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Relative deprivation and risk factors for obesity in Canadian adolescents

Frank J. Elgar [a, *], Annie Xie [a], Timo-Kolja Pförtner [b], James White [c], Kate E. Pickett [d]

[a] Institute for Health and Social Policy, McGill University, Montreal, Canada
[b] Institute for Medical Sociology, University of Cologne, Cologne, Germany
[c] School of Medicine, Cardiff University, Cardiff, Wales, UK
[d] Department of Health Sciences, University of York, York, England, UK

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ABSTRACT

Research on socioeconomic differences in overweight and obesity and on the ecological association between income inequality and obesity prevalence suggests that relative deprivation may contribute to lifestyle risk factors for obesity independently of absolute affluence. We tested this hypothesis using data on 25,980 adolescents (11–15 years) in the 2010 Canadian Health Behaviour in School-aged Children (HBSC) study. The Yitzhaki index of relative deprivation was applied to the HBSC Family Affluence Scale, an index of common material assets, with more affluent schoolmates representing the comparative reference group. Regression analysis tested the associations between relative deprivation and four obesity risk factors (skipping breakfasts, physical activity, and healthful and unhealthful food choices) plus dietary restraint. Relative deprivation uniquely related to skipping breakfasts, less physical activity, fewer healthful food choices (e.g., fruits, vegetables, whole grain breads), and a lower likelihood of dieting to lose weight. Consistent with Runciman's (1966) theory of relative deprivation and with psychosocial interpretations of the health consequences of income inequality, the results indicate that having mostly better off schoolmates can contribute to poorer health behaviours independently of school-level affluence and subjective social status. We discuss the implications of these findings for understanding the social origins of obesity and targeting health interventions.

1. Introduction

Rising trends in childhood obesity are a public health concern in many countries (Lobstein et al., 2004). The prevalence of overweight and obesity in young people in developed countries has increased by 47.1% between 1980 and 2013 (Ng et al., 2014), with a levelling off found recently in the United States (Ogden et al., 2014) and some countries in Europe and Asia (Olds et al., 2011). In 2011, approximately one-third of Canadian children and adolescents were estimated to be either overweight or obese (Roberts et al., 2012). Most youth do not outgrow this problem. About four out of five adolescents who are obese will continue to be obese as adults (Freedman et al., 2005). Obesity in children and youth increases the risks of type 2 diabetes, hypertension, sleep apnea, and cardiovascular disease (Biro and Wien, 2010; Freedman et al., 2007), and relates to a diminished quality of life (Swallen et al., 2005), low self-esteem (Strauss, 2000), social discrimination (Puhl and Brownell, 2001), and various psychiatric disorders (Mustillo et al., 2003).

Prior research on the social determinants of obesity has studied its complex relation to socioeconomic position (SEP). A socioeconomic gradient in overweight and obesity has been observed in many high-income countries whereby weight problems are more common in lower SEP groups (Devaux and Sassi, 2013; McLaren, 2007). The evidence from longitudinal studies suggests that this association is transactional; childhood obesity limits social mobility and prospectively relates to fewer years of education and lower incomes in adulthood (Gortmaker et al., 1993). Conversely, low SEP in childhood increases the risk for adult obesity even after differences in adult SEP are taken into account (Power et al., 2005; Senese et al., 2009).

The mechanisms that underlie this socioeconomic pattern involve material and psychosocial factors of affluence and social

* Corresponding author. Institute for Health and Social Policy, McGill University, 1130 Pine Avenue West, Montreal, H3A 1A3, Canada.
E-mail address: frank.elgar@mcgill.ca (F.J. Elgar).

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position (Adler and Ostrove, 1999). First, low SEP can impact health through limiting access to material resources that support health, such as affordable, nutritious foods and safe and accessible areas that facilitate physical activity (Conrad and Capewell, 2012), although some have argued that this material path stems mostly from individual SEP and not neighbourhood deprivation (Macintyre, 2007). Second, low SEP carries with it the psychosocial effects of low socioeconomic position in society and the stress and anxieties of living in relative poverty (Wilkinson and Pickett, 2007). This psychosocial path explains why the socioeconomic gradient in excess body mass extends throughout the full range of SEP including middle and upper SEP groups and why two individuals with equivalent material resources (e.g., household income) might differ in health status if one is surrounded by more affluent people and the other is surrounded by less affluent (Eibner and Evans, 2005; Elgar et al., 2013).

Research on the theoretical construct of relative deprivation has helped to unpack this psychosocial pathway by examining how upward socioeconomic comparisons can generate psychological stress and compromise health and wellbeing independently of absolute deprivation (Eibner and Evans, 2005). Relative deprivation, or "poverty amid plenty," has been studied at the ecological level in terms of the correlation between income inequality and prevalence of adult obesity (Pickett et al., 2005; Wilkinson and Pickett, 2007) and between income inequality and adolescent body mass (Elgar et al., 2015). Although absolute deprivation could limit access to nutritional education and other health resources, the stress associated with feeling deprived in relation to others may explain why lower SEP groups also show less dietary restraint and dietary preferences for high fat and high caloric foods (Oliver and Wardle, 1999; Roemmich et al., 2002; Torres and Nowson, 2007).

