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Child food portion sizes in the home environment: how do parents decide?

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The consumption of larger portion sizes (PS) of food has been implicated in the increased prevalence of childhood obesity. The home is usually the first place children learn about food, however, little is known about how parents determine child PS in the home environment. This narrative review aimed to explore parental beliefs, decisions, strategies and barriers to the provision of appropriate food PS for children in the home environment. Results indicate that parental decisions on child food PS are based on the amounts they serve themselves, personal intuition and knowledge of child appetite. Owing to the habitual nature of food provision, parental decisions on child PS may be taken without conscious thought and/or could be part of a complex decision-making process influenced by several interlinked factors, including parental childhood mealtime experiences, other family members and child weight status. Strategies to determine child-appropriate PS include modelling the desired PS behaviour, use of unit-based food packaging and PS estimation aids, and providing the child with a degree of autonomy to rely on their own appetite cues. A lack of knowledge/awareness of PS guidance is a key barrier identified by parents to the provision of age-appropriate PS, warranting the inclusion of salient child-appropriate PS guidance within national dietary recommendations. Further home-based interventions to improve the provision of appropriate child PS are required, leveraged on parental strategies already in use, as outlined in this review.

Key words: Portion size decisions: Family: Children: Home

The increasing portion sizes (PS) of foods over time have been implicated in the global rise of obesity^(1,2). Research suggests that by 3 years of age, the external eating environment begins to play an influential role in child food intake⁽³⁾ and similar to the portion size effect observed in adults^(4,5), food intake in children increases in response to exposure to larger PS^(6–9). Children’s food preferences and dietary patterns reflect what has become familiar to them in childhood^(10–12) with the home environment typically regarded as integral in the development of early life food preferences and intake patterns^(13–15). Results from

nationally representative data in the United Kingdom (UK) show that among young children, eating out-of-home is associated with both larger energy intakes and larger PS⁽¹⁶⁾. Furthermore, a greater consumption of vegetables and a lower consumption of sweets has been reported at home compared to other contexts⁽¹⁷⁾. From birth to early adolescence, children rely on their primary carers for food, and the PS offered are largely at the parent’s discretion in the early years⁽¹⁸⁾. Studies examining PS in children have typically been carried out in experimental laboratory settings^(8,9,19–22) or in the school

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environment,^(8,23–25) with few studies carried out in the home setting^(26,27). Thus, little is known about behaviours and intake in relation to child food portion size in the home environment. The objective of this review was therefore to explore parental beliefs, decisions, strategies, barriers and opportunities in relation to the provision of appropriate food PS for their children.

This narrative review considered studies carried out in the home environment investigating PS strategies used by parents of children aged 2–12 years. Throughout the current review, PS is defined as the amount of food intended to be consumed at a single eating occasion⁽²⁸⁾.

Portion size decisions

Role of the child and parent

Reports suggest that from an early age children have strong preferences for certain foods and can make their own decisions with respect to the type and PS of food offered for consumption. Results from focus group discussions demonstrate that children between the ages of 6 and 11 years, rely on certain physical cues to decide on an appropriate PS. These include ‘tummy growling’ and ‘your brain telling you’, previous experience with the food(s), as well as PS served by parents and parental guidance⁽²⁹⁾. These findings indicate that parental PS decisions may be child-driven and reflect the critical role played by parents in connection with child PS.

Parents report a conscious desire to set an example based on their own food PS decisions, however these are found to be largely based on the amounts they serve themselves^(26,29). Two experimental studies^(26,30) have demonstrated a positive correlation between parental and child PS when parents serve a meal or a snack in the home environment. Thus, if a parent serves themselves a larger/smaller PS than appropriate, they are likely to do the same for their child. Results from qualitative studies in this area are mixed. For example, in support of the experimental research, parents report that they use their own PS as a guide for determining PS for their child^(29,31,32), while others report using their own intuition, previous experience and knowledge/perception of the child’s appetite^(29,31,33–37). Furthermore, research using the ‘think aloud’ method, in which parents verbalise their thoughts during food preparation, has indicated that maternal PS decisions can be automatic and influenced by the mother’s own hunger and liking of the food product⁽³⁶⁾. Fig. 1 gives an overview of the different factors influencing parental PS decisions.

