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Children respond to food restriction by increasing food consumption.

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Abstract

Consistent with the insurance hypothesis, research shows that when children experience restricted access to food, they display increased intake when restrictions are lifted. This effect appears more robust for girls compared to boys, and for children with lower levels of inhibitory control. The insurance hypothesis has potentially important implications for parental feeding practices.

Commentary

Nettle et al. find limited evidence for an association between food insecurity and BMI in children and note that 'explaining the weaker association in children stands as a challenge to the IH' (Section 6.4). There are two important reasons why such a finding is unsurprising. First, as Nettle et al. note, food insecurity is typically assessed via parental report and will not necessarily reflect a child's experience. As described below, irrespective of food insecurity, many parents place restrictions on their child's access to food. Thus in principle, even in affluent households children may feel they are not always able to choose the type and quantity of foods they eat. Second, in some instances these kinds of parental restrictions can actually help prevent excess weight gain among children (Rollins, Loken, Savage & Birch, 2014b). As with low-income countries, we may fail to find a relationship between food insecurity and BMI among children because even during times of increased availability, some children may not have access to sufficient quantities of energy dense foods to enable them to store excess weight.

Nevertheless, a number of alternative lines of research do provide support for the insurance hypothesis among children. This research includes both laboratory-based manipulations of food restriction as well as measures of parental food restriction. Parental food restriction refers to parents' attempts to limit children's access to or consumption of certain types of food (typically those that are energy dense) for health or weight related reasons. Such behaviour is generally assessed via parental or child questionnaires that ask about whether

the child is allowed to eat certain foods, whether they have to ask permission before eating certain foods, and whether the parent restricts the quantity of foods consumed.

Laboratory studies have shown that restricting children's access to a particular food will increase their expressions of desire for, and consumption of that food (Fisher & Birch, 1999b; Jansen, Mulkins, Emond & Jansen, 2008; Jansen, Mulkins & Jansen, 2007; Rollins, Lokens, Savage & Birch, 2014a). Although such effects do not appear to extend beyond the immediate post-restriction period (Fisher & Birch, 1999b; Rollins et al., 2014a), research on parental feeding practices suggest that when children are exposed to continued food restrictions, effects on intake may be sustained. For example, children whose parents restricted access to particular snacks, ate greater quantities of these snacks in the laboratory setting (Fisher & Birch, 1999a; Jansen et al., 2007; Rollins et al., 2014a; though see Jansen et al., 2008 for a null effect). Likewise, longitudinal research has found that girls who were exposed to greater parental food restrictions at age 5 were more likely to eat in the absence of hunger in the laboratory at ages 7 and 9 (Birch, Fisher & Davison, 2003; Fisher & Birch, 2002). Such effects are consistent with the insurance hypothesis.

An important finding from the meta-analysis conducted by Nettle et al. is that food insecurity is associated with BMI among women but not men. Although studies employing laboratory manipulations of food restriction among children have not tended to explore sex differences (Fisher & Birch, 1999b; Jansen et al., 2008; Jansen et al., 2007; Rollins et al., 2014a), there seems to be little evidence

to indicate that boys and girls respond differently in these studies (Fisher & Birch, 1999b). However, there is evidence to suggest they respond differently to parental food restriction; Fisher and Birch (1999a) found that both parent and child reports of maternal food restriction were associated with laboratory measures of intake among girls but not boys. Interestingly, this study also found that maternal and child reports of food restriction were correlated for girls but not boys leading the authors to speculate that whilst boys and girls may be subject to similar restrictions, boys may be granted more autonomy and choice over what they eat, which may diminish the effects of restriction.

Other longitudinal research has looked at the association between parental food restriction and child BMI. This work suggests a complex relationship with some studies supporting the notion that parental restriction increases BMI (Anzman & Birch, 2009; Faith et al., 2004; Francis & Birch, 2005), and others showing that parental restriction occurs in response to concern over child weight (Rhee et al., 2009; Spruijt-Metz, Li, Cohen, Birch & Goran, 2006). Since certain personality traits have also been linked to a tendency to consume more energy dense foods (e.g., Tapper, Baker, Jiga-Boy, Haddock & Maio, 2015), an additional possibility is that child BMI and parental food restriction are correlated only because they are both influenced by child trait variables. As noted above, a further complication is that parental restriction may sometimes prevent children from gaining excess weight (Rollins et al., 2014b).

More recently, research has shown that the effects of parental food restriction on intake are moderated by children's level of inhibitory control. In the laboratory,

children with low inhibitory control respond to food restriction with increased intake whereas children with high inhibitory control do not (Rollins et al., 2014a). Similarly, parental restriction is associated with greater increases in girls' BMI among those with low inhibitory control, but not among those with high inhibitory control (Anzman & Birch, 2009). A similar pattern occurs for eating in the absence of hunger (Rollins et al., 2014b). Such effects are consistent with other evolutionary accounts of behaviour that describe how reduced levels of inhibitory control are adaptive for those who grow up in harsh, unpredictable environments (Griskevicius et al., 2013; Simpson, Griskevicius, Kuo, Sung & Collins, 2012).

Thus research findings relating to child feeding are consistent with the insurance hypothesis. However, they also raise important questions that have yet to be answered. For example, what type of parental food restriction drives overeating? Is there a critical period in childhood that determines eating later in life? The insurance hypothesis could help guide research in such areas. Given that child feeding is an issue many parents struggle with (Moore, Tapper & Murphy, 2010), such research could also help inform the development of evidence-based advice and intervention.

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