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Winning the War against Childhood Obesity: The Role of Teachers and Schools in Early Childhood Education

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Abstract

American children are at the epicenter of a global childhood obesity epidemic. Due to increased adiposity, school-aged children are being routinely diagnosed with adult illnesses like Type II diabetes, hypertension, and elevated cholesterol levels. The keys to combating these epidemiological trends are prevention and early intervention. Since the majority of American children are enrolled in school, school-based interventions offer enormous potential in teaching lifelong health habits and curbing the incidence of childhood obesity, especially when these habits are taught proactively as a component of early childhood education. Adiposity rebound is the critical period of increasing body mass index (BMI), that occurs at about age six, after the early childhood nadir on BMI growth charts. Due to this classical occurrence in school-aged children, early childhood education is an ideal therapeutic window for implementing school-based obesity prevention strategies. This essay will examine the phenomenon of adiposity rebound and the role that teachers and schools may play in combating the issues related to childhood obesity during this critical period of early development.

About fifty years ago, the associations of children, regular play, and physical activity was a societal norm and expectation. Children would play outside from sun up to sun down. Physical education and recess were components of most school days and seventy percent of meals were prepared at home. At that time, food sales away from home amounted to approximately 14 million dollars compared with 44.1 million dollars spent on foods consumed at home (Economic Research Service, 2008). Fast foods were the exception and not the dietary rule. Then, things dramatically changed. Dietary excess became the standard. In 2009, food sales away from home skyrocketed to 574.5 million dollars compared with 607.4 million dollars spent on foods consumed at home (Economic Research Service, 2008). Across the nation, physical education programs in schools were

eliminated due to budgetary constraints and the complete devotion of instructional time to core subjects like English and Math to meet the strict testing requirements mandated by the Bush administration's "No Child Left Behind Act" (Henley, McBride, Milligan, & Nichols, 2007). Video gaming time and computer usage increased, along with television viewing among our nation's children. To make matters worse, the promotion of dietary imbalance increased within our culture due to food advertisements on television. Mink, Evans, Moore, Calderon, and Cosgrove (2010) found that a 2,000-calorie diet consisting entirely of advertised foods would contain 25 times the recommended servings of sugars and 20 times the recommended servings of fat, but less than half of the recommended servings of vegetables, dairy, and fruits. At every turn, there was ready

access to high-calorie, nutrient-scarce foods and beverages, and increasing portion sizes that were contributing to the expanding waistlines of school aged children.

According to the World Health Organization (WHO), obesity is defined as abnormal or excessive fat accumulation that may impair health (World Health Organization [WHO], 2011). It results from consuming more calories than are expended (Centers for Disease Control [CDC], 2006). In the United States, the number of children and adolescents affected by obesity has continued to increase over the last three decades. According to the National Health and Nutrition Examination Survey from 2007-2008 (NHANES), childhood obesity affects approximately 12.5 million (17%) children and adolescents (age 2-19) in the United States (CDC, 2006). Childhood obesity has been associated with the development of several co-morbidities such as obesity and disability in adulthood, hypertension, diabetes, osteoarthritis, certain cancers, and premature death (CDC, 2006). In addition, obesity can contribute to depression, isolation, and feelings of hopelessness and despair (CDC, 2006). These psychosocial issues can extend into adulthood as well. Obesity is a complex disease that is related to lifestyle, environment, and genetic tendencies. Although researchers are still grappling with the complexities of this health condition, what is known is that once the trajectory of childhood obesity has been established, it is difficult to reverse the pathology and to avoid the adverse health outcomes associated with it (CDC, 2006).

Adiposity Rebound

Childhood adiposity, as measured by body mass index (BMI), increases during the first year of life and then decreases as children begin ambulating and engaging in regular physical activity. At the same time,

children tend to engage in picky eating and adipose cell growth stabilizes as a result of the combined increase in physical activity and selective eating pattern. Around six years of age, a renewed rise in body fat growth, known as adiposity rebound, occurs extending through adolescence into adulthood (Rolland-Cachera et al., 1984).

