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Parents, portions and potential distortions: Unpicking children's meal size

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Abstract

Parents and caregivers play a powerful role in shaping the food environment in which their children learn about appropriate portion sizes. Parents often report just 'knowing' the amount of food to serve to their children, but evidence indicates that these decisions are driven by the portions parents pick for themselves. This is potentially problematic because like adults, young children are susceptible to overeating from large portions, and raises questions about how children develop their own portion knowledge. Understanding the social, emotional and cultural factors that shape children's learning about appropriate portion sizes and self-regulation will lead to a better understanding of the calories that end up on children's plates and in their mouths and the eating behaviours that define them as adults.

Keywords

Portion size; Children; Parents; Learning; Cross-culture

Introduction

Children's eating behaviours reflect a tendency to eat foods that are familiar and liked, often characterised by a strong preference for sweet and fatty energy dense foods and a dislike of sour and bitter tastes common to many fruits and vegetables. While preference for some basic tastes is innate, most eating behaviours are shaped by experience and no more so than during the rapid growth period of childhood. As infants are weaned from a liquid milk-based diet, they must learn how to eat, acquiring the mouth and tongue movements required to mash, bite and chew increasingly complex solid foods (Le Reverend *et al.* 2014). After weaning, toddlers are exposed to a widening food environment and continue to learn to like the taste and texture of a broad range of unfamiliar foods, readily acquiring preference for energy dense foods that provide a satisfying post-ingestive experience. Children also learn about the different contexts of consumption, such as a meal vs. a snack, mealtime frequency and structure and also what constitutes an appropriate portion of food. Inevitably adults are central to this learning, playing a powerful role in shaping a child's food environment.

Parents and portions

At home and in childcare environments the meals and snacks offered to infants and young children are determined by their parents and caregivers, who plan, buy, and prepare foods and drinks for the children in their care. Food provision will be influenced by factors such as family income, nutritional understanding, availability and accessibility of a variety of foods, as well as cultural variations in feeding practices. As children get older they are faced with increasing opportunity to exert control over their food environment, initially through rejecting unfamiliar foods during a natural period of early neophobia (Dovey *et al.* 2008), and later by choosing their own foods in shops and school canteens, and sometimes selecting their own portion sizes at meals. These changes are somewhat reflected in dietary data as the relationship between parent and child diet composition tends to be weaker for older children and adolescents (Wang *et al.* 2011), who have more independence in their food choices.

If young children consume diets similar in *quality* to their parents, it is possible that the *quantity* of their diet follows a similar trend. A recent study by Johnson *et al.* (2014) reported a significant and

relatively strong relationship between the amount of food (in kcal) parents served themselves and their child across three different dinner-time meals at home (r = 0.51, p < .001; N = 145). Moreover, the large variation in the parents own serving size across the different meal occasions was mirrored in the servings to their children, meaning that when a parent served themselves more than usual, they did the same for their child. Importantly, children who were served more also ate more (r = 0.88, p < 0.001).

This is potentially problematic because like adults, young children are not perfect self-regulators of energy intake (Zandstra *et al.* 2000) and are susceptible to overeating in response to the food environment. The 'portion size effect' has been documented in numerous laboratory and free-living studies, confirming that people tend to eat more when served larger portions of food: a behaviour that is present in children as young as two years old (Fisher 2007). This primarily occurs because the majority of people strive to eat everything on their plate (Fay *et al.* 2011), so the more they start with the more they eat. On the one hand, susceptibility to increased intake from large portions could be used to promote consumption of healthier foods, like fruit and vegetables (Rolls *et al.* 2010). On the other hand, receiving large portions of energy dense foods unrelated to energy requirements could inadvertently promote over consumption from one meal to the next. Sustained exposure to large portions could train children to adopt similar serving behaviours by learning that larger portion sizes are 'normal'. Moreover, a child who learns to 'clean their plate' might quickly become less responsive to their own internal signals for hunger and fullness (Birch *et al.* 1987), which is another potential risk-factor for overconsumption.

Why are parents' portions closely related to those they serve their children?

To begin to answer this question it is useful to first consider how parents decide on the portions they offer to children. During focus group discussions, mothers of 6-11 year old children revealed that they 'kind of have to guess' the portions they serve, although some consideration was given to their child's appetite. They dismissed the idea of precisely weighing and measuring appropriate portions as impractical (Croker *et al.* 2009). Similarly, parents of younger children (2-4 years) revealed just 'knowing' how much their child needed to eat but not always being convinced that their children are truly full when they say so (Sherry *et al.* 2004).

