

BY FEMKE W.M. DAMEN, ELLEN VAN KLEEF,
CARLO AGOSTONI, and
EVA ALMIRON-ROIG





Portion Control Opportunities in Children's Diets

While the current food environment of large serving sizes, high calorie density, and plentiful and inexpensive options makes it difficult for parents to properly feed their kids, practical tools are emerging that support portion size management for children.

The number of overweight people worldwide is growing at an alarming rate. An estimated 42 million children, including adolescents, worldwide are overweight (Ng et al. 2014). Consumers often believe that what they eat is more important than how much they eat. However, the rise in overweight and obesity is partly believed to be caused by the rapid growth of “supersized” portions of high-calorie foods in grocery stores and restaurants over the past decades that encourage excessive consumption.

Recent research has robustly shown that people eat more when they are served larger portions and packages but do not compensate for this increased consumption by eating less at later times. A review of 104 portion size studies showed that doubling of portion size leads to an average consumption increase of 35% (Zlatevska et al. 2014). This so-called “portion size effect” has been shown to occur for various kind of foods such as pasta, snacks, beverages, chips, and vegetables and in a variety of contexts.

Similar to adults, children tend to eat more when more food is presented to them and this tendency has been detected among children as young as 2 years of age (Fisher and Kral 2008). Although not all children respond equally, research has shown that from age 2 to 5 years, meal size promotes faster growth regardless of how often food is eaten (although frequency is also important if portion sizes are large) (Syra et al. 2016, Duffey and Popkin 2011). This faster growth carries an associated greater risk for obesity later in life. Clear information on recommended portion sizes may help

prevent excess weight gain in children.

Portion size management is therefore essential in the development of healthy eating habits of children. This means both using portion size to limit less healthy food consumption and possibly calories but also encouraging the intake of healthier foods, such as fruit and vegetables.

This article explores key factors that make it hard for both parents and children to manage portion size and some recent developments on how to support portion size management on a practical basis.

Factors Challenging Portion Control

There is no easy way to change eating habits for the good. Research may explain why it is so difficult to control our portion and serving sizes. Food consumption is often seen as a rational process with well-reasoned decisions on what to choose and how much to eat or drink. But in reality, many of these decisions are taken in a rather impulsive and intuitive way. A key problem is that today's food environments in most Western-world countries are not very supportive of healthy portion choice. In our more accessible food environment, food and particularly nutrient-poor and calorie-dense food is plentifully available, appealing, and relatively inexpensive. This is especially the case in environments in which large amounts of foods are readily accessible, such as fast food restaurants and supermarkets. In these environments, our body's system of hunger and fullness is often overruled by external temptations and cues on what is “normal” to eat. In other words, in such circumstances consumers may pay less attention to signals of fullness while eating.

Consumers find it difficult to precisely assess what is a suitable portion. Instead, they trust visual indicators of what a proper portion is, such as the shape and (unit) size of serving utensils and packages (Wansink 2004). Changes to the unit size, for example, can unknowingly impact how much consumers serve and eat. For example, consumers find it more acceptable to eat one larger unit (e.g., one large chocolate bar) compared to eating the same amount from smaller units (e.g., five small chocolate bars) (van Kleef et al. 2014). A complicating factor is that many people have the tendency to finish entire servings or units from a food, the so-called

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Figure 2. Delboeuf illusion: The amount of pasta on each plate is identical, however, the food on the rimmed plate (right) may be perceived as a larger portion. © Samohin/iStock/Thinkstock, © Suradech14/iStock/Thinkstock, © Beauty photographer/Shutterstock

“completion compulsion” or plate-cleaning tendency (Siegel 1957). We simply do not stop because we are feeling full. This may be the result of being taught to clean your plate and eat what is served as a child. It has been estimated that adults eat on average 92% of what they serve themselves (Wansink and Johnson 2015). Moreover, consumers are also attracted to purchase larger portions because they seem a good deal (“value for money”).

Another reason why it is so hard to manage portion sizes is related to the value conflicts that parents experience when feeding their young children. Value conflicts in food choice have been defined as the conflict that arises when satisfying one value (e.g., allowing your child to enjoy candy) would prevent meeting another value (e.g., being a good parent by providing healthy nutrition; Connors et al. 2001). A recent study among 136 mothers of young children (age 2–7 years) examined snack choices of mothers for their children (Damen et al. in preparation). Results show that mothers indeed face value conflicts when choosing a snack, while

considering it either healthy or unhealthy, for their young children. Important value conflicts relate to health considerations (mothers want to give healthier snacks) as well as to influence of others (when other people are around, different snacks are provided to the children).