The psychosocial dimension of SEP has also been investigated using subjective measures of perceived status or rank in the socioeconomic structure (Goodman et al., 2007). Health surveys of adolescents have found that subjective ratings of social position share weak but statistically significant associations with physical activity, healthful food choices, and reduced risk of obesity (Goodman et al., 2003; Quon and McGrath, 2014a). However, this research has also found that objective measures of SEP do not fully account for the association between subjective status and adolescent health, either because it is a distinct causal pathway to health or because its subjective nature allows it to share bidirectional effects on health (Garbarski, 2010). In Quon and McGrath's (2014b) meta-analysis of 44 studies on the effects of subjective social status on adolescent health, the effects of subjective status largely depended on the health domain with larger effects found on subjective health assessments than on specific health behaviours and physiological indicators of allostatic load. Using both objective and subjective measures of SEP might therefore give a deeper understanding of how relative differences in SEP – real or perceived – are associated with the behavioural determinants of obesity.

In a global context of a high prevalence of obesity (Ng et al., 2014), rising income inequality (Organisation for Economic Co-operation and Development, 2011), and widening socioeconomic differences in adolescents' body mass and physical activity (Elgar et al., 2015), the goal of this study was to better understand the contribution of relative deprivation to shaping social inequalities in obesity risk factors. To achieve this, we examined three socioeconomic variables - absolute deprivation between schools, relative deprivation within schools, and subjective social status - in relation to a set obesity risk factors in adolescents. We hypothesised that relative deprivation relates to physical inactivity, skipping breakfasts, fewer healthful food choices, more unhealthful food choices, and to less dietary restraint after other individual differences in body mass, absolute affluence, and subjective social status are controlled.

2. Method

2.1. Participants

The 2010 Health Behaviour in School-aged Children (HBSC) study in Canada surveyed 26,069 students in grades 6 to 10 in all provinces and territories except New Brunswick and Prince Edward Island (Freeman et al., 2011). Following an international protocol (Currie et al., 2012), a stratified sample of 436 schools was recruited to represent the distribution of regions, economic conditions, school types (public or Catholic), languages of instruction (English or French), and community sizes in Canada. Private schools, special needs schools and schools for youth in custody were excluded. The HBSC protocol stipulated a standard questionnaire format, item order, and testing conditions. Teachers or trained interviewers distributed the questionnaires in classroom settings.

The age of the sample ranged from 9 to 19 (mean = 13.85; SD = 1.52) years, and males (49.17%) and females (50.83%) were equally represented. Participation in the HBSC study was voluntary. School jurisdictions and individual schools chose to request either active or passive parent consent. Approximately 41% of participating schools used passive consent and 59% used active consent. Response rates were 11/13 (84.6%) at the provincial/territorial level, 436/765 (57.0%) at the school level and 26,078/33,868 (77.0%) at the individual level. Reasons for nonparticipation were failure to return consent forms, failure to receive parental consent, and absence on the day of survey administration. A university research ethics board approved the study procedures.

2.2. Measures and procedures

Teachers or trained interviewers administered the HBSC questionnaire in classroom settings. The survey collected data on sociodemographic characteristics and various health indicators and health-related behaviours. Of relevance to the present study are students' date of birth, gender, and self-reported body weight (*kg*) and height (*cm*). These variables were used to include the body mass index (kg/m^2) as a control variable in the analyses. We did not attempt to identify overweight and obese cases given the high rate of misclassification that occurs with self-reported height and weight (Elgar et al., 2005).

Physical activity was measured with the question: "Over the past 7 days, on how many days were you physically active for a total of at least 60 min per day?" with responses ranging from 0 to 7 days. The question was prefaced with the description of "any activity that increases your heart rate and makes you get out of breath some of the time" followed by specific examples (e.g., running, brisk walking, skating, biking) to ensure the item measured moderate-to-vigorous physical activity. The criterion of 60 min per day was consistent with Canadian Physical Activity Guidelines for young people to be considered physically active (Tremblay et al., 2011). This measure of physical activity was found to have adequate test-retest reliability and concurrent validity alongside accelerometer data (Prochaska et al., 2001).

Two items measured the frequency of eating breakfasts, on weekdays and on weekends, and the responses were combined to determine the number of breakfasts per week (0–7). Skipping breakfasts based on similar self-report measures has well documented links to excess body weight in youth due to poorer nutrition and appetite control (Timlin et al., 2008).

A series of ten items on food choices asked "How often do you eat (a) fruit; (b) vegetables; (c) dark green vegetables; (d) orange vegetables; (e) whole grain breads; (f) sweets, candy or chocolate;