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Research report

Reported consumption of takeaway food and its contribution to socioeconomic inequalities in body mass index ☆

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ABSTRACT

The aim of this study was to examine whether takeaway food consumption mediated (explained) the association between socioeconomic position and body mass index (BMI). A postal-survey was conducted among 1500 randomly selected adults aged between 25 and 64 years in Brisbane, Australia during 2009 (response rate 63.7%, $N = 903$). BMI was calculated using self-reported weight and height. Participants reported usual takeaway food consumption, and these takeaway items were categorised into "healthy" and "less healthy" choices. Socioeconomic position was ascertained by education, household income, and occupation. The mean BMI was 27.1 kg/m^2 for men and 25.7 kg/m^2 for women. Among men, none of the socioeconomic measures were associated with BMI. In contrast, women with diploma/vocational education ($\beta = 2.12$) and high school only ($\beta = 2.60$), and those who were white-collar ($\beta = 1.55$) and blue-collar employees ($\beta = 2.83$) had significantly greater BMI compared with their more advantaged counterparts. However, household income was not associated with BMI. Among women, the consumption of "less healthy" takeaway food mediated BMI differences between the least and most educated, and between those employed in blue collar occupations and their higher status counterparts. Decreasing the consumption of "less healthy" takeaway options may reduce socioeconomic inequalities in overweight and obesity among women but not men.

Introduction

Socioeconomic differences in weight status in developed countries are widely reported (McLaren, 2007). Earlier studies found that people who were low educated, in lower status occupations (Kjøllesdal, Holmboe-Ottesen, Mosdøl, & Wandel, 2010), or had low income (Sarlio-Lahteenkorva, Silventoinen, & Lahelma, 2004) were more likely to have a higher body mass index (BMI) compared with their more advantaged counterparts. While socioeconomic gradients in BMI have consistently been reported among women, the association has been less consistently observed among men (McLaren, 2007; Sobal & Stunkard, 1989).

One possible reason for disadvantaged groups' higher BMI is their less healthy dietary behaviours (Davey Smith & Brunner, 1997; James, Nelson, Ralph, & Leather, 1997). Takeaway foods are often considered to be part of an unhealthy diet as these foods, in general, are high in energy, fat and added sugar (Bowman & Vinyard, 2004). Frequent takeaway and fast-food consumption are associated with excess weight and weight gain (Bowman & Vinyard, 2004; Rosenheck, 2008; Smith et al., 2009), and these foods are more likely to be consumed or purchased by lower socioeconomic groups (Miura, Giskes, & Turrell, 2012; Thornton, Bentley, & Kavanagh, 2011). These findings suggest that takeaway food consumption may play a role in socioeconomic differences in weight status; to date, however, there has been no research that has examined the role of takeaway food in this association. Examining such a relationship is crucial, as takeaway foods have become an important part of our diet, and these foods are commonly and frequently consumed among a large proportion of the population: in 2009, about 40% of Australian adults reported consuming takeaway food once a week or more (Miura et al., 2012).

Takeaway foods include a wide variety of food-types which can be categorised into "healthy" or "less healthy" choices depending on their nutritional profiles (Miura et al., 2012). Given that low socioeconomic groups tend to have a less healthy diet than their more advantaged counterparts (Davey Smith & Brunner, 1997; James et al., 1997), the choice of takeaway foods is likely to be socioeconomically patterned (Miura, Giskes, & Turrell, 2009). These socioeconomic variations in takeaway food choice are likely

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to have implications for diet quality and weight status as the nutritional content of takeaway foods vary between "healthy" and "less healthy" choices, with the latter containing much higher energy than the former (Chand, Eyles, & Ni Mhurchu, 2012). As overweight, especially obesity, is associated with a range of health conditions (World Health Organization (WHO), 2000), socioeconomic differences in weight status are likely to be a major contributing factor to socioeconomic health inequalities (James et al., 1997).

In order to better understand socioeconomic inequalities in health, the use of multiple socioeconomic indicators has been recommended (Braveman et al., 2005). Studies have typically employed education, occupation or income as socioeconomic measures, and each indicator reflects different pathways to health-related outcomes (Braveman et al., 2005). For example, education reflects the knowledge based assets of individuals and may influence their capacity to understand health promotion messages (Galobardes, Shaw, Lawlor, Lynch, & Davey Smith, 2006) and hence maintain a healthy weight. Occupation represents work-based social networks (e.g. within and between employees and employers) and shared beliefs. Income directly reflects economic and material resources, and thus, influences an individual's ability to access health enhancing services and products (Galobardes et al., 2006). Therefore, using multiple indicators of socioeconomic position (SEP) will assist our understanding of socioeconomic inequalities in weight status, and this a necessary pre-requisite for the design and implementation of interventions to reduce the inequalities.

