Examining Structural Relationships Among Environmental, Behavioral Factors, and Childhood Obesity

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The startling growth in the obesity epidemic facing American children has been a leading public health concern over the past several decades. A considerable body of research has focused on understanding various factors associated with childhood obesity. However, these relationships have often been examined individually without consideration for how these factors could jointly contribute or mitigate the effects of each other. Our research seeks to address this gap by testing a comprehensive model on factors influencing childhood obesity. We analyze data on fifth graders from the Early Childhood Longitudinal Study (ECLS-K) conducted by the National Center for Educational Statistics. Our results challenge the current intervention programs by providing empirical support of relative importance among multiple factors contributing to childhood obesity.

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EXTENDED ABSTRACT

The startling growth in the obesity epidemic facing American children has been a leading public health concern over the past several decades. The childhood obesity epidemic results in not only severe health consequences, but also the attendant medical, psychological, and social costs (Allison, Fontaine, and Naraya 1999; Rippe and Aronne 1998). A considerable body of research has focused on understanding various factors associated with childhood obesity. Past research has identified two main factors associated with childhood obesity: behavioral and environmental factors. Behavioral factors include a sedentary lifestyle and consumption of excess calories, which lead to low energy expenditure and high energy intake, while environmental factors consist of (1) family factors, (2) school factors, (3) community factors, and (4) media factors.

However, these relationships have often been examined individually without consideration for how these factors could jointly contribute to obesity. Furthermore, due to the limitations of past study samples, it was often not possible to account for the child’s psychological traits in these studies. In order to develop more effective intervention programs, we must consider these factors jointly (Davison and Birch 2001) and also test for possible moderating effects of key psychological factors. With that in mind, the goal of this study is to develop and test a comprehensive model on factors influencing childhood obesity. By applying the theory of consumer socialization (Moschis and Churchill 1978), we postulate that children’s behaviors related to obesity-prevention such as healthy eating patterns and physical activities are (1) learned “consumer skills” through the socialization process and are (2) influenced by social agents (i.e., family, school, community, and media). We further examine the potential moderating role of the child’s psychological traits, such as self-control and internalizing problems, in the relationship among environmental, behavioral factors and children’s weight status.

We analyze data on fifth graders from the Early Childhood Longitudinal Study (ECLS-K) conducted by the National Center for Educational Statistics. The longitudinal survey was performed in the fall and spring of kindergarten (1998-99), the fall and spring of 1st grade (1999-2000), the spring of 3rd grade (2002), 5th grade (2004), and 8th (2007) grade. The ECLS-K used the nationally representative sample of a cohort of children who entered kindergarten in the fall of 1998 from approximately 1000 schools. A multistage probability sample design was employed to select the ECLS-K sample. Information about children was obtained from parents (through CATI interview), teachers (through paper survey) and students (through in-person interview and paper survey). However, we focused on the 5th grade data (2004) because the ECLS-K started to include information on children’s food consumption since 5th grade; furthermore, the 7th grade data are not yet available to the public. Among a total of 11,820 students from the 5th grade data, our sample was limited to 9,019 students who attended public schools and provided information on BMI.

For the purpose of testing the proposed model by incorporating multiple factors simultaneously, we use the structural equation modeling (SEM) approach. We first tested the measurement model to examine whether the measurement items have the appropriate properties to represent each construct included in the model. We then evaluated the structural model by examining overall model fit and structural relationships specified in the model. LISREL 8 (Joreskog and Sorbom 1993) was used for evaluating both the measurement and structural models.

The results from this study provide empirical support of identifying relative importance among multiple factors contributing to childhood obesity. The major findings from our study are: (1) When family, school, community, and media factors are considered jointly, the family factors appear to be the most significant determinants of a child’s involvement with unhealthy eating patterns and physical activities, (2) especially, mothers’ working hours more than 35 hours and children’s TV viewing time have a significant and direct impact on children’s weight status, (3) while the school factors and community factors have relatively less significant impact on children’s behaviors related to obesity-prevention, and (4) children’s psychological traits such as self-control and internalizing problems moderate the relationships among environmental, behavioral factors and children’s weight status.

The findings from our study are important in several ways. First, it might be the one of the first studies to look at the relationship between childhood obesity and multiple factors including both environmental and behavioral factors simultaneously. In so doing, we overcome conflicting past findings based on largely bivariate relationships. Second, the relative importance of family or parental factors contributing to childhood obesity leads to a re-examination of the current intervention programs. More effective education materials and health communication tools targeting parents are critical in improving children’s healthy eating and increased physical activities. Third, the moderating effect of children’s self-control confirms that school records regarding children’s test scores for psychological traits can be used as a tool to evaluate children at being risk of obesity. Political support that aids systematic intervention programs is needed.

While findings from this study may offer vital implications on the prevention of childhood obesity, we acknowledge several limitations of this study and offer possible directions for future research: (1) perform a longitudinal analysis of the models developed in this study, (2) include other potential environmental variables from the comprehensive model, (3) improve the measurements used in our study, and (4) incorporate qualitative insights from parents and children.

REFERENCES


