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The Impacts of Childhood Obesity on Adult Health and Quality of Life

Miriam Weinstock
Touro College

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Miriam Weinstock
Miriam Weinstock will graduate with a BS in Biology in June 2017.

Abstract
Obesity has emerged as one of the most preeminent concerns of the modern era. Thirty six percent of our country's citizens are classified as obese and six percent qualify as extremely obese. Developing obesity as an adult is fairly common, but countless studies have shown a direct correlation between childhood obesity and remaining severely overweight as an adult. Aside from the physical and aesthetic discomfort of maintaining superfluous girth, the health hazards threatening the obese population are extremely discomfiting. The enormity of the issue requires extensive study so that society can educate themselves of the dangers and how to prevent them. The purpose of this paper is to explore the ramifications of childhood obesity on adult quality of life; given the probability that overweight youth will remain that way, it is vital to determine the groups at risk for obesity and what diseases they're likely to be at risk for. The studies discussed support the theory that obese children will usually remain that way and that they are at even higher risk for diseases like diabetes and heart disease than their obese peers who had not suffered from childhood obesity.

Part I-Introduction:

The last three decades have witnessed an enormous increase in childhood obesity in the United States. It is estimated that at least 17% percent of children are currently overweight according to the Centers for Disease Control and Prevention (CDC), and certain demographics like Hispanic and Black Americans display more alarming percentages. As more children become classified as overweight, those already at risk for extreme obesity are becoming even heavier. This becomes a grave concern because an adolescent develops an acute probability of becoming an obese adult. Consequently, childhood obesity has evolved into the most widespread predominant nutritional disorder affecting American children that pediatricians address (Childhood Overwieght, 2014).

Contributors to Childhood Obesity

The factors that contribute to this serious health concern are numerous. The most obvious ones are food choices consumed in an individual's diet, and average physical vs. sedentary activity. Less obvious but still pertinent are hereditary and genetic factors. There are numerous genetic alterations, or single gene mutations that are responsible for weight gain, although this is rarer (Childhood Overwieght, 2014). Parental obesity is a very significant indicator of a child's potential for being overweight. Specifically, parental BMI preceding and during pregnancy is a dominant early-life risk factor influencing BMI of offspring in adulthood. BMI is an acronym for body mass index which is a figure that relates weight to height and is obtained by dividing a person's weight in kilograms by his or her height in meters squared (Definition of Body mass index, 2016).

In the Australian pregnancy cohort study, offspring of mothers who had not received a college education, smoked and gained excessive weight during pregnancy or had high BMIs preceding pregnancy, had a higher chance of being obese at age 22. Paternal obesity, bottle fed babies and those who had a high birth weight had an increased risk of childhood but not necessarily adult obesity (Rath et. al. 2016).

Physical Consequences of Childhood Obesity

Adolescents who suffer from extreme overweight issues are prone to a host of severe medical issues at every stage of life, amongst them problems that normally afflict only the senior population. A well-documented study indicates that the lifetime risk of being diagnosed with type 2 diabetes (a disease brought on by excess weight) is estimated at 30% for boys and 40% for girls. Other publicized studies of the health issues directly or indirectly caused by obesity include cardiovascular disease, hypertension, high cholesterol, and in some rare but disturbing incidents, heart attacks in children as young as 5 (Bagchi, 2011).

Children who suffer from these contributing factors to heart disease may be suffering from Metabolic Syndrome (MS), which refers to a group of risk factors that increases the danger of developing heart disease and other health problems, such as diabetes and stroke. (What Is Metabolic Syndrome?, 2016).

In a study to determine MS prevalence, 201 obese subjects aged 6 to 18 were studied. The subjects in the study were diagnosed with MS if they had a BMI above the 97th percentile and met two or more of the following conditions: triglyceride level ≥ 1.7 mmol/L, HDL ≤ 1.03 mmol/L, fasting glucose ≥ 5.6 mmol/L, and arterial hypertension (systolic blood pressure ≥ 130 mmHg and/or diastolic blood pressure ≥ 85 mmHg). Of the 201 children and adolescents, 110 (54.7%) subjects were moderately obese and 45.3% were categorized as severely obese. The frequency of MS was 24.5% in the group of moderately obese and 37.4% in severely obese subjects. The majority of children and adolescents in the study had one or two components of MS. This discovery highlights the significance of recognizing degrees of obesity in children and adolescents, which could theoretically influence different rates of displaying cardiovascular risk factors (Šimunović et. al. 2016).