This study aims to investigate whether takeaway food consumption mediates (explains) socioeconomic differences in BMI among adults using education, occupation, and household income as socioeconomic indicators. We examined men and women separately as consistently strong gender differences in the association between SEP and BMI have been reported (McLaren, 2007; Sobal & Stunkard, 1989).

Methods

Study participants

This study was based on a cross-sectional survey conducted in the Brisbane metropolitan area (Australia) in 2009. A total of 1500 adults aged between 25 and 64 years were randomly selected from the electoral roll of the Brisbane statistical subdivision. Data were collected by a self-administered postal survey and a total of 903 adults responded to the survey (response rate 63.7%). Ethical approval was granted by the Queensland University of Technology Human Research Ethics Committee (ID 0900000445).

Body mass index (BMI)

Participants were asked to report their height and weight, and BMI was calculated by kg/m^2. Self-reported weight and height provide acceptable estimates of the weight status of the population (Australian Bureau of Statistics (ABS), 1998).

Takeaway food consumption

Takeaway food is defined as foods or meals that are pre-prepared commercially and require no further preparation by the consumer, and can be consumed immediately after purchase. Participants were asked how often they usually consumed any takeaway foods in the last 12 months ("never" to "once a day"). Those who reported consuming takeaway food were then asked to indicate how often they consumed each of 22 specific takeaway items. Seven response options ranged from "never or rarely" to "once a day". These takeaway foods are the most frequently consumed takeaway items in Australia and were used in a previous study (Miura et al., 2012).

Each of the 22 takeaway items was categorised as either "healthy" or "less healthy" choices based on the Australian Guide to Healthy Eating (The Commonwealth Department of Health & Family Services, 1998) which categorises food into five core food groups and an "extra" food group. The "extra" foods (e.g. deep-fried takeaway foods) are a non-essential part of a diet and are typically high in fat, sodium, or sugar. Most of the "less healthy" items were consistent with the extra foods. To classify foods not identified in the "extra foods", nutrient composition data were used (New South Wales Health and New South Wales Department of Education and Training, 2006; Queensland Health, 2007). Foods meeting one or more of the following criteria were classified as "less healthy": >2500 kJ of energy/serve; >3 g of saturated fat/100 g; <2 g of fibre/serve. Beverages classified as "less healthy" were those containing $\geqslant$600 kJ energy/serve and/or >3 g of saturated fat/100 g. Foods or beverages not meeting any of these criteria were considered "healthy" options. This classification resulted in nine "healthy" items and 13 "less healthy" items.

"Healthy" takeaway foods comprised: kebab, sandwiches, fried rice, pasta, Asian-style noodles, sushi, salad, diet soft drink, and fruit/vegetable juices. "Less healthy" items comprised: potato chips, hamburger, pizza, savoury pies, fried fish/seafood, fried chicken, fried dim-sum, curry, cakes, non-diet soft drink, thick/milk shake, flavoured milk, and ice-cream. A score was calculated to characterise each participant's takeaway food consumption as follows: never/rarely = 0, <once a month = 1, one to three times/month = 2, four times/month = 3, two to four times/week = 4, five to six times/week = 5, and $\geqslant$once/day = 6 (Miura, Giskes, & Turrell, 2011). "Healthy" and "less healthy" takeaway food indices were created by summing the items. Each respondent's score was re-scaled to range from 0 to 100. Higher scores were indicative of consuming a wider variety or greater frequency of takeaway food in the last 12 months. Dietary intake indices are summary measures that evaluate the specific dietary habits of individuals or groups, and are a widely used approach in nutritional epidemiology (Kourlaba & Panagiotakos, 2009; Thompson & Subar, 2008). The index method quantitatively characterises individuals in terms of whether they are more (or less) likely to follow specific dietary behaviours (Kourlaba & Panagiotakos, 2009).

A test–retest reliability study of the "healthy" and "less healthy" takeaway food measures was assessed in a separate sample of 100 individuals in the target age range who completed the same survey twice, four weeks apart. Interclass correlation coefficients (ICC) for the "healthy" takeaway food index was 0.72 (95% CI 0.52, 0.85) whereas the ICC for the "less healthy" index was 0.69 (95% CI 0.46, 0.83). According to Landis and Koch's scale of strength for reliability coefficients, both the "healthy" and "less healthy" takeaway food measures had "substantial" reliability (Landis & Koch, 1977).

Socioeconomic measures and demographic information

SEP was measured using the respondent's education, household income and occupation. Education was ascertained by the highest competed qualification and was coded as: (1) bachelor degree or higher, (2) Diploma and vocational (trade or business certificate), and (3) no post-school qualifications.

For household income, participants were asked to estimate their total pre-tax household income from 11 pre-defined categories. Equivalised household income was calculated by allocating a weight of 1.0 to the first adult in the household; additional adults thereafter were weighted as 0.5, and children <18 years were weighted 0.3 (Atkinson, Rainwater, & Smeeding, 1995). Total