According to the landmark study by Rolland-Cachera et al. (1984), adiposity rebound can serve as a gauge for predicting obesity in adulthood. Research suggests that early adiposity rebound might constitute a marker for generalized growth acceleration and fat cell hyperplasia (Rolland-Cachera et al., 1984). Subsequently, the research also demonstrated a relationship between the age at adiposity rebound and final adiposity (as an adult) (Rolland-Cachera et al., 1987). An early rebound (before 5.5 yrs) was followed by a significantly higher adiposity level than a later rebound (after 7 yrs). This phenomenon was consistently observed regardless of the subject's adiposity at 1 year (Rolland-Cachera et al., 1987).

In a retrospective cohort study using lifelong height and weight measurements, Whitaker, Pepe, Wright, Seidel, and Dietz (1998) observed that adult obesity rates were higher in those with early versus late adiposity rebound, and that adult obesity occurs more frequently in children who have early adiposity rebound. The study concluded that an early adiposity rebound is associated with an increased risk of adult obesity independent of other risk factors for the disease.

Several other studies have confirmed that an earlier adiposity rebound (based on assessment of BMI) increases the risk of later obesity (Rolland-Cachera et al., 1984; Lawlor & Chaturvedi, 2006). Yet, there still remains some skepticism about the value of adiposity rebound since BMI is not a true measure of adiposity and other markers of adiposity do not show the same patterns as

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BMI over early life (Lawlor & Chaturvedi, 2006; Cole, 2004). One of the main criticisms of BMI is that it does not discriminate between muscle and adipose tissue and does not directly assess fat distribution. In general, measures of fat distribution such as waist circumference and sagittal abdominal diameter are more highly correlated with cardiovascular disease risk factors and diabetes than BMI; however, differences are usually small (Stevens, McClain, & Truesdale, 2008). Furthermore, practical considerations such as cost and feasibility must influence the choice of measure of obesity in large populations. The additional cost of a more precise measure may not be justified in many circumstances (Stevens et al., 2008). Overall, despite the criticism, BMI remains the most cost effective, reliable, and non-invasive tool available for assessing adiposity. Therefore, the findings of these early researchers regarding childhood adiposity rebound might indicate a possible window of opportunity for primary prevention of obesity.

Is there a critical period for the primary prevention of obesity?

Three periods in early life may be particularly important for the development of obesity and its associated morbidity and mortality: the perinatal period; the period of adiposity rebound; and puberty/adolescence (Lawlor & Chaturvedi, 2006). Studies in animal models of human disease suggest that brief interventions during critical or sensitive periods of development can have lasting effects in terms of disease prevention (Lawlor & Chaturvedi, 2006). These findings are fueling current research and offer tremendous promise in improving existing obesity treatment and prevention in children and adolescents. Based on the existing research data, it appears that adiposity rebound may qualify as a sensitive

or critical period of development where potential health promotion efforts might have an enduring impact on obesity prevention (Cole, 2004). Yet, there are still unanswered questions regarding the modification of the age at occurrence of adiposity rebound. It may be genetically programmed, difficult to alter, and merely a reflection of an inherited susceptibility to obesity. Alternatively, the age at adiposity rebound might reflect important environmental influences that are modifiable (Whitaker et al., 1998). If the latter is the case, the time of adiposity rebound may be a critical period in childhood for the development of obesity (Whitaker et al., 1998; Dietz, 1994). It stands to reason that if healthy eating habits and physical activity patterns are established prior to and throughout adiposity rebound, school aged children could possibly retain a body weight within the normal parameters for their age and sex beyond this critical period of development. Even though the normal physiological tendency is to gain weight at this stage, the healthy nutritional habits and physical activity will help counter any excessive weight gain during this period. Therefore, targeting the prevention of obesity before and during a key period, like adiposity rebound, may be of particular relevance in reducing subsequent risks of adult obesity and associated chronic disease (Lawlor & Chaturvedi, 2006). This is where the role of teachers and schools is critical in increasing health literacy and fostering health promotion among school-aged children during this sensitive time of development in early childhood.