Ethnicity and parental childhood mealtime experiences

Differences in parental PS decisions and strategies based on ethnicity have been noted. For example, white parents are more likely to consider PS compared to African American and Hispanic parents⁽³⁷⁾. Similarly, English-speaking mothers in the United States of America (US) reportedly allow their children more autonomy than Spanish-speaking parents with respect to PS decisions⁽²⁹⁾. However, Chinese mothers living in

the UK are shown to share PS strategies with British mothers⁽³⁸⁾, suggesting an important role for environment despite ethnicity. There is also evidence that parental PS decisions may be influenced by their own mealtime experiences as children⁽³¹⁾. Parents are shown to be motivated by their personal experiences as children, with some expressing a desire to avoid replicating personal negative experiences, such as being told to ‘clean their plates’ to avoid food waste^(39,40). Notably, parents have been shown to influence indulgent feeding practices, for example, providing larger PS of treats, in an effort to give themselves and their children more positive mealtime experiences^(39,41). Also, PS decisions appear to be passed on from one generation to the next in what has been termed as inter-generational transmission^(30,31), defined as ‘the process through which purposively or unintentionally, an earlier generation psychologically influences parenting attitudes and behaviour of the next generation’⁽⁴²⁾. This process has been observed in health⁽⁴³⁾, stress response⁽⁴⁴⁾ and parenting behaviour⁽⁴⁵⁾.

Other family members

Parents with children of varying ages have been shown to acknowledge that each child is different and that PS decisions should differ accordingly⁽³³⁾. However, there is evidence to suggest that PS decisions for younger children in a household are likely to be based on the PS offered to the older children^(29,31,46). The role of partners and grandparents in the provision of appropriate child PS has not been widely examined. Partner support has been shown to facilitate healthier food choices in general⁽⁴⁷⁾, whereas contrastingly, US mothers have indicated that their views on food type and PS differ from those of their partners, reporting that their partners are more likely to purchase larger amounts of food for their child and contribute to the availability of high-energy dense (HED) foods in the home⁽⁴⁸⁾. Fathers are also reported by mothers to be more likely to engage in an indulgent feeding style, for example, pressurising children to eat, using food to regulate child emotion, using food as a reward and presenting larger food PS^(48–50). Grandparents play an integral role in caring for their grandchildren, in particular those of preschool-age^(50,51). As such grandparents facilitate the development of their grandchildren’s attitudes towards food and subsequent food preferences^(32,51–53). However, grandparents reportedly practice more autonomy promoting behaviour, especially with regards to provision of sweet treats, are shown to use food as a reward, and are also reported to serve large PS of HED foods^(32,39,46,52). Notably, mothers report believing that their own parents practiced more restrictive parenting styles as parents than as grandparents⁽⁴⁶⁾.

Child weight status

Parental feeding practices may differ based on child weight status. In a study involving siblings aged between 6 and 12 years, parents were more likely to use restrictive feeding practices with their overweight child than with their healthy weight child⁽⁵⁴⁾. Parents consider that it is