When it comes to portion control, the value conflicts mothers’ experience when picking a snack for their children depend on package size and healthiness of the snacks. For many mothers, the package size represents a consumption norm that helps them determine what is appropriate to give to their child. More specifically, when a snack is pre-packed in that the portion size of that snack is already set, some mothers take this portion size as the recommended amount: “If there are two in a package, he gets both (cookies), I do not think about it.” Other mothers struggle with these single-sized portions because although they feel it is too much, their child feels disappointed because they only get part of the supposed “normal” portion. As one mother stated: “I think two cookies is too much, so he will get one out a

pack of two. However, he does not like that.” So, large and unclear optimal serving sizes may evoke conflicting feelings among parents. Moreover, pre-packed portion sizes are often difficult to split into more suitable smaller portions.

When it comes to the perceived healthiness of a snack, mothers want their children to eat larger portions of healthy snacks and smaller portions of snacks they consider to be unhealthy. One mother mentioned: “She can eat as much as fruit as she wants, even if it is just before dinner or lunch.” Another mother said: “For cookies and sweets, the portion size is very important, not too much.” It is particularly with foods such as cookies, chips, and candies that mothers experience uncertainty in deciding how much is appropriate to eat.

Overall, these findings support the notion that parents on a whole struggle to decide what a reasonable portion is to give to their children, and this may be affected by the context of eating (location, social interaction, time pressure, etc.). When it comes to snacks, for example, parents may decide based on strategies that are quick and practical even if they lack evidence or accuracy. A qualitative study from the U.S. found that among 60 low-income parents—social group more predisposed to obesity—of children aged 3–5 years (Blake et al. 2015), around 90% mentioned they applied strategies to control the portion size for child snacks, with the most common being subdividing snacks that come in large packs either by using containers, or other means (e.g., hands), and 40% mentioned using pre-packaged snacks, while very few used weighing scales or measuring cups (13%). Accordingly, portion size management tools especially for children need to fit in with the family’s lifestyle and budget. In addition, they need to be appealing to both children and parents for continued use.

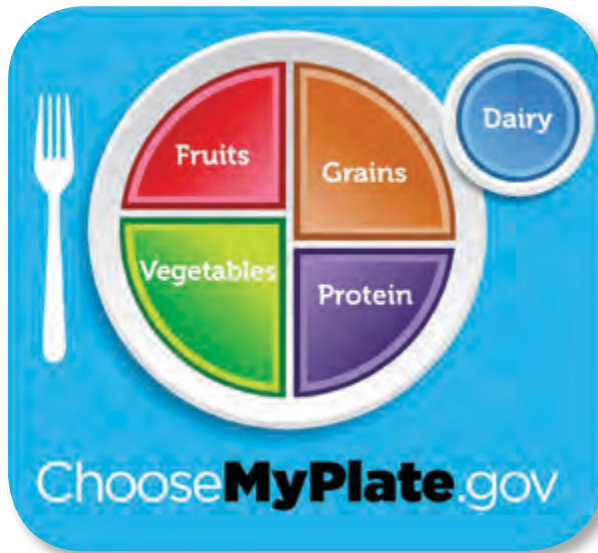
Portion Size Management Tools for Children

It is easy to find an abundance of educational materials for healthy eating in children (UK Department of Health 2011). However, few of these materials have been translated into practical, hands-on instruments that parents can use especially when out and about, or when pressed for time. Therefore, while a plethora of educational materials exist mostly based on lists or images of portion sizes for children, these tend to focus on very young children (up to 4 yr), may be too general (e.g., based on food groups rather than specific foods (Figure 1), in particular high energy foods may be missing), and can be inconsistent across sources. In addition, not all of these materials are endorsed by health professionals, contributing further to their lack of

credibility among the public. Despite this, some reliable evidence-based materials exist for pre-school children that can be used as a starting point (More and Emmett 2015, First Steps Nutrition Trust 2008), although they do not cover all age ranges. These sources have been developed by nutritionists and are based on energy and nutrient needs of 1–4 year olds. When it comes to older children though, the lack of age-appropriate, food-specific recommendations are more obvious. Alberta Health and Wellness has produced an extensive guide of food portion sizes for children aged 1 through 18 years, which is also gender-specific (Alberta Government 2012), and other countries also have published children portion size tables endorsed by health professionals (Rivero Urgell et al. 2015).

