



Parenting style and obesity risk in children



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ABSTRACT

Background. Parents play a critical role in their children's lifestyle habits. The objective was to assess the effect of parenting style on the risk of childhood obesity, and to determine whether poverty was a moderator of the association.

Methods. Participants were from the 1994–2008 cross-sectional samples of the National Longitudinal Survey of Children and Youth (NLSCY), a nationally representative survey of Canadian youth. Factor and cluster analyses identified four parenting styles consistent with Baumrind's parenting style prototypes. Multivariable logistic regression assessed the risk of obesity based on parenting style after adjusting for covariates. Analyses were stratified by age (preschool: 2–5 years of age, $n = 19,026$; school-age: 6–11 years of age, $n = 18,551$) and the moderating effect of poverty (household income < low income cut-offs adjusted for household size and geographic region) was assessed. Analyses used sampling and bootstrap weights.

Results. In multivariable analyses, compared to authoritative parenting, preschool- and school-age children with authoritarian parents were 35% (95% CI: 1.2–1.5) and 41% (CI: 1.1–1.8) more likely to be obese, respectively. In preschool children, poverty moderated this association: authoritarian and negligent parenting was associated with 44% (CI: 1.3–1.7) and 26% (CI: 1.1–1.4) increased likelihood of obesity, respectively, but only among the children not living in poverty. In school-age children, poverty was not a moderator.

Conclusions. Parenting style is associated with childhood obesity, but may be moderated by poverty. Successful strategies to combat childhood obesity should reflect the independent and interactive associations of sociodemographic and social–familial influences on health especially in early childhood.

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Background

Obesity prevalence in Canadian youth has doubled since 1980 (Tremblay and Wilms, 2000). In addition to biologic factors, sociodemographic and environmental factors are associated with obesity; lower socioeconomic status (SES) (Wang and Beydoun, 2007), living in neighborhoods with poor walkability, and poor access to fresh fruits and vegetables increase the risk for obesity (Powell et al., 2006; Nilsen et al., 2010).

In children, environmental factors specific to family life may play an additional role (Berge, 2009). Previous research in the social–familial domain has primarily focused on behavior-specific parenting (“parenting

practices”) and has found that a child's obesity risk is influenced by parental control over specific behaviors (such as if the parent controls the types and amount of snacks a child is allowed) (Berge, 2009).

General parenting style has been shown to affect adolescent risk behaviors, but its effect on childhood obesity is poorly understood (Newman et al., 2008; Berge, 2009). While some studies report an association between parenting style and BMI z-scores (Berge et al., 2010; Chen and Kennedy, 2005; Olvera and Power, 2010), few studies report an association with obesity (Agras et al., 2004; Wake et al., 2007). The inconsistent findings might suggest that small studies were underpowered to detect associations (Agras et al., 2004), were focused on young children who had not yet undergone their adiposity rebound (Wake et al., 2007), or that other variables may be moderating the association.

In particular, despite the mounting evidence that poverty is an independent predictor of obesity, sociodemographic characteristics have been inadequately investigated in the existing literature (Berge, 2009;

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Sleddens et al., 2011). It has been suggested that the relationship between parenting styles and children's obesity risk may be affected by the larger social environments and contexts in which children live. For instance, neighborhood safety, or parenting norms based on different SES may warrant different parenting styles to be effective (Patrick et al., 2013). But research is limited and further investigation of potential moderation is needed (Sleddens et al., 2011).

Because obesity tracks from childhood to adulthood (Juhola et al., 2011) and is associated with several health risks (Freedman et al., 2001; Moriarty-Kelsey and Daniels, 2010), reducing childhood obesity is a top public health priority (World Health Organization, 2012). Thus the aim of this study is to investigate the association between parenting style and obesity in a large representative sample of Canadian youth, and to assess if poverty moderates this association. Specifically, we hypothesized that 1) compared to authoritative parenting, authoritarian, permissive and negligent parenting would be associated with a higher risk of childhood obesity and 2) the strength of this association would differ between children living and not living in poverty.

Methods

A cross-sectional sample of participants from the National Longitudinal Survey of Children and Youth (NLSCY) database comprised the study population. The study's sampling design and study protocol have been published previously (Statistics Canada and Human Resources Development Canada, 1995). Briefly, samples representative of the non-institutionalized civilian youth (ages 0–11) throughout Canada was collected bi-annually since 1994. The cross-sectional samples of interest for this study ($n = 66,813$) were those obtained from 1994–2008 (8 cycles).

Data collection consisted of computer-assisted questionnaires completed by the person most knowledgeable (PMK) of the child and included sociodemographic and SES characteristics, family characteristics, neighborhood characteristics, and child's characteristics. Statistics Canada obtained informed consent and assent from parents and youth respectively, and protects against the identity disclosure of any individual or organization (Canadian Institutes Of Health Research et al., 2010). Thus, as a secondary data analysis with no identifiable information, ethics approval from the Institutional Review Board was not required.

