loss camps is unknown.

The goal of this study is to analyze the effectiveness of weight-loss camps as an intervention method in obese non-Black Hispanic and Hispanic youth ages 13-18. Non-Black Hispanic and Hispanic youth are specifically being targeted because those groups have the highest percentages of childhood and adolescent obesity, as well as adult\textsuperscript{2}. By immersing children in an environment that encourages weight loss and healthy living, but does not focus explicitly on being fat, youth may gain greater self-esteem and confidence in themselves, as well as have a memorable summer. This may help them to continue with weight loss efforts after camp as well. The study will also seek to look at the factors that resulted in the most successful weight loss and maintenance of camp gains by former campers. It will also help in figuring out the essential factors of a residential camp experience that future workers may possibly be able to integrate into less-expensive camp intervention programs.

Methods

I plan to gather a group of 150 non-Hispanic Black and Hispanic youth ages 13-18 in Los Angeles County who meet the definition of obesity, using monetary and youth-friendly incentives to encourage participation. Fifty youth will be sent to stay at Camp Pocono Trails, a residential weight-loss camp, for 7 weeks and 4 days. Fifty youth will participate in a non-residential weight loss day-camp, modeled after a similar camp run by Larsen10, for 7 weeks and 4 days from 7am-6pm Monday through Friday. Fifty youth will not go to either camp, but be asked to live their lives normally. Several metrics (physical, behavioral, psychological) will be used to track changes in the youth. Physical metrics include BMI, BMI-z, body weight and height, systolic blood pressure, 1-mile run times. Behavioral metrics include eating and activity habits. Psychological metrics include general attitudes towards life, body shape satisfaction, self-esteem, and worries. Data will be collected before the youth attend camp, after the youth attend camp, and each year after that for 10 years. I will use statistical tests to analyze the data for trends and for statistical significance, which will determine how effective the camp experience was.

Expected Outcomes

Those who go to camp will do much better in the long-run than those who don’t, simply because they’ve had the immersive opportunity to lose weight. In addition, those who have supportive parents, friends, and maintain higher self-esteem after camp will be able to retain and expand upon the benefits gained from going to weight loss camp. Children who lack a supportive environment or lose self-esteem after camp will be less likely to maintain and expand upon results.
Conclusion

While rates of childhood obesity remain stable within the United States, childhood obesity affects non-Hispanic black and Hispanic youth at greater rates. Obesity proves a great risk factor in chronic health conditions such as diabetes and has major financial costs. Weight-loss camps may prove to be a useful intervention method. To determine their long-term effectiveness, 150 youth (in groups of 50) will either be sent to a residential or non-residential weight loss camp or receive no camp experience. Behavioral and physical changes will be monitored before, immediately after, and annually for 10 years after the camp experience, with the results hopefully published as a paper in a journal.
Works Cited


Budget

Costs to Run Day Camp

According to the American Camp Association, the average cost per child per day to run a day-camp was $71.20. Using this figure: $71.20 x (7 x 5) + (7 x 4) = $189,240

It was not possible to find figures on how much a dietician would cost. The Labor Bureau puts the average salary of a nutritionist at $56,300. As the camp is only 7 weeks and 4 days (7.5 weeks), I plan to pay the dietician around $10,000, so they have incentive to participate in the camp.

The camp will most likely be run at a community center such as the YMCA. According to them, the rates for renting facilities (in this case the multi-purpose room for activities, and the meeting room for classes) is $50/day for the meeting room and $30 an hour for the full multipurpose room. The day camp will be run for 11 hours each day. This puts the cost for the rooms at the following: ($50 x 7 x 5) + ($30 x 11 x 7 x 5) + ($50 x 4) + ($30 x 11 x 4) = $15,150

Costs to Send Children to Residential Camp

Using 2018 Rates:

Sending 50 children to Camp Pocono for 7 weeks, 4 days

- 50 x $10190 = $509,500

Camp Pocono gives out free airfare for campers living west of the Mississippi River.
Costs to Incentivize Participation

- Movie Tickets will be given out for pre- and post- camp visits, 2 per participant, 2 times.
  
  Based on my experience and looking at prices for the most popular movies, an adult ticket is about around $13
  
  $13 \times 2 \times 150 \times 2 = $55,900

- Then, each annual visit will be $50 per participant (10 times)
  
  $9 \times 150 \times $50 = $67,500

I also plan to hire a statistician for a year to help me analyze the data. The average salary for a statistician is $85,160.

Thus, the total costs would be around $988,750.