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A longitudinal examination of childhood maltreatment and adolescent obesity: Results from the National Longitudinal Study of Adolescent Health (AddHealth) Study

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A R T I C L E   I N F O

A B S T R A C T

Objectives: We sought to explore the association between childhood maltreatment (e.g., neglect, physical and sexual abuse) and longitudinal growth trajectories of body mass index (BMI) from adolescence to young adulthood.

Methods: We used latent curve modeling to examine data from the National Longitudinal Study of Adolescent Health ($N = 8,471$), pooling years 1995–2008. Relative weight was indicated by BMI.

Results: Children who experienced neglect had a faster average rate of BMI growth over time compared to children who experienced no childhood maltreatment. In addition, the co-occurrence of childhood neglect and physical abuse was related to increased levels of BMI at baseline, even after adjustment for 14 separate child and parental demographic and psychosocial characteristics. Parental obesity and education, child birth place, and family income were also associated with both baseline BMI and the rate of change in BMI over time.

Conclusion: Childhood neglect plays a role in the development of adolescent obesity. Future research should examine potential mediators or moderators of the longitudinal relation between childhood neglect and adolescent and young adult obesity including impulsivity, depression, and compulsive eating behavior.

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Introduction

Childhood maltreatment (CM) increases an individual's risk for a variety of physical and mental health problems throughout the lifespan, including cardiovascular disease (Batten, Aslan, Maciejewski, & Mazure, 2004), lowered immunity (Shirtcliff, Coe, & Pollak, 2009), impaired brain development (Choi, Jeong, Rohan, Polcari, & Teicher, 2009; De Bellis & Thomas, 2003), physical complaints (e.g., allergies, diabetes, arthritis, asthma, bronchitis, high blood pressure, and ulcers; Rich-Edwards et al., 2010; Springer, Sheridan, Kuo, & Carnes, 2007), neurobehavioral and cognitive symptoms (e.g., attention deficit, poor executive functioning; Beers & De Bellis, 2002) and emotional/behavioral problems (Shin, 2005; Widom, DuMont, & Czaja, 2007). Recent studies have also reported that CM may be associated with obesity. Specifically, these studies found a relationship between CM and obesity during adulthood in clinical settings (Felitti, 1993; Grilo & Masheb, 2001; Grilo et al., 2005; Gustafson et al., 2006), health insurance data (Anda et al., 2006; Bonomi, Cannon, Anderson, Rivara, & Thompson, 2008; Williamson, Thompson, Anda, Dietz, & Felitti, 2002), and community samples (Alvarez, Pavao, Baumrind, & Kimerling, 2007; Fuemmeler, Dedert, McClernon, & Beckham, 2009; Rohde et al., 2008). In addition, the importance of studying the effects of CM on obesity is highlighted by the alarming prevalence of obesity in the US Data from 2008 indicating that 33.8% of adults

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were obese and an additional 34.3% were overweight, representing considerable increases from a few decades ago (Flegal, Carroll, Ogden, & Curtin, 2010).

While previous studies suggest that CM may contribute to an increased risk of adult obesity, few studies have examined the association between CM and obesity in adolescence. Examination of potential predictors of obesity during adolescence is particularly important, as obesity at this age is highly predictive of adult obesity and the serious morbidity and mortality that attend to it (Whitaker, Pepe, Seidel, & Dietz, 1997). Maltreated children suffering from a variety of physiological and psychological challenges as sequelae of CM may be also vulnerable to obesity and overweight problems during adolescence (Gustafson & Sarwer, 2004). Furthermore, a few existing studies on the associations between CM and later obesity have been limited by their cross-sectional design. As a result, while an emerging number of studies have examined the relationship between CM and adult obesity, less seems to have been done to explore the longitudinal relationship between CM and body mass index (kg/m^2; BMI) from adolescence to young adulthood. If CM has adverse effects on adolescent obesity, it is possible that consequences of CM persist into young adulthood through increased BMI scores in adolescence. Identification of intraindividual variation in adolescent BMI and its relation to CM is critical to better understand how CM may operate on course of BMI from adolescence to young adulthood.