Considering more practical approaches, the use of age-appropriate tableware and serving utensils has also been advocated as well as the use of specific tableware design, such as plates with rims (Robinson et al 2015). The idea behind these tools is that if children are presented with a portion according to their needs they may still feel satiated and not be tempted by visual cues of the food present in a plate which is the size of an adult (Hollands et al. 2015). The presence of rims has been proposed to create a visual effect that the food amount is larger than it is (known as Delboeuf illusion, Figure 2) and which recently has been shown to be associated with increased expectations of fullness and reduced food intake in adults but only in those that are not overweight (Peng 2017). Overall, more evidence to support the use of

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such plates is needed as changes in energy intake were not detected in all experimental trials and most work has been carried out in adults (Robinson et al. 2014). On the

Figure 1. The U.S. Dept. of Agriculture's MyPlate program offers a visual cue of appropriate portions of different food groups.

other hand, the use of tall, thin, and smaller volume glasses has been proposed to help perceive portion sizes of liquids as larger, however, most of this work was done in adults. The practicalities of using such drinking cups in young children need to be considered.

More recently, a number of portion control and portion learning systems, including sector plates, calibrated drinking cups and bowls with attractive designs for children have been commercialized, mostly in the U.S. and based on the U.S. Dept. of Agriculture nutritional guidelines (e.g., Choose My Plate, Gov, Precise Portions Nutrition Control Systems, Plate my Meal) (Figure 3). Although the portion sizes defined by these tools are

based on government guidelines for 1–4 year old children, to our knowledge the actual tools have not been endorsed by health professionals and there are no validation studies supporting their effectiveness. Another limitation is that these tools tend to use a “one fits all” approach by which they may need adaptation to cultures different from Westernized countries and the U.S. in particular. Some flexibility has been introduced by including a different plate for each meal and snack, and non-English language versions in some of these tools.

Despite these limitations, the potential of portion control plates for children is good, based on data from studies with similar tools designed for adults. A recent trial in



Figure 3. Examples of commercial portion control and portion learning tools for children. Source: (top) Precise Portions NCS, Virginia, USA (image courtesy of Precise Portions Nutrition Control Systems); (right) Plate my Meal Ltd, Tnuvot, Israel.

the UK for example has shown that a portion control plate and a set of portion control spoons were helpful in reducing portions of starch and increasing portions of salad and vegetable among people with obesity who had been on a weight-reducing program (Almiron-Roig et al. 2016). These consumption changes may suggest that such tools may help to learn and gauge appropriate amounts of food at the time of serving which are easy to remember due to the shape and design of the plate. Parents may potentially find it easier and quicker to portion appropriate amounts using these plates and bowls compared with the need for checking labels or using food scales. For some foods, provided the divisions are comparable to recommended portions, the same objective may be achieved with the use of ordinary age-appropriate plates, snack and lunch boxes containing divisions, however, these

will lack the visual information on what type of food to serve in each sector, and may be less appealing to children.

Finally, the fast progress of technology should not be underestimated as a facilitating media for the design of new and more versatile portion control tools, which may also benefit companies and other stakeholders interested in promoting healthy eating. For example, apps are already available that help shoppers to switch less healthy items for healthier ones before reaching the grocery check-out line, at home or on the go (UK Department of Health), and these offer great potential for portion control especially in adolescents due to their increased independence and mobility.

Challenges Ahead

In the face of challenges of an increasingly tempting food

environment, the urge to get value for money when purchasing foods, and insensitivity to bodily feelings of fullness, consumers have a hard time managing their portions and food intake.

Parents in particular face difficulties in deciding about adequate portion sizes for foods perceived as “unhealthy.” On the other hand, these foods commonly represent convenient options especially when on the go, because they come pre-packaged and have low perishability (being cheap), plus are highly liked (therefore avoiding waste). A suggestion for food technologists and product developers working on portion size could be to try to make smaller portions of such products, or sell them in resealable packs, to help parents reduce their value conflicts while providing their children an adequate amount of these products, and still fulfilling the convenience demand. Another



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option may be to improve clarity in the package information as to how much is a recommended portion versus what comes in the pack.

Even if it is generally agreed that a variety of reasons and not just diet may explain the steady increase in the prevalence of overweight and obesity throughout the global pediatric population, adjusting energy intake to what is required by age is advantageous for both preventive and therapeutic purposes. To this aim, balancing the amount of food we eat is key and this can be done by modulating environmental portion sizes or by convincing people to leave out a few spoons of food from their usual portion dishes (Hill 2003). What would be easier to follow to change how much we eat? **FT**

Femke W.M. Damen is a PhD student, Food Quality and Design Group, Wageningen University, Wageningen, The Netherlands (femke.brouwer-damen@wur.nl), **Ellen van Kleef**, PhD, is associate professor, Marketing and Consumer Behavior Group, Wageningen University, Wageningen, The Netherlands (ellen.vankleef@wur.nl), **Carlo Agostoni**, MD, is professor, Dept. of Clinical Sciences and Community Health, University of Milan, Milan, Italy, (carlo.agostoni@unimi.it), and **Eva Almiron-Roig**, PhD, RD, is investigator scientist, Center for Nutrition Research, University of Navarra, Pamplona, Spain (ealmiron@unav.es).

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