Just 'knowing' the right amount to serve a child helps parents to plan meals, limit food wastage and reduce the likelihood of having to prepare additional snacks. Adults remember only about a quarter of the 200+ food-related decisions they make a day (Wansink and Sobal 2007), and experience little difficultly in selecting an 'ideal' portion of a food for a given meal (Brunstrom and Rogers 2009) or expressing beliefs about the effects a particular food might have on their own appetite (Brunstrom 2011). Importantly, these judgements are strong predictors of how much of a food an adult will serve to themselves and then consume (Wilkinson *et al.* 2012). The concept of an 'ideal' portion size seems to align with parents' sense that they 'know' or 'guess' the portions they serve to their child, and suggests that adults probably make similar decisions when selecting the portions they serve to others, including their children, irrespective of the differences in a child's energy requirements. In a preliminary trial conducted in Singapore, mothers were asked to select their ideal portions of a range of potential lunch time foods for themselves and for their 5 year old child using a computer-based portion selection task and a real dinner-time meal. These preliminary measurements indicate that the 'ideal' portions parents select for themselves correspond to those they select for their child

(Figure 1), suggesting that parents utilise their own 'ideals' to choose their children's portions (McCrickerd and Forde unpublished data).

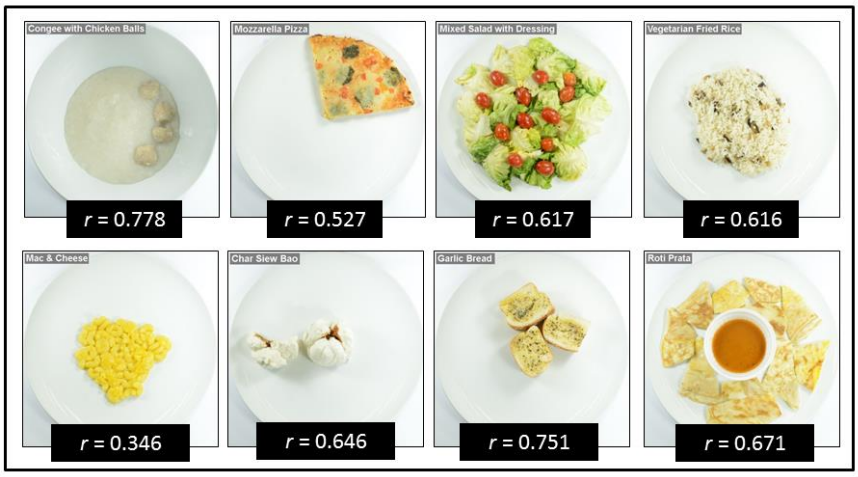

Figure 1. Pearson's correlations between mothers' selected portion for themselves and for their children (n = 17), across eight test foods.

So what drives the selection of an ideal portion size in adults, and is it truly 'ideal'? Conventional wisdom would suggest the most liked foods are selected in bigger portions, but this is not necessarily true. Instead, Brunstrom and Rogers (2009) noted that across seventeen different meal and snack foods, the food's expected satiation (the extent to which it was expected to deliver fullness) was a much stronger correlate of ideal portion size. Specifically, the ideal portion size tended to be larger for foods expected to be less filling ($r = 0.80$, $p < 0.001$), whereas food liking was unrelated to portion selection ($r = 0.06$, $p > 0.05$). Another related judgement important for portion decisions is expected satiety, described as the extent to which a food is expected to suppress hunger over time. The problem with these beliefs is that adults tend to underestimate the energy content of the most energy dense foods, which on a calorie-for-calorie basis are often expected to be less filling and hunger supressing than less energy dense options (Brunstrom and Rogers 2009; Brunstrom *et al.* 2008). This suggests that adult's portion decisions might promote overconsumption of caloric foods specifically.

The correspondence between a parent's ideal portion for themselves and for their child might suggest that any inaccuracies in adult portion judgements might also be evident in the foods served to children. However, in reality parent and child mealtime interactions are much more complex. For instance, mothers of picky eaters actively avoid overwhelming their child by serving smaller portions of foods that they know they will accept, whereas mothers of less fussy children report that the quality and quantity of the other foods their child has eaten earlier in the day inform portion decisions (Johnson *et al.* 2015). Children's eating behaviours can also reflect aspects of their caregiver's behaviour. At four years old, children whose parents feeding styles were described as particularly indulgent (low control and highly responsive) or authoritarian (high control but low responsivity) selected larger portions of food for themselves when they were away from their parent's supervision (Fisher *et al.* 2013). Thus child's interpretation of the social and emotional context of the food environment will shape their own portion behaviours. While parents' decisions about portion sizes are only one of many factors that contribute to children's food intake, this new

perspective on children's eating behaviour presents opportunity to develop novel approaches to tackling overconsumption in childhood.