Given the deleterious effects of CM on public health and the increased risk of adult obesity among victims of CM, the present study investigated the long-term effects of CM on BMI trajectories from adolescence to young adulthood. In specific, we conducted latent curve modeling (LCM) analyses of CM and adolescent and young adult BMI using a nationally representative sample in the US LCM is a commonly used growth modeling approach, which allows each individual in the sample to have distinct patterns of change over time, and provides an estimate of the average initial level and growth rate of adolescent BMI (Bollen & Curran, 2006). While few studies have examined the longitudinal relationship between CM and adolescent BMI, understanding the extent to which CM predicts initial status and growth rates of BMI will contribute to the development of secondary prevention and intervention efforts targeting CM victims at risk for adolescent and adult obesity. Furthermore, our study adds two notable contributions to the existing literature. First, considering the relationship between CM and BMI, we controlled for a large number of potential confounders. Most significantly, our analyses controlled for the number of obese parents each adolescent had, which research has consistently demonstrated to be associated with an increased likelihood of a child being obese in adolescence and adulthood (Whitaker et al., 1997). Furthermore, in order to assess whether CM posed an environmental risk that increases susceptibility for higher BMI among children who are already at risk of being overweight or obese, we included an interaction between CM and number of obese parents in the model testing. Finally, emerging studies also suggested that frequency (number of times each maltreatment episode occurred) of CM may be equally important to presence of CM in understanding the effect of CM on adolescent obesity (Litrownik et al., 2005; Manly, Cicchetti, & Barnett, 1994). The present study attempted to examine how frequency of CM was associated with change in BMI over time in a separate model testing.

Methods

Design and sample

We used a secondary data analysis of the National Longitudinal Study of Adolescent Health (AddHealth). The AddHealth is a national longitudinal study of adolescents (grades 7–12), which used a multistage, stratified, school-based, cluster sampling: students from 132 high and corresponding feeder middle schools were selected to participate in an in-home interview (Harris, Halpern, et al., 2009). The baseline data were collected in 1995 with 20,745 adolescents and approximately 17,500 of their parents. Of these adolescents, 88% were interviewed at Wave II in 1996 and 73% at Wave III in 2002. Finally, of 15,197 Wave III respondents, 80% (N = 12,157) were interviewed at Wave IV in 2008. Because we rely upon data on CM, which was collected retrospectively at Wave III, our final analytic sample consists of 8,471 respondents. In our sample, respondents were on average 15.5 years old at Wave I, 16.1 at Wave II, 21.8 at Wave III, and 28.3 at Wave IV. Institutional review board (IRB) approval and informed consent were obtained before data collection by the AddHealth research team.

Measures

In order to reflect their sensitive nature, AddHealth used a computer-assisted self-interviewing (CASI) method in measuring three forms of CM including physical abuse, sexual abuse, and neglect at Wave III. The definition of each CM subtype is as follows: Physical abuse—"by the time you started 6th grade, how often had one of your parents or other adult caregivers slapped, hit, or kicked you?"; sexual abuse—"how often had touched you in a sexual way, forced you to touch him or her in a sexual way, or forced you to have sexual relations?"; and neglect—"how often had not taken care of your basic needs, such as keeping you clean or providing food or clothing or how often had left you home alone when an adult should have been with you?" All three CM responses were dichotomized (1 for one or more times, 0 for never). Since the co-occurrence of different types of CM on an individual is widely documented, these responses were combined into six categories: no CM, neglect only, physical abuse only, sexual abuse ever (sexual abuse only, sexual and physical abuse, and sexual abuse and neglect were collapsed into one variable because of the small number of sexual abuse cases in the sample), neglect and physical abuse, and all three types (Banyard, 1999; Bensley, Van Eenwyk, Spieker, & Schoder, 1999; Felitti et al., 1998). In all analyses, no CM was the reference category.