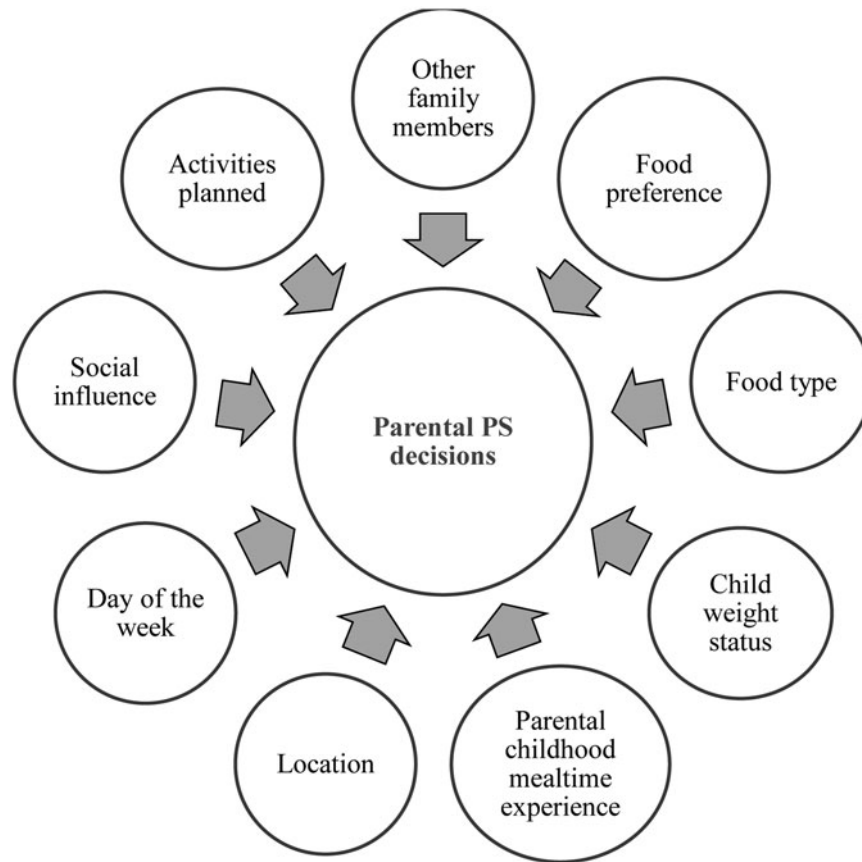


Fig. 1. Factors influencing parental portion size decisions. PS, Portion Size.

their responsibility to ensure their child is of a healthy weight by providing appropriate foods and managing their food PS⁽⁴⁶⁾. However, they report feeling ill-equipped to discuss child body weight status,⁽⁴⁷⁾ at the risk of inducing anxiety, especially with older children⁽³²⁾. Results from quantitative studies suggest that parental decisions on both food type and PS are influenced by child weight status^(55–57). Specifically, mothers of children with obesity showed higher rates of encouragement for a large PS of vegetables than for treat foods. Notably however no differences in PS of fruits, berries and vegetables selected by children based on weight status were observed⁽⁵⁵⁾. Qualitative evidence indicates that even when parents are not specifically concerned with their child's food PS, they would be worried if their child put on weight, especially if they felt their child showed signs of being unable to control food consumption^(29,33). Further qualitative evidence found parents to be concerned about their child being teased as a result of being overweight⁽³²⁾, albeit focus group discussions among 34 Scottish mothers indicate a difficulty among mothers in recognising whether or not their child is overweight⁽⁴⁶⁾. Taken together, these findings indicate an overall willingness of parents to manage their child's weight and avoid the development of unhealthy eating patterns. The findings also indicate a lack of guidance for parents on how to deal with weight

status issues in their children, albeit it is difficult for parents to recognise when their child is overweight^(32,46).

Food type and other influencers

Parental perception of the healthfulness of a food product influences PS decisions⁽³⁷⁾ with results from qualitative studies indicating that parents are more likely to control the PS offered of HED foods compared to more healthful options^(29,30,33,57). In a study analysing the portions of low-energy dense (LED) and HED foods offered to children aged 2–4 years, 46% of parents chose PS of HED snacks that were smaller than the suggested serving size, while 28% chose PS that were greater⁽³⁰⁾. This finding is further supported by the diminutive terms cited by 60 parents in a US study such as, 'something small', and 'a little bit' when asked to describe age-appropriate portions of snack foods⁽³⁷⁾.