The obese pediatric population is also prone to developing nonalcoholic fatty liver disease (NAFLD). In a Japanese study conducted on NAFLD, researchers determined that more than 10% of all obese children had at least modest increases in serum transaminases, which indicates liver damage, even if they hadn't

developed full NAFLD. Other consequences of obesity include cholelithiasis, pseudotumor cerebri, obstructive sleep apnea, polycystic ovary syndrome, and orthopedic conditions such as slipped capital femoral epiphysis (Allcock., 2009).

Psychological Impact

Aside from the many alarming medical conditions these children grapple with, the detrimental impact their circumstance can have on their emotional wellbeing can be devastating. Obese and overweight children often develop depressive symptoms that can lead to negative body image and put them at risk for developing an eating disorder. Consequently, these children suffer from low self-esteem, which can instigate behavior issues that may develop into learning difficulties (Childhood Overwieght, 2014). A well detailed study on the psychological effects of childhood obesity found that children aged 5 to adolescents aged 18 shockingly compared their quality of life to individuals undergoing chemotherapy treatment for cancer (Bagchi, 2011).

A study involving young school age girls was conducted to determine how much behavior is impacted by weight. The study observed behavioral problems in 17%, 27%, and 2% of obese, overweight, and normal weight children, respectively. Cultural differences between varying countries didn't impact the correlation between the two factors and similarities were observed in most of the emotional-behavioral problems related to overweight and obesity. Internal emotional baggage, which includes anxiety, depression and withdrawal were seen in 11%, 15%, and 2% respectively, and external indicators of emotional disturbance, including aggression and delinquent behaviors, were observed in 8%, 17%, and 2% in obese, overweight, and normal weight children, respectively. (Seyedamini, et. al. 2012)

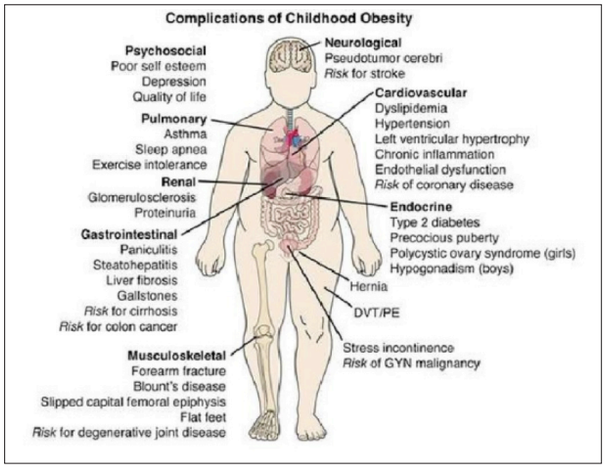

Figure 1 A diagram of a child's obese body with labels on the parts of the body that can be affected by obesity (Williams, 2010).

The data we have concerning childhood obesity and its correlation to significant impact on the physical and emotional health of the child is concerning enough. But the consequences on health later in life also requires study. Thus, the essential question in this field is: What effects will adolescent obesity have on the health of the child when s/he becomes an adult?

This paper will examine the various health issues that can surface for individual who continue to suffer from extreme overweight into adulthood, in addition to proposing some solutions for those who fall into that category.

Methods

Information was obtained online with access to online publications through the Touro college library. Additional references were obtained through Pubmed.

Part 2- Results and Discussion: Correlation Between Childhood Obesity and Adult Obesity

Before determining what the medical impacts on adult health are due to childhood obesity,we need to answer a fundamental question: Do obese children become obese adults? According to the response of test subjects, roughly twice as many individuals who reported that they were "considered a fat child" were more than 155% larger than what their ideal body weight should have been as young adult women, compared with women who did not report that they were "considered a fat child" (Rimm, 1976). Corpulence in infants leads to a twofold increase for risk of subsequent obesity. Another study concluded that the odds ratio for the persistence of obesity rises with age among obese children; endurance of obesity for overweight children hovered at 50%. Considering that this study was conducted before the enormous surge in childhood obesity in recent years, the current figure would be even higher (Allcock et. al., 2009).