When do children develop their own portion knowledge?

How and when children develop their own portion knowledge is virtually unknown, but is likely to influence their food intake as children grow older and start to exert more control over their own eating environment. Previous work has shown that 11 year old children can make clear judgements about how filling different snack foods would be, which are not just based on their reported liking or the perceived volume of food (Hardman *et al.* 2011). This implies that we learn information relevant for portion decisions earlier in childhood, presumably through experiencing the effect foods have on appetite sensations, although it is not clear when these learned beliefs start to influence children's eating behaviours. What we do know is that children adopt adult eating patterns from early on, with infants as young as 12 months rapidly migrating towards a dietary pattern of three large meals a day, rather than smaller more frequent meals that might be better suited to smaller stomachs and large energy requirements (Reidy *et al.* 2014). Learning meal patterns that fit in to the 'adult' day could be some of the first environmental cues that weaken a child's ability to regulate food intake based on their own internal cues for hunger and fullness (Fox *et al.* 2006).

The social context of eating does not just differ between families, but also across countries and cultures. Much of what we know about portion selection has, to date, been based on studies completed in educated, middle class western homes. However, approximately half of the world's population lives in Asia regions, where meal structure, portion selection and eating behaviours are influenced by different cultural principals (Rozin and Rozin 1981). In Asia the focus is far more on self-selection, and plate-cleaning is often discouraged when eating out or as a guest in someone's home. As illustrated in Figure 2, it is common to have multiple individual and shared plates to choose from, which is quite different to the large single plates of food consumed by people in the US and UK. Research is yet to systematically study how children learn to select portions in these different serving contexts, and the impact this might have on energy intake.

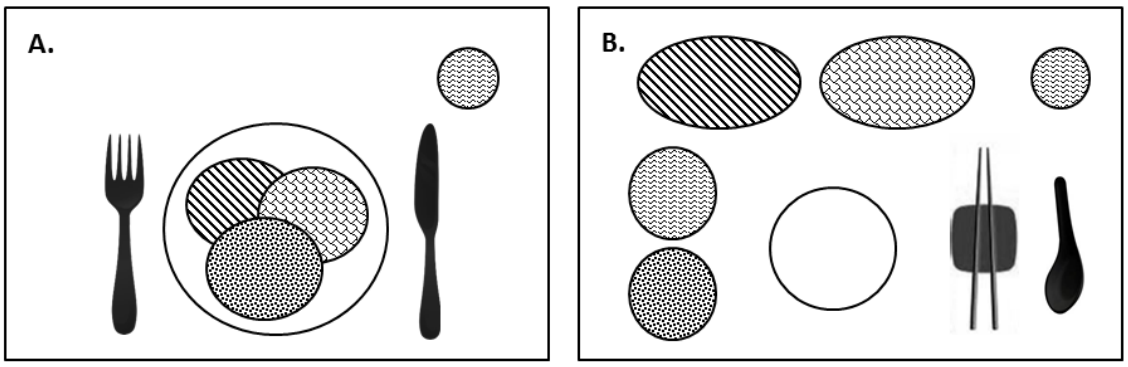

Figure 2. An illustration of typical contexts for portion selection at a meal time in the UK or US (A) and in Asia (B). In the West it is typical to have one large plate of food, whereas in Asian societies it is common to have your own small bowl of rice, while the rest of the meal is self-selected from a number of shared dishes (usually a variety of meats and vegetables), including soups.

Conclusions

Parents often report just 'knowing' how much food to serve to their children, but to date most of the evidence has focussed on pre-meal portion decisions made by adults about their own intake and not on portion decisions parents make for their child. New research indicates that parents' portions correspond closely to those they select for their children and this suggests that if parents' overestimate their own portion requirements they may do the same for their children and unintentionally promote excess food intake. Children acquire portion knowledge in the context of the dynamic food environment(s). Parents set the context for much of this learning, which is complex and combines a developing sensory anatomy and an evolving set of food preferences. Understanding how the social, emotional and cultural contexts influence children's portion knowledge will inform child feeding strategies that help children to learn about appropriate portion sizes and preserve self-regulation. A major challenge will be recognising how all the potential determinants of portion size decisions change and interact through early childhood, adolescents and adulthood, and to identifying which elements of portion selection most likely lead to sustained overconsumption of calories.

Conflict of interest

The authors K. McCrickerd and C.G. Forde declare no conflict of interest

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