Evidence suggests that parents tend to compare the PS they serve their children with the PS served by other parents in their social circle, particularly where parent peers have children in a similar age group^(31,35,40). In addition, parents consider the influence that a child's peers may have on PS and food intake, with some stating that this is only relevant out of the home⁽²⁹⁾, while others believe that peer influence from nurseries and out-of-home experiences ultimately impact child food preferences



and intake both in and/or out of the home⁽³⁸⁾. Indeed, many parents describe controlling PS out-of-home as a challenge, as eating out-of-home is generally considered a treat^(37,38). However, there is also evidence suggesting that parents are more likely to offer pre-packaged crisps and biscuits when out-of-home compared to when at home, in addition to being more relaxed about PS when out-of-home⁽³⁷⁾. Weekend v. weekday intake is also thought to influence parental PS decisions, with significantly larger PS of HED food such as chips, fried foods and sweet snacks/desserts observed among children at weekends compared to weekdays⁽⁵⁸⁾. This finding is supported by qualitative evidence from France indicating that food habits differ between weekends and weekdays, especially with respect to the type of meal served⁽³¹⁾. Other parental considerations include the proximity to the last/next eating occasion and the PS of food previously consumed by the child during the day^(33,37,40). Parents may also base their PS decisions on level of physical activity undertaken by the child, with larger PS offered when children are considered to be more active^(31,36).

Parental strategies to serve appropriate food PS

Several strategies have been shown to help parents serve child appropriate PS. These include, the use of packaging, modelling the desired PS behaviour and the use of portion size estimation aids (PSEA). In some cases, PS strategies are attributed more to habits formed over time rather than deliberate or conscious efforts⁽³⁸⁾, while conversely PS strategies used are in response to the child's needs at the time⁽³³⁾.

Packaging

Qualitative studies from the UK and US^(12,35,37,39,41) provide evidence that pre-portioned snacks are a common strategy for parents to manage their child's PS. UK mothers of children aged 2–4 years, have reported package size as being useful for determining the amount to offer at any one time⁽³⁶⁾. Further research suggests that disposable food and drink packages are commonly reused by parents as a reference to help estimate subsequent PS⁽⁵⁹⁾. Indeed when parents buy larger packages of food products, they typically repackaged the food into individually wrapped units^(37,38). Also, parents report using pre-packaged snacks to prevent negotiation and children asking for more⁽³⁸⁾. These findings highlight the value of unit-based food packaging in relation to providing child appropriate food PS, offering an opportunity to food manufacturers.

Modelling

Modelling of desired healthful PS behaviours has been shown to have a consistent impact on improving dietary behaviours in children^(29,35,60–62). Parents report an awareness that their children mimic their food behaviour and are influenced by how much they (the parents) serve themselves⁽²⁹⁾. Parents believe that eating with their

children provides them with an opportunity to teach children about what to eat, and to encourage appropriate table manners⁽⁶¹⁾. Interestingly there is some evidence to suggest that children are particularly likely to model healthy eating practices⁽⁴⁸⁾. Further evidence from Finland in this regard, indicates that parental consumption of fruits and vegetables predicts consumption among 8-year-old children⁽⁵⁵⁾. Notably, among children aged 2–4 years, a combination of modelling, use of rewards and repeated exposure has been shown to improve liking and consumption of a previously disliked vegetable⁽⁶²⁾.

Portion size estimation aids

Adults on the island of Ireland reportedly prefer 'visual' tools to help estimate appropriate PS⁽⁶³⁾. Likewise, parents have reported using charts, child-sized plates, their own hands, plates with dividers or tablespoons^(29,31,32,38) to determine appropriate PS for their children. Notably the use of large dishware is thought to challenge this ability^(32,33) and some parents report using child-sized utensils as a strategy⁽³¹⁾. In observational studies investigating parental v. child estimates of PS, results indicate a large variability between parents and children^(64,65). Specifically, parental PS estimations only aligned with child estimates as child BMI increased⁽⁶⁵⁾. Intervention studies examining parental use of PSEA in children are limited. Available studies have largely focused on parental self-efficacy in identifying and/or measuring appropriate child PS^(66,67). Specifically, parents of children aged 8–12 years, were better able to identify child-appropriate PS following a home-based intervention study targeted at childhood obesity⁽⁶⁶⁾. Further evidence among parents of children aged 3–5 years indicates an increase in the use of measured portions following an obesity prevention programme on self-regulation and healthy preferences⁽⁶⁷⁾. These findings highlight the use of PSEA as a potentially important strategy in the provision of age-appropriate food PS, and the success of their use in the home environment should be further explored.