Measures

Parenting style

Parenting style describes the general characteristics of the interactions between parent and child. Initially described by Baumrind (1966) and expanded upon by Maccoby and Martin (1983) four archetypes of parenting style occur along two dimensions of responsiveness (nurturing or warmth) and demandingness (establishing boundaries and enforcing them): authoritative (responsive and demanding), authoritarian (not responsive but demanding), permissive (responsive but not demanding) and negligent (not responsive and not demanding). Twenty-five questions encompassing different interactions between the PMK and child were collected on 5-point Likert scales. Parenting styles were identified according to the methodology outlined by Chao and Willms (2002) and have previously been shown to correspond well with Baumrind's parenting styles. Briefly, a factor analysis on the PMK-child interactions was conducted. The number of factors was based on the least number of factors with a cumulative eigenvalue of approximately 1. Five variables had low loadings (<0.40) on all factors and were excluded from further analysis. Due to non-unique factor loadings, a varimax rotation was used and the remaining 20 variables had high loadings on a single factor. The four factors that were identified were consistent with those previously reported (Chao and Willms, 2002) and were labeled as 'reasons with child' (5 variables), 'difficulty managing the child' (5 variables), 'responsive' (5 variables), and 'uses a firm approach' (5 variables) (eTable 1). Any variable with negative factor loadings was reverse coded; higher values indicated higher cumulative scores of the variables comprising that factor. A scaled score was calculated for each factor, and a cluster analysis was conducted to group similar observations together using k-means clustering. The parenting style that best corresponded to a cluster was identified based on the characteristics provided by Baumrind (1966) and were consistent with the literature (Chao and Willms, 2002).

Weight status and health

The child's height and weight were reported by the PMK and were converted to body mass index (BMI) values and compared to the World Health Organization (WHO) growth curves (De Onis et al., 2007). The literature indicates that parents tend to underestimate height (thus artificially inflating their child's BMI). Thus the main outcome of interest was whether the child was obese, rather than whether the child was overweight or obese. While this analytic decision was not expected to fully eliminate misclassification, because larger errors in height and weight are required to erroneously misclassify a normal-weight child as obese, it was likely to *diminish* misclassification. A child was identified as obese if their BMI percentile was $>$ the 97.7th percentile for their age and sex as defined by the WHO growth curves. BMI is not always used for children less than 2 years of age, thus only the participants between the ages of 2–11 ($n = 43,437$) comprised the eligible sample (Daniels, 2009). An additional 5860 participants were excluded due to missing data.

Poverty

The past year's household income (before taxes and deductions) was reported by the PMK and compared to the low income cut-offs established by Statistics Canada which are adjusted for household size and geographic region (Giles, 2004). Poverty was defined as annual household income below the cut-off. A subanalysis maintaining household income as a low income cut-off ratio did not affect the results; thus poverty as defined above was used in all analyses.

Covariates

Sociodemographic characteristics known to be associated with parenting style or health were included in multivariable analyses. These included continuous covariates (child's age, birth weight, birth order of the child, maternal age, family functioning score, neighborhood cohesion, neighborhood safety) and binary covariates (child's sex, whether the PMK was an immigrant, whether the PMK had at least a high-school education, whether the family was a two-parent or a single-parent household). The family functioning score measured the family's ability to deal with stressors as a unit and was based on the validated McMaster Family Assessment Device (Byles et al., 1988). A sensitivity analysis additionally adjusted for neighborhood cohesion and safety. Because the study sample was reduced due to missing neighborhood data but results were unaffected, neighborhood characteristics were omitted from the final models.

Data analysis

All analyses were conducted with SAS 9.3. Due to the complex sampling strategy used in the NLSCY, sampling and bootstrap weights were used. The association between parenting style and obesity risk was assessed in multivariable logistic regression adjusting for all the covariates previously described. Authoritative parenting style served as the referent. Whether poverty was a moderator in this association was also assessed. Due to evidence of differences in parenting style between preschool (2–5 years of age) and school-age children (6–11 years of age) in this study sample, analyses were stratified by age category.

Results

The analytic sample ($n = 37,577$) did not significantly differ from those excluded due to missing data ($n = 5860$) in sex or age of the child, but was less likely to be from an immigrant family or poor, and the PMK was more likely to have at least a high-school education (data not shown). The implications of this are described in the discussion. Most of the missing data occurred with the covariates; the proportion missing parenting style was $<5\%$. A sensitivity analysis wherein multivariable models maximized sample size by minimizing the number of covariates did not differ from the results presented here.

Many of the characteristics were significantly different between the younger and older samples (Table 1). Approximately one-third of the younger children were obese (29.8%), and 18.8% of the school-age children were obese. Nearly half of the parents of younger children were authoritative (41.9%), and the rest were nearly evenly divided into authoritarian, permissive, and negligent (15.7%, 20.1%, and 22.3%, respectively). Parents of school-age children were primarily authoritative (31.9%), or negligent (31.1%), followed by permissive (21.7%) or authoritarian (15.3%).

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