The Role of Teachers and Schools in Obesity Prevention

Population-based obesity prevention efforts, like those in school settings, have clear advantages. They offer opportunities to enlist the involvement of parents and

disseminate other knowledge pertinent to healthy eating and physical activity. In addition, large numbers of children can be reached, guidance could be continuous and concentrated, and cost to the family may be minimized (Brownell & Kaye, 1982).

The potential and pivotal role that teachers and schools may play in combating childhood obesity has been explored in the literature in other contexts, but not from the perspectives of primary prevention and intervention at critical junctures in early childhood development, like that of adiposity rebound. Given the possibility that there is a theoretical window of opportunity to effect change on health outcomes and divert the pathogenesis of disease, schools and early childhood educators can play a critical role in increasing the health literacy of school-aged children prior to and throughout the adiposity rebound of early childhood. For example, schools can create wellness policies and curriculums that support and include nutrition, physical education, and opportunities for physical activity, as well as other school-based initiatives that are designed to promote student wellness.

One school-based strategy that is gaining wider acceptance is the use of school gardens to teach school-aged children about health, nature and wholesome nutrition (Somerset & Markwell, 2008). For example, the Organic School Project is a national example of an obesity prevention program that was designed to reconnect school children to their food source through organic gardening, wellness education, healthy nutrition, mindfulness, and environmental stewardship, through an integrated wellness curriculum (Organic School Project, 2011). Related strategies that can be readily implemented during early childhood, foster healthy eating habits, and foster regular physical activity include: the installment of salad bars (in cafeterias),

teaching children how to use the salad bars, and allowing for daily indoor or outdoor recess (Budd & Volpe, 2006). Farm to school programs, where regular field trips to local farms take place to allow students to collect produce, have also been shown to be beneficial as school-based obesity prevention programs (Budd & Volpe, 2006). Classroom tasting parties may be effective in fostering food awareness by allowing young school-aged children to experience different vegetables and fruits that they may not ordinarily encounter e.g. mango, kiwi, zucchini, squash, rutabaga, etc. (Budd & Volpe, 2006). At the same time, early childhood educators may augment children's understandings of food by incorporating nutrition education into daily lessons, so that by the time this upward trend in BMI occurs, students have the life skills to help them ward off obesity and the associated adverse health outcomes. As pivotal figures, teachers can foster a positive and supportive school context, and provide good modeling and social learning opportunities. In addition, they are uniquely positioned to collaborate with parents in creating healthy behaviors. Well-informed teachers can serve as a resource for parents and children.

Conclusion

Childhood obesity continues to be a prevalent problem in school-aged children. It is a multi-determined condition that requires a multiplicity of prevention and treatment approaches (CDC, 2006). Parents and professionals who hope the obese child will "grow out of it" await an unlikely event. Approximately 80% of overweight children become overweight adults (Brownell & Kaye, 1982). With increased adiposity, obese children are susceptible to a myriad of chronic diseases including hypertension, type II diabetes, hypercholesterolemia, and depression. Once this disease trajectory is set in motion, it is difficult to reverse. Research has demonstrated that attempts to

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treat established obesity in adolescence and adulthood may be too late to have an important impact on disease prevention or improvement in overall health (Lawlor & Chaturvedi, 2006). Therefore, it might prove to be more feasible and efficacious to target early childhood for obesity prevention rather than treat established obesity.

Adiposity rebound may represent a critical period for the primary prevention of obesity, where healthy eating and physical activity habits can be established. Although there is still room for future research to examine the biological and behavioral determinants of adiposity rebound and whether the age at adiposity rebound is a modifiable risk factor for adult obesity, the period of adiposity rebound still offers a potential therapeutic window for primary obesity prevention efforts within school settings (Whitaker et al., 1998). Together, teachers and schools can provide powerful leadership to help stem the tide of childhood obesity.

Winning the war against childhood obesity is possible by making small changes in campus food provision, increasing opportunities for dietary education, and an increase in physical education in the classroom and beyond. Such measures would have a significant impact on a child's health and ability to learn. Research has proven that healthy children have an easier time retaining information at school. Moreover, healthy children become healthy adults.

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