Autonomy

Evidence suggests that providing children with a degree of autonomy with respect to PS from an early age has several positive outcomes in relation to PS behaviour⁽²⁹⁾. Three main scenarios have been highlighted with respect to autonomy: 1. Guided autonomy, where PS decisions are jointly shared between the parent and the child, with some families negotiating with the child on the food portions served^(29,33,34); 2. Full autonomy, where the child is given total control over their own PS^(29,31,34); 3. No autonomy, where the PS decision is largely taken by the parent^(33,34). In cases where no autonomy was given, parents considered safety and utensils not being 'child-friendly', as the rationale, as well as a desire to avoid messy situations (especially with younger children)⁽³¹⁾. Parents were also of the opinion that the child may be unable to serve themselves the appropriate PS if given full autonomy^(31,34). Meal type has been reported to play a role in the level of autonomy given



to the child, with more autonomy given for a breakfast meal or a snack, compared to lunch or dinner^(31,34). However, for the most part, parents do not allow complete autonomy, preferring guided autonomy while taking the child's preferences into account⁽³⁴⁾. Notably, results from an experimental study investigating meal-time structure have demonstrated that children, aged 2–4 years, who are involved in food choice and selection of PS, are less likely to refuse food during the meal⁽⁶⁸⁾. Further evidence demonstrates that when children are included in food choice and meal preparation, they exhibit less food fussiness and greater food enjoyment^(68–70). Allowing some level of autonomy with respect to PS in the home environment may therefore be beneficial to the development of positive PS behaviours in children.

Replacement, reduction and satiety cues

Among preschool children in childcare facilities, serving a variety of vegetables and fruit leads to increased consumption^(24,71), suggesting the potential for a similar influence in the home setting. Evidence from the UK investigating replacement of HED snacks with LED options and reduction in PS of HED snacks by 50%, are shown to be successful strategies for PS control in young children (mean age 36.6 ± 9.5 months)⁽²⁷⁾. Further results show that replacement influences children's intake more positively compared to reduction, though both strategies were well received and applied by mothers⁽²⁷⁾. Indeed, increasing the PS of vegetables served during a meal while decreasing the portions of other components has been reported by a group of US parents as a useful strategy to optimise vegetable intake among their children aged 6–11 years⁽²⁹⁾. In relation to reduction, parents have reported both cutting up the food to give children the impression that there was a larger portion than what was available in reality⁽³⁶⁾, as well as the sharing of snacks as a portion control strategy^(36,38).

It has been reported by parents in qualitative studies that offering a small portion of food first, then offering more in response to the child's cues is a portion control strategy^(31,33,34). Parents report relying on feedback from the child with respect to satiation, as well as having an implicit agreement with the child that they could ask for second helpings, but only if they finished their first helping of the meal^(34,36). In qualitative research conducted among children aged 6–11 years, mixed opinions in relation to how much food to eat were evidenced, with some children stating a reliance on parents, e.g. *'My dad, if he thinks we're eating a lot, will tell us to wait and see if we feel full and if we're still hungry later'*⁽²⁹⁾, while others reported relying on their intuition, e.g. *'my tummy tells me to stop eating'* and *'eating less than their parents portions'*⁽²⁹⁾.

