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Research report

Home food availability mediates associations between mothers' nutrition knowledge and child diet ☆

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ABSTRACT

Evidence suggests that mothers' nutrition knowledge and home food availability (HFA) are directly and independently associated with children's food intakes. In this study we test the hypothesis that HFA mediates the association between maternal nutrition knowledge and child diet. In this cross-sectional study of Australian women living in socioeconomically disadvantaged neighbourhoods in Melbourne, Australia, mothers with dependent children (aged 5–12 years) provided data on their child's diet, HFA, nutrition knowledge and a range of sociodemographic characteristics. To test our hypothesis we assessed associations between nutrition knowledge and HFA, and between HFA and child food intake (adjusting for nutrition knowledge and child age). In all instances significant associations were found. HFA was found to mediate relationships between mother's nutrition knowledge and children's intake of fruit, vegetables, salty foods and soft drink. Our analyses showed that HFA was a mediator of the associations between maternal nutrition knowledge and child's diet in this population. This supports a focus on nutrition education that expands mothers' understanding of what foods to buy, prepare and serve. Further exploration of these associations will provide a stronger evidence base upon which to inform 'best bets' for parent-focussed nutrition promotion seeking to promote children's healthy eating.

Introduction

Preventing child overweight and obesity remains an important public health challenge (Lobstein, Baur, & Uauy, 2004; Waters et al., 2011). The potential for overweight will be influenced by the home environment in which a child eats and plays. Home food environments are largely constructed by parents (Anzman, Rollins, & Birch, 2010), who thus provide both the genetics and the environments within which a child's potential for overweight may be expressed. While much has been written about the ways in which parents may influence their child's dietary intakes (Savage, Fisher, & Birch, 2007; Stang & Loth, 2011), few studies have sought to examine the pathways by which this occurs (Ventura & Birch, 2008). Consequently, our understanding of how parents influence their children's eating remains relatively limited; as does our understanding regarding where to focus health promotion investments that seek to support parents to promote improved child nutrition and in turn, reduced obesity risk.

Two constructs commonly reported as important predictors of children's eating are maternal nutrition knowledge and home food availability. The evidence of associations between mothers' nutrition knowledge and child diet is equivocal, with some studies reporting positive associations (Blaylock, Variyam, & Lin, 1999) and others reporting null associations (Colavito, Guthrie, Hertzler, & Webb, 1996; Hudson, Stotts, Pruett, & Cowan, 2005) or a combination of positive and null associations (Gibson, Wardle, & Watts, 1998; Vereecken & Maes, 2010). The equivocal nature of these findings may well reflect the inconsistent ways in which nutrition knowledge is conceived and measured. For example, nutrition knowledge may include assessments of knowledge of dietary guidelines, of nutrients in food, diet and health relationships, or of 'best' food/meal choices (Parmenter & Wardle, 1999). Given this, conflicting findings may reflect the disparate constructs being measured rather than the strength of association.

A large number of cross-sectional studies support the proposition that child (Bryant et al., 2011; Busick, Brooks, Pernecky, Dawson, & Petzoldt, 2008; Grimm, Harnack, & Story, 2004; Spurrier, Magarey, Golley, Curnow, & Sawyer, 2008) and adolescent (Campbell et al., 2007; Hanson, Neumark-Sztainer, Eisenberg, Story, & Wall, 2005; Neumark-Sztainer, Wall, Perry, & Story,

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2003) dietary intakes are associated with home food availability. In addition to cross-sectional associations, Pearson, Ball, and Crawford (2011) reported that home availability of fruits, vegetables and energy-dense snack foods were associated with longitudinal changes in adolescent ($n = 1850$) food consumption, such that availability of energy-dense foods was inversely associated with change in fruit consumption and positively associated with change in energy-dense snack consumption over a 2 year period. Further, in that study, home availability of fruits and vegetables was positively associated with change in vegetable consumption.

Plausibly, maternal nutrition knowledge may be an important determinant of the types of foods purchased and made available in the home, and this may in turn influence children's diet. However, such pathways have not previously been investigated. Mediation analysis enables investigation of the mechanisms by which maternal nutrition knowledge and home food availability might influence children's dietary intakes. While a number of factors are likely to predict home food availability (Neumark-Sztainer et al., 2003), including neighbourhood food availability (Inglis, Ball, & Crawford, 2005), cost (Inglis, Ball, & Crawford, 2008; Inglis et al., 2005; Jones et al., 2010), and family food preferences (Hannon, Bowen, Moinpour, & McLerran, 2003), this study will focus on the likely influence of the mothers' knowledge regarding those foods that comprise a healthy diet. This focus on knowledge is important given that is a modifiable potential predictor of diet. Thus, in this study we aimed to examine if maternal nutrition knowledge was associated with child intake of food and drink items likely to increase obesity risk, and where such a relationship existed, to assess whether this association was mediated by home food availability.