A study was conducted where 1,355 participants from the Australian Pregnancy Cohort were analysed. This represented an Australian birth group born between 1989 and 1991. There were 12 periodic intervals where mothers and children were surveyed starting from early pregnancy: birth, 1, 2, 3, 5, 8, 10, 14, 17, 18, 20 and 22 years. The data collected provided researchers with an opportunity to track BMI patterns from birth to maturity and to examine the significance of early-life contributing factors to obesity.

Factors that were investigated as possible causes of being extremely overweight were: sex, most advanced level of education of the mother (paternal education level not available), maternal and paternal pre-pregnancy BMI (based on recalled weight recorded at 18 weeks of pregnancy), maternal smoking during

pregnancy, maternal anemia and diabetes during pregnancy (pre-existing or gestational), and excessive pregnancy weight gain (change in weight from pre-pregnancy to 18 weeks and 34 weeks' gestation). These factors all represent pre-birth conditions. Post-partum, other factors of influence were observed to be cesarean delivery, early birth, birth-weight, first-year growth and extent of breast-feeding.

BMI of the participants was recorded; to eliminate any gender discrepancy the BMI was standardized using z scores and standard deviations. A BMI higher than the 85th percentile was considered overweight and obesity was declared above the 95th percentile. In adulthood, these would correlate to BMIs of 25 and 30 respectively.

The results indicated that maternal and paternal BMI produced the strongest effect on offspring BMI, particularly in adolescence and early adulthood. Compared to children whose parents were not overweight, children at ages 14 and 22 with overweight mothers had more than 4 times the risk of developing obesity. This paled in comparison to children of obese mothers which predicted a 7to10-fold increase of risk. Paternal overweight almost tripled obesity risk at age 14 although it was determined to be non-impacting at age 22. But paternal obesity resulted in an almost fourfold increased risk of offspring obesity at both ages (Rath, 2016).

In an attempt to clarify the correlation between childhood and adult obesity, statistics were assembled from four longitudinal studies conducted between 1929 and 1960. The studies compared the BMI at the target adult age of 35 to the BMI between 1 and 18 years. BMI at age 13 usually predicted the BMI at 35 and the BMI at 18 was usually extremely accurate in predicting adult size. One study tracked the BMI of infants until the age of 21. At the study's completion, 41% of the individuals that were lean at one year remained in the lean category and 41% of the fat infants remained in the fat category. Further studies have projected that up to 81% of overweight (BMI greater than 85th percentile) adolescents will become obese young adults. (Whitaker, 1997)

Researchers have also had to determine which BMI should be the cutoff point that ascertains obesity. They established that the likelihood that obesity will continue in 50% of adolescents identified by a BMI ≥95th percentile, or by a weight-for-height of 130%, which is slightly larger than a BMI ≥95th percentile, suggests that a BMI ≥95th for children of the same age and sex signifies a realistic cutoff point to identify lasting obesity. After establishing these percentage guidelines, researchers then had to establish the number adolescents that fall into these categories. The CDC has determined contemporary data that demonstrates that 31.9% of youth aged 2-19 are at or above the 85th percentile, 16.3% are at or above the 95th percentile and a shocking 11.3% are at or above the 97th percentile of the 2000 BMI-for-age growth charts. This indicates that approximately one in three individuals between the age of 2 and 19 years is either overweight or obese (Allcock., 2009).

Health Implications for Obese Adults

Now that we have determined the immense likelihood that obese children will morph into obese adults, we need to examine the health consequences this correlation presents. Individuals who suffer from childhood obesity are at risk for higher rates of developing disease as an adult as well as dying earlier. This can be referred to as the impacts on adult morbidity and mortality, which is defined in the following way: Morbidity describes the unhealthy state of an individual while mortality occurrence of death in a population (Morbidity vs. Mortality, n.d.).