Barriers to providing appropriate food PS in the home environment

A lack of knowledge/awareness about child PS guidelines is one of the main barriers reported by parents to serving

appropriate child PS. In qualitative studies, parents report a lack of awareness of the existence of PS guidance as well as confusion surrounding the available PS guidance^(32,36,46). Indeed, some parents have reported to never having thought (and/or obtained advice) about their child's PS⁽³⁵⁾. UK mothers of children aged 8–11 years have indicated a lack of knowledge regarding child PS recommendations with some stating they were unconcerned about finding any such recommendations⁽³³⁾. Conversely, mothers have reported a belief that knowledge of child appetite and food preferences helps them make decisions on the most appropriate PS to feed their child⁽⁴⁰⁾. Parents report an awareness that their children are exposed to multiple external sources of information regarding health and nutrition^(60,72). However, a key factor influencing the use of food-related guidelines is maternal confidence/trust in the source of messaging⁽³⁶⁾. Of note, parents report that their children may be more responsive to health care professionals as they get older than to them in relation to implementing healthful behaviours⁽⁷³⁾.

Children classified as 'good eaters' are considered to like a variety of foods, while 'picky eaters' are thought to be easily overwhelmed by the food on their plates⁽⁴⁰⁾. When a child is believed to be a 'picky eater', parents are more likely to take into consideration the child's food preferences and avoid presenting foods disliked, owing to concerns about food waste^(40,73). With 'picky eaters', parents express frustration in relation to dealing with the specific needs of catering to children with these traits⁽⁷³⁾ as well as low confidence in their ability to influence their 'picky' eaters PS decisions positively. Parents have also expressed fatigue at the time and financial burden, related to serving appropriate food PS for their 'picky eater', owing to the time required to customise meals and serve PS to suit the child's limited preferences⁽⁷³⁾.

Opportunities for policy

Food and nutrition education-based interventions involving parents and children do not typically place emphasis on PS^(39,74). Among those that have, results indicate an improvement over time in the ability of parents to identify appropriate PS for their children, particularly with the inclusion of social support, and positive effects are shown to be sustained 9 months post-intervention^(66,75–78). Notably, studies from the US have shown that even with long-term programmes, the effects on PS are only sustained when support is extended beyond the intervention period^(67,75). Furthermore, parents would welcome policy that encourages healthy eating and subsidies on healthy foods, as well as child-focused PS guidance⁽⁷²⁾. Research highlights the value of schools as a vehicle to improve healthy food consumption in the home environment. Specifically, an improvement in understanding of nutrition labels and increased fruit and vegetable intake in the home environment was reported among US families who took part in a school-based intervention⁽⁷⁹⁾. A lack of clear guidelines is

implicated as a key challenge among parents to serving child-appropriate food PS. This may indicate that PS guidance may need to be more prominent within national dietary guidance. In the current digital age, there is an opportunity for the targeted promotion of such guidelines to parents through different channels; for example, the use of social media and other digital platforms, parent groups and as a larger part of interventions generally targeted at promoting good health in children. However, care should be taken to ensure that the messages are from trusted sources.

Conclusions

Based on a range of quantitative and qualitative evidence, this review provides an insight into parental beliefs, decisions, strategies, barriers and opportunities relating to the provision of appropriate child food PS in the home environment. Parental beliefs in relation to child PS are influenced by a wide range of interlinked factors, primarily driven by ensuring the provision of healthful foods. In contrast, parental decisions relating to child PS are typically driven by an unconscious process, likely owing to the habitual nature of child feeding. Parents are aware that their own PS influences that consumed by their child, however this does not necessarily translate into practical steps to serve child appropriate food PS. The use of unit-based food packaging is a particularly promising strategy for helping parents to manage child food PS, and there is a need for long term interventions in this area. Finally, more salient age-appropriate PS guidance for children is warranted within national dietary recommendations.

Supplementary material

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Conflict of Interest

None.

Authorship

LA was involved in the generation of the topic, data review and writing of the review article. LKP, CL, MTM and MAK advised on the content and critically reviewed the manuscript. All the authors read and approved the final manuscript.

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