Methods

Sample

Data were collected during 2007–8 as part of the Resilience for Eating and Activity Despite Inequality (READI) study, which is a cohort study of health behaviours and obesity among women and children living in socioeconomically disadvantaged neighbourhoods (Cleland et al., 2010; MacFarlane, Abbott, Crawford, & Ball, 2009). Ethical approval for the study was granted by the Deakin University Human Research Ethics Committee, the Victorian Department of Education and the Catholic Education Office. Participants were randomly selected using the electoral roll from 40 rural and 40 urban suburbs (neighbourhoods). Neighbourhoods were randomly selected from the most socioeconomically disadvantaged third of all suburbs within 200 km of Melbourne, Australia, according to the Australian Bureau of Statistics' (ABS) Socioeconomic Index for Areas (Australian Bureau of Statistics., 2008).Only neighbourhoods with more than 1200 inhabitants were included in the sampling frame. Since voting is compulsory for Australian adults, the electoral roll provides a relatively complete record of population data on Australian residents aged 18 years and over.

A baseline survey was mailed to an initial sample of 11,940 women aged 18–46 years (150 women from each of the 80 neighbourhoods, or where there were fewer than 150 women living in the neighbourhood, all women within the age range within that neighbourhood). A total of 4934 returned a completed survey and a signed consent form. Excluding from the denominator those whose surveys were returned to sender unopened ($n = 861$) or who were otherwise ineligible (e.g., were deceased, or were incorrectly denoted females on the electoral roll) ($n = 17$), the response rate was 45%. Of these 4934 women, 571 were excluded because they no longer lived in a READI suburb, nine were excluded because they were not within the desired age range, three were excluded because the survey was not completed by the women it was addressed to, and two subsequently requested to be withdrawn from the study. Of the remaining eligible 4349 women, those who had a child aged between 5 and 12 years ($n = 1457$) were asked if they would complete an additional survey about their child (using the next birthday method), with 771 women (53%) agreeing to do so. Of these, 634 allowed their child's height and weight to be measured, and 613 returned completed surveys about their child. Participants with missing data on any of the study variables were subsequently excluded, leaving a final sample of 536 children and mothers to be included in analyses.

Procedure

The self-report survey, along with a plain language statement and a consent form was distributed to women between August 2007 and January 2008. It assessed the women's physical activity, eating behaviours and factors thought to influence these behaviours and obesity risk. Also included in the package were an invitation letter, a consent form, a $1 lottery ticket and a teabag. A reminder protocol (Dillman, 1978) was employed whereby letters were sent to non-responders 10 days after the initial survey package was mailed. This was followed by a second reminder letter including another copy of the survey a further 10 days later. The surveys were initially pilot-tested with a convenience sample of 32 women aged 18–46 years and minor modifications were made for clarity based on the feedback received. As noted, a second survey assessing child diet, physical activity and behavioural factors was sent to those women who had a child aged between 5 and 12 years.

Measures

Mother's nutrition knowledge

Nutrition knowledge was assessed by eight questions. Participants were required to select the best choice from several foods/meals to satisfy a given criteria (adapted from Parmenter & Wardle, 1999) (Parmenter & Wardle, 1999). For example, participants were asked "In your view, which one of the following would be the best choice for a low fat, high fibre snack?" and given the options: (1) diet strawberry yoghurt, (2) raisins, (3) a muesli bar, (4) wholemeal biscuits with cheddar cheese, and (5) I do not know. Each participant's nutrition knowledge score was calculated as the number of these items they answered correctly, so that each participant had a nutrition knowledge score between 0 and 8. The test–retest reliability of these eight items, derived from 72 women in a separately recruited sample from the sampled neighbourhoods, over a 1 week period was considered acceptable (percent agreement 0.69–0.85) (Portney & Watkins, 2000).

Mother's Body Mass Index

BMI ($kg\,m^{-2}$) was calculated by dividing self-reported weight (in kilograms) by self-reported height (in metres) squared, and categorized as healthy weight (18.5–24. $9\,kg\,m^{-2}$), overweight ($25.0–29.9\,kg\,m^{-2}$) or obese (BMI $30.0\,kg\,m^{-2}$ or more).

Mother's level of education

Level of education was assessed by asking women to indicate their highest education level, categorized as low (did not complete year 12), medium (completed year 12 or equivalent) or high (tertiary qualification).

Home food availability: Home food availability was assessed by asking mothers to indicate how often fruit, vegetables, potato crisps and other salty snack foods, chocolate or other confectionary, cakes/doughnuts/biscuits, soft drink, and fruit juice were usually available in their home. Response options were 1 (Never), 2