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Disentangling the effects of parental food restriction on child's risk of overweight

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ABSTRACT

The links between parental restriction of food intake, child's eating behaviour and child's adiposity are still unclear. Our aim was to validate a model suggesting an underlying mechanism for the impact of parental restriction on child's adiposity through a broad dimension of child's eating temperament entitled the appetite reactivity (including both appetite arousal and appetite persistence). Using an online questionnaire administered at home to children aged between 8 and 11 years ($N = 414$) with one or both of their parents, we measured: based on child's reports, the perceived maternal restriction of child's food intake, the appetite reactivity and both the desired and the eaten mean food portion sizes; based on parental reports, the mean food portion size given to the child and the child's BMI. Structural equation modelling was used to test a model linking measured variables. A well-fitting structural model (AGFI = 0.91; RMSEA = 0.07; SRMR = 0.08) was identified, showing that: (i) perceived maternal restriction of child's food intake negatively impacts child's appetite arousal and food portion size but positively influences child's appetite persistence; (ii) the two components of appetite reactivity have a positive effect on child's adiposity which is partly mediated by child's actual food portion size. Results suggest an explanation for the controversy surrounding the links between parental food restriction and child's adiposity: through its negative impact on child's appetite arousal and food portion size, parental control may protect against overweight, but because of its positive effect on appetite persistence, it can also be detrimental.

1. Introduction

There have been substantial increases in prevalence of overweight and obesity among children and adolescents in developed countries, with 23.8% of boys and 22.6% of girls being either overweight or obese in 2013 (Ng et al., 2014). Parental feeding practices and in particular, their impact on children's adiposity have been researched extensively (Clark, Goyder, Bissell, Blank, & Peters, 2007).

This study focused on the impact of parental restriction of child's food intake on child's eating behaviour and adiposity in 8 to 11-year-old children, with a specific interest in the effect of parental restriction on the expression of child's appetite reactivity. The concept of appetite reactivity, inspired by the broad dimension of reactivity described by Rothbart and Bates (2007), corresponds to the response pattern of desire to eat facing external stimuli (external food cues) or internal stimuli (internal sensations of hunger, internal negative emotions) (Godefroy, Trinchera, Romo, & Rigal, 2016). Similar concepts have been used in the literature: external and emotional eating from the Dutch Eating Behaviour Questionnaire (DEBQ) (van Strien & Oosterveld, 2008), and food responsiveness and enjoyment of food from the Children's Eating Behaviour Questionnaire (CEBQ) (Wardle, Guthrie, Sanderson, & Rapoport, 2001). The main innovation with this concept of appetite reactivity is the introduction of two sub-dimensions distinguishing between appetite arousal (pattern of emergence of desire to eat) and appetite persistence (continuation of desire to eat) (Godefroy et al., 2016).

The link between parental restriction of child's food intake and child's eating behaviour is still unclear, in particular regarding its direction. Parental restriction does not only impact child's eating behaviour but is also predicted by child's appetitive traits: child's

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food responsiveness indeed seems to trigger parental restriction (Webber, Cooke, Hill, & Wardle, 2010). Moreover the links between perceived parental restriction and dimensions close to appetite reactivity are contradictory: in 7 to 12-year-old boys and girls, perceived restriction on eating has been negatively related to emotional and external eating (van Strien & Bazelier, 2007) but in 5-year-old girls, the perception of parental restriction has been positively associated with external eating (Carper, Orlet Fisher, & Birch, 2000). There is however substantial evidence that restrictive feeding practices increase children's reactivity to the restricted palatable foods (Fisher & Birch, 1999b; Jansen, Mulkens, & Jansen, 2007).

Perceived parental restriction thus probably has a positive impact on both aspects of appetite reactivity, but in the end, how does parental restriction impact actual food intake and in particular its quantitative aspect, i.e., the food portion size actually eaten by the child? Some studies suggest that restricting access to palatable foods affects children's intake of these foods: indeed, in the specific context of an unsupervised and unrestricted procedure where children are provided free access to generous quantities of the restricted snack foods, their intake of the restricted food is significantly higher than the intake of a control food (Fisher & Birch, 1999b) and in girls only, the intake of snack foods increases with maternal restriction (reported by both the mother and the child) (Fisher & Birch, 1999a). However, some evidence supports an important role for the supervision of parents in their child's actual food intake. Indeed, a study by Klesges, Stein, Eck, Isbell, and Klesges (1991) showed that children selected less non-nutritious food and had meals with a lower global caloric content when they were being watched by their parents compared to when they were not. We can thus assume that children are impacted by parental presence for the food portion size they eat (and especially the unhealthy food portion size) and their intake of snack foods at home under the supervision of parents is certainly much lower than their intake in the free access procedure used in the above mentioned studies.