A 1988 follow up on the Third Harvard Growth Study of the early 1930s that tracked school-age youth into adulthood provided some insight into the effects on adult health and quality of life. Overweight participants were determined to be adolescents who had more than two measurements of their body mass index (BMI) above the 75th percentile during high school. Subjects with a BMI between the 25th and 50th percentile throughout high school were classified as slim. The follow-up data was collected when the subjects were 55 years of age, and the results were modified to represent smoking status and reported weight. There was an extremely high correlation between disease and their excess childhood weight. Both males and females had increased rates of the classic diseases that afflict the obese population: diabetes, coronary heart disease, atherosclerosis, hip fracture and gout. The risk of these diseases was only slightly diminished after adjustment for smoking and adult weight. Only the risk of diabetes became insignificant after adjustment for lower adult weight; type 2 diabetes is known to be directly correlated to high weight (Dietz, 1998).

A Dutch study similarly sought to observe the impact of a higher BMI at age 18 on premature adult mortality from all causes. A group of over 78,000 Dutch men at the age of 18 were studied and tracked over a 32-year period. They found a higher incidence of all-cause deaths in those individuals with a BMI >25 (classified as overweight) compared to individuals with a BMI between 18 and 25 (Hoffmans, 1988).

Cardiovascular Disease and Risk Factors

Of all the diseases mentioned, the most severe are arguably cardiovascular. How does childhood obesity impact adult heart health, or lack thereof? With rising evidence to help conclude that childhood obesity is linked to adult obesity, the medical world has been grappling with the question as to whether obese

adults' risk of cardiovascular disease (CVD) is increased by their pediatric obesity or just similar to weight-matched peers.

The precise connection between obesity in youth and adult development of cardiovascular disease was researched in the Princeton Follow-up Study. As expected, the group that presented symptoms of MS in childhood due to obesity had a dramatically increased risk of developing cardiovascular disease 25 years down the road, compared with the group that didn't suffer as children. In fact, MS in childhood was a stronger determinant of future cardiovascular disease in adulthood than was gender or even genetic history of cardiovascular disease. The youth in their initial study exhibited an adolescent incidence of MS of 4%. In the follow-up study, this had risen to 27.2% for adults. This study also demonstrated that risk of CVD increased by more than 24% for each 10 % increase of BMI (Allcock, 2009).

Researchers also wanted to establish the connection between weight change or maintenance from youth to adulthood and the subsequent development of MS.

From 1993-4, a population study examining participants born between 1947-57 was implemented in Finland. Records of the 7-year-old height and weight were obtained for 439 subjects. Obesity was delineated as the top third BMI measure and MS was diagnosed based on observations in the following areas: a systolic blood pressure ≥140 mm Hg and a diastolic blood pressure ≥90 mm Hg. If a patient was receiving treatment of antihypertensive drugs they were considered to have high blood pressure as well. Other factors were: dyslipidaemia (hypertriglyceridaemia ≥1.70 mmol/l, low HDL cholesterol levels <1.00 mmol/l (<1.20 mmol/l in women), insulin resistance (abnormal glucose metabolism according to the World Health Organization's criteria or hyperinsulinaemia (≥78 pmol/l), or both).

The number breakdown amongst the 439 subjects was as follows: 75 were obese as both adults and children, while 219 weren't obese for either age. Of these, 71 were obese adults who hadn't been fat as children, and another 74 were overweight in their youth but not as adults. Eight per cent of men and 5% of women displayed symptoms of MS, which amounted to 30 individuals in total. Of those people, 21% were obese adults and 21 had also suffered from childhood obesity. The study found that risk of MS was 2.9% for adults who had been obese as children but this figure increased to 26.7% for people who continued to obesity into adulthood. Interestingly there was a zero incidence of MS in the 74 people who had formerly been overweight but had since slimmed down.

The study concluded that ultimately childhood obesity augmented the dangers for developing MS as an adult and that obese youth who grew to be obese adults had a particularly high risk of MS. Incredibly, the risk was lower in obese adults who had not been that way as children. This reinforces the theory that obesity determined prior to adulthood is more detrimental than late onset obesity. The probable explanation for this is that unceasing obesity serves as a "generator" for protracted insulin resistance, which is directly correlated to and causes hypertension and metabolic irregularities. The study results indicate that prevention of adult obesity and consequent MS and CVD risk is dependent on the earliest possible intervention for obese children to ensure they lose the weight (Vanhala, 1998).

One of the indicators of CV. is carotid artery intima-media thickness (IMT) and is recognized as an important predictive measure of clinical coronary atherosclerosis health issues in middle-aged and elderly populations. Carotid artery IMT measures the thickness of the inner two layers of the carotid artery, the intima and media. A thickening of both is a measure used to diagnose the extent of carotid atherosclerotic vascular disease (Carotid Intima-Media Thickness Test, n.d.).

From September 1973 to December 1996, a study that investigated the effect of childhood adiposity on adult heart health examined a cohort of 486 participants from a community in Bogalusa, Louisiana. Surveys were conducted approximately every 3 to 4 years; 7 surveys examined children from the ages of 4 to 17 years while 5 surveys followed up with young adults aged 18 to 38 years, who had participated as children and remained available. The premise of the study (observing children into adulthood over a 20-year span) enabled the researchers to measure the collective and snowballing effect of risk factors since childhood. The purpose of the study was to observe the link between carotid IMT in young adults and traditional cardiovascular risk factors measured since childhood.

Participants experienced the following procedure for each examination: Height and weight were obtained within a .1% range of error after the subject fasted for half a day. These measures were used to calculate BMI. Next, duplicate blood pressure measurements were taken. Systolic and diastolic blood pressure levels were evaluated 6 times and these levels were averaged for the final observation.

The results found strong correlation coefficients between CVD risk factors measured since childhood and the carotid IMT in young adults: Overweight adolescents with high levels of LDL cholesterol ("bad" cholesterol) in childhood, high BMI and systolic blood pressure were interrelated with carotid IMT in young adults, with LDL-C level showing the highest correlation. As mentioned previously, this is concerning as high carotid IMT levels are strong indicators of developing cardiovascular disease. (Li S 2003)

Prostate Cancer and Obesity

Prostate cancer has also been linked to obesity. When the prolonged nature of this disease is considered, it can be assumed that adolescent health may be an early life contributor. A number of studies of the correlation between prostate cancer and early life obesity. It is important to note that the results of the studies provided conflicting data: some observed a direct link between childhood BMI and prostate cancer risk, while others actually determined that increased BMI served as a protective measure against the disease.

A contemporary study that tracked 950,000 men for a 20-year span was conducted in Norway. The study determined that a BMI larger than 30 amplified the risk of prostate cancer by only 9%. Conversely, the 50 to 59 age group of obese men had a 58% increased risk of prostate cancer but no younger age group presented a substantial risk. Another study that incorporated data from the Health Professionals Follow-up Study by Giovannucci and colleagues, discovered that an increased BMI was actually correlated to a decreased risk of prostate cancer among men younger than 60 years or those with a family history of the disease (Freedland and Aronson, 2004).

Psychological Ramifications of Childhood Obesity into Adulthood

Aside from the obvious physical implications obesity presents, the Harvard Growth study also determined that additional psychological repercussions resulted when adult morbidity was linked to childhood obesity. In a large sample studied during the National Longitudinal Survey of Youth, surveyors revealed that obesity present in adolescent females had grave social consequences several years later as an adult. Amongst them were: low marriage rates, decreased years of education, inferior net incomes and compounded poverty levels. The prevalence of these results, (after adjustment for the income and educational levels of the individual's family as well as self-esteem) indicated that female obesity actually triggered these socioeconomic links, as opposed to being a result of these socioeconomic associations. This further demonstrates the detrimental impacts of adolescent obesity on adult quality of life. (Dietz, 1998)

Part 3: Future- Preventions and Treatment Youth Intervention Studies

Looking forward, it is incumbent on us as a society to prevent and treat obesity given all the severe and often fatal maladies obesity causes. So far, exploration of obesity prevention was conducted in only a limited number of studies. This may be for a host of reasons including a dearth of funding for public health and obesity investigation; insufficient prevention tactics, and overall inadequate training in medical education programs. The prevention tactics targeting obesity on a small community-wide scale that have been used are the following: Targeting a community wide population with the goal of reducing the average BMI collectively, which is known as an intervention strategy. If a strategy narrows the scope to target only individuals already at high risk (offspring of obese parents) it is a selective prevention. This kind of program seeks to educate and imbue these people with the necessary skills to avoid weight gain. Finally, a targeted prevention tactic assists those who are already overweight or obese in their attempt to lose weight. One example of how this was implemented was in the North Carelia Project which incorporated media education, as well as programs specifically designed for schools and work places. The program saw the most success in a ten year follow up when children were treated in conjunction with their parents. Weight changes and decreased incidence of obesity proved the efficacy of the family based and lifestyle mediations.