The question of the relationship between dimensions close to appetite reactivity and child's adiposity has been debated too. In 3 to 13-year-old children, adiposity increases linearly with the food approach tendencies reported by parents through the CEBQ (food responsiveness, enjoyment of food and emotional over-eating) (Sleddens, Kremers, & Thijs, 2008; Viana, Sinde, & Saxton, 2008). Moreover, a longitudinal analysis using the CEBQ supports the theory that weight gain in childhood is strongly influenced by differences in these appetitive traits (van Jaarsveld, Llewellyn, Johnson, & Wardle, 2011). However, it is noticeable that the positive links between the food approach dimensions of the CEBQ and child's BMI are not systematically reported by all studies using the CEBQ (e.g., Carnell & Wardle, 2007). External and emotional eating reported by parents through the DEBQ-parent version have been associated with child's weight status: they are significantly higher in 9 to 12-year-old children who are obese compared to children of the same age who are normal weight (Braet & van Strien, 2003). However several studies (Moens & Braet, 2007; Snoek, Engels, van Strien, & Otten, 2013) have found no association between the external or emotional eating self-reported by young adolescents (through the DEBQ-child version) and their weight status. A potential explanation for this absence of association is that because of social desirability bias, overweight children who for instance tend to under-report their weight (Shannon, Smiciklas-Wright, & Wang, 1991), may also tend to under-report their external and emotional eating.

It is finally also unclear whether parental food restriction results in lower or higher child weight status. Parental self-report of restriction has been associated with higher child weight status in various populations from different countries and age groups (Birch et al., 2001; Francis, Hofer, & Birch, 2001; Geng et al., 2009; Kaur et al., 2006), but this result has not been replicated by several authors who found either no association between parental restriction and child's BMI (Carnell & Wardle, 2007; Sud, Tamayo, Faith, & Keller, 2010) or a negative association (Robinson, Kiernan, & Matheson, 2001). As for parental restriction perceived by the child, it has been positively linked with child's BMI (Monnery-Patris et al., 2011; van Strien, Van Niekerk, & Ouwens, 2009) and shown to be significantly higher in overweight children compared to normal weight children (van Strien & Bazelier, 2007). The direction of the relationship is also complex: child's weight can trigger parental restriction, which can in turn influence child's weight in a cyclic model (Ventura & Birch, 2008). There is indeed evidence that maternal restriction predicts daughters' eating, which in turn predicts daughters' adiposity, thus having an impact on maternal restriction, to complete the cycle (Birch & Fisher, 2000). The mixed results on the association between parental restriction and child's BMI could be due to underlying mechanisms and pathways involving the effect of parental restriction on different aspects of child's eating behaviour (i.e., appetite reactivity and food portion size).

The links between parental restriction of child's food intake, child's eating behaviour and child's BMI are therefore complex. To our knowledge, in the last 20 years, only two studies showed an indirect effect of parental restriction on child's weight status mediated through child's eating behaviour (Birch & Fisher, 2000; Joyce & Zimmer-Gembeck, 2009). The goal of this research is thus to investigate the indirect links between parental restriction and child's BMI, with a focus on the underlying processes involving the effects on child's appetite reactivity and food portion size. Specifically, the objective of this study is to validate the theoretical model described in Fig. 1 (the variables involved in this theoretical model are precisely defined in Table 1). We focus on maternal restriction because mothers usually play an important role in their child's control of food intake (Birch & Fisher, 2000; Edmunds & Hill, 1999; Rollins, Loken, Savage, & Birch, 2014). Besides, we concentrate on the child's perception of parental restriction because the perception of these practices by the child him/herself is probably less biased by parent weight concerns and restrained eating (Monnery-Patris et al., 2011). The following questions will therefore be addressed: 1/how does perceived maternal restriction of child's food intake impact child's appetite reactivity and child's actual food portion size? 2/how does child's appetite reactivity impact child's BMI and child's actual food portion size and how does this latter dimension impact child's BMI? 3/what are the mediation and indirect effects between perceived maternal restriction and child's appetite reactivity, between child's appetite reactivity and child's BMI and between perceived maternal restriction and child's BMI?

1.1. Description and justification of the hypotheses of the theoretical model

1.1.1. Perceived maternal restriction of child's food intake positively impacts child's appetite reactivity and negatively impacts child's actual food portion size

H1. *Perceived maternal restriction of child's food intake has a positive effect on child's appetite arousal.*

H2. *Perceived maternal restriction of child's food intake has a positive effect on child's appetite persistence.*

Experimental studies have shown that restrictive feeding practices increase both children's tendency to be attracted to the