Researchers on the subject believe that primary intervention for youth is better than attempting to treat already obese adults. There are established periods that have been identified as crucial to preserving healthy body weight: the prenatal stage, the period between 5 and 7 years of age (which is referred to as the adiposity rebound) and the teenage years. Although a large percentage of individuals may only experience weight gain as adults, there is a substantial correlation between childhood and adult BMI. Childhood obesity persevering into adulthood appears to rise linearly as a child get older. Precursors of adult diseases such as hypertension are increasingly affecting obese children. As demonstrated earlier, childhood obesity is a strong predictor of adult morbidity and it has therefore been suggested that an effective treatment of adult obesity may be youth intervention. Based on this assumption, researchers developed the KOPS (Kiel Obesity Prevention Study) which inaugurated in 1996. A cohort of 5 to 7 year old children was gathered in a the city of Kiel, Germany and the study was supervised with cooperation from school physicians and teachers, in addition to the formation of a new sports program for heavy children. Basic information gathered at the beginning of the study included: evaluation of the nutritional state and dietary habits of the child, review of lifestyle (active vs. sedentary) social status, physical fitness compared to a subgroup of children, muscle strength, and preexisting health factors that increased risk, such as blood pressure, glucose levels and cholesterol. The cohort (which amounted to 25,338 children in total) had their BMIs recorded in comparison to the norms of the total group of 5-7 year olds born in 1998. Overweight and obese BMIs were designated based on the following criterion: triceps skinfold thickness (TSF) as a parameter of fat mass. The 90th TSF percentile was used as the value to determine obesity. The study was designed to conduct a follow up session with the participants every 4 and 8 years. The study was implemented by introducing a nutritional

awareness and health promotion program for children and their parents in three intervention schools every year. Corresponding data from demographically similar schools were designated as the control groups. This reversed every alternate year. Family assistance and a structured sports program were offered to families with overweight or obese children, as well as families with normal-weight children with obese parents.

The premise of the study was that preventing obesity is dependent on healthy lifestyle. Lifestyle changes can only be implemented by augmenting knowledge and self-awareness as well as harnessing self-esteem and personal independence. The rigorous intervention methods included a panoply of directives, amongst them: eat fruit and vegetables daily, reduce the intake of high fat foods, keep active at least 1 hour a day, and decrease TV consumption to less than 1 hour a day. These messages were delivered to pre-school age children within their first year. Teachers working in conjunction with skilled nutritionists offered 8 hour courses on nutrition for the students as well as parents, who were asked to attend school meetings to address the issue. Aside from the programs offered in school, families with obese children or parents were provided with counseling and support programs for the family as a whole. This consisted of home visits arranged by a nutritionist who visited on between 3 to 5 times in a span of 3 months to assist with shopping, cooking and 'resetting the family table'. The counseling instructed parents to screen food ingestion and physical activity. A half year program of structured sports biweekly was also offered to overweight youth. Assessment of the results were collected with the intention of determining the following outcomes: primarily, a change in BMI and second, change in health-related comorbidity, or the presence of diseases caused by obesity. The differences were examined in both the intervention and the control schools.

In the first 4 years of the study, school interventions were directed at 414 children, their parents and teachers. 92 out of 368 eligible families partook in the family intervention program and 25% of the families finished the program. The short-term effects were studied for all children within 3 months after the end of the interventions. Due to the interventions, 60% of the children exhibited adequate nutrition recognition (as opposed to the original 48%), 65% of children related that their physical activity had increased (while time spent in TV watching had diminished) and 28% of them had joined a sports group. Families as whole had a 50% increase in their produce consumption and low fat food was also consumed more frequently, increasing from 20% to 50%. The nutritional state of children in the intervention schools was reevaluated after 1 years' time. Compared to the nutritional states of children in control school, the intervention school group showed drastically improved results: the control groups had higher increases in TSF as well as percentage of fat mass. (Müller et al. 2001)

Another study was conducted to evaluate various methods of intervention for adolescents ranging from behavioral, which consisted of introducing simple intervention methods, to pharmacological treatments which consisted of a drug regimen, and finally, surgical interventions for the morbidly obese sector.

Behavioral interventions were incorporated in schools or specialty health care settings to target youth aged 5 to 18 years and introduced behavioral modifications similar to the Kiel Obesity Prevention study: education about healthy dietary habits and augmented physical activity. The data collected from the school interventions described a 0.4 to 2.07 difference in mean BMI change between those that were treated and the controls at 6 to 12 months, with a collective estimate of .82 lower BMI in those treated. This would mean a loss of 3 pounds for an 8-year-old boy or girl, (assuming growth of 2 inches or less), and a 4-pound loss for a 12-year old boy or girl. For a 16-year-old adolescent, this would mean a weight loss of 4.5-6 pounds, depending on gender. Specialty health care setting proved to be much more effective, displaying a 1.9 to 3.3 BMI difference, compared to control groups, for 6–12 months post-treatment. This would mean a 12-13-pound weight loss for an 8 year old (again, assuming 2 inches of growth), and a 16.6 to 17.75 pound weight loss for a 12 year old. 16 year olds enrolled in the program could experience up to a 23-pound weight loss (Whitlock EP et al. 2008).

It is important to acknowledge that the trial results would not necessarily translate well to helping individuals in a real world setting. The studies utilized media advertisements for enrollment; it follows that those participants may have been more inspired to lose weight, and had a surplus of free time. Parental alarm, multiple failed attempts at weight loss or other such factors may have produced skewed results.

Pharmacological aides in addition to behavioral interventions have been investigated only in obese youth aged 12 to 18 years that meet adult criteria for class II obesity, which is a mean BMI of 35 to 40 the beginning of the trial. Drugs incorporated into the weight loss regimen such as sibutramine and orlistat were administered in conjunction with behavioral interventions for a 6-12 month span. Unfortunately, longer term impacts after treatment termination are not presented for any of the pharmacological trials (Whitlock EP et al. 2008).

A sizable trial consisting of 498 people tested 12 months of sibutramine in combination with a behavioral intervention plan. The control group received the same behavior modification plans but a placebo pill. Sibutramine is a medication that supports weight-loss by altering neurotransmitters within the brain. Nerves need to correspond with other nerves and neurotransmitters are what nerves produce to accomplish the

process. When neurotransmitters are sent out, they either attach to other nerves or they may experience reuptake, which is when the same nerve reabsorbs it. Sibutramine obstructs the reuptake of the neurotransmitters dopamine, norepinephrine, and serotonin. Preventing reuptake of neurotransmitters modifies the balance of neurotransmitters within the nerve cells and thus affects nerve function and interaction.

After 12 months, the subjects who took the 10-15 mg dosage of subatramine lowered their BMI by almost 3 units, which corresponds to a 14-pound weight loss. Astonishingly, the participants of the control group experienced a 4.2-pound weight gain. Interestingly, it seems the decrease in weight that occurs over a year with intense and successful behavior intervention rivals the achievements of the pharmacological interventions in the same time span, but more direct comparison would be necessary to substantiate the claim. (Whitlock, et al. 2008) Although this drug proved to be successful, it's important to note that it's no longer available in the U.S. for fear of heart attack or stroke (Eni Williams, 2015).

Conclusion

Childhood obesity is increasing with alarming frequency and can be attributed to a number of factors including diet, health education, and parental BMI. The impacts can be devastating; obese children battle with deadly diseases that can severely compromise their quality of life. This issue only gets amplified if obesity persists into adulthood. Numerous studies have demonstrated the adult health ramifications caused by childhood obesity, including diabetes, metabolic syndrome and cardiovascular disease. Overall mortality for adults also increases when they have a BMI above 25 (overweight range). Although the present seems bleak, various studies have investigated prevention and treatment for obesity, amongst them community wide behavior interventions that have been very successful. If obesity is effectively conquered in childhood, the individual's adult health and quality of life can be immeasurably improved.

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