Progress in Nutrition 2020; Vol. 22, N. 3: IN PRESS DOI: 10.23751/pn.v22i3.9315

Original article

Tableware and Food Consumption

Eun Young Park[1], *Eun Young Jung*[2]

[1] Department of Secondary Special Education, Jeonju University, Jeonju 55069, Republic of Korea;
[2] Department of Home Economic Education, Jeonju University, Jeonju 55069, Republic of Korea

**Correspondence: Eun Young Jung*,
Department of Home Economic Education, Jeonju University, 303 Cheonjam-ro, Wansan-gu, Jeonju 55069, Republic of Korea.
Tel: 82. 63. 220. 2827
Fax: 82. 63. 220. 2053
Email: jjjj@jj.ac.kr

The authors declare no conflict of interest.

Summary

We conducted a review to investigate whether the evidence for an association between tableware in the built food environment and food consumption is consistent and important. We systematically searched electronic databases for articles published in English since 2000. A total of 541 studies were identified. Of these, we excluded 525 studies and reviewed 16. The types of tableware studied were plates (n=7), bowls (n=5), glasses (n=2), cups (n=1), spoons (n=1), and chopsticks (n=1). Their manipulated properties were size (n=9), color (n=6), shape (n=5), and type (n=1). In conclusion, there is a tendency to use tableware as an indication of how much should be served and consumed. Simply using smaller tableware might be all that is required to make an environment less conducive to overeating. One possible effect of tableware color has been identified in this review. Thus, the review demonstrates that tableware affects mainly visual aspects of perception.

Keywords: bowl, food intake, plate, spoon, tableware

Introduction

Obesity is the presence of high levels of stored body fat that occurs when caloric intake exceeds caloric expenditure. Obesity increases the likelihood of various diseases, particularly heart disease, type 2 diabetes, obstructive sleep apnea, certain types of cancer, and osteoarthritis (1). Much effort is being expended on identifying influences on obesity and ways to prevent or reverse weight gain. Major risk factors for obesity are determined by behaviors that are in principle modifiable (1, 2). Most behavior occurs outside awareness, cued by stimuli in the environment (3, 4). Recently, a systemic perspective has emerged that considers environmental influences on obesity (5). It is recognized that a provided environment can exert considerable influence on behavior, and that altering the environment may provide a catalyst for behavior change (6). Thus, the concept of environment alteration could be a novel strategy for weight loss, in maintenance of weight, and also in prevention of weight gain (7).

The environment can be organized into the eating environment and the food environment (5, 7). The eating environment refers to the ambient factors that are associated with the eating of food, but that

are independent of food itself, such as atmospherics, the effort of obtaining food, the social interactions that occur, and any distractions that may be present. In contrast, the food environment refers to factors that directly relate to the way food is provided or presented, such as its salience, structure, package or portion size, stockpiling, and tableware.

A piece of tableware is any intermediate transfer device used for setting a table, serving food, and dining. Tableware includes cutlery, glassware, a variety of dishes, and other useful items for practical as well as decorative purposes (8). As much as 71% of the food consumed in the United States is estimated to be eaten using tableware (9). Tableware used to consume food may influence its selection and consumption; in the built food environment, it can facilitate or inhibit the amount of food consumed (9, 10).

Given the effect of tableware on food consumption, the role of tableware size and shape in consumption amount is taken for granted. The magnitude of the effect of these factors on food consumption was reported in a systematic review (11). However, the scope of the review was insufficient to provide specific and comprehensive results on other aspects of tableware. An effect size for tableware size and shape was reported in 15 eligible studies, and a meta-analysis of 13 independent comparisons from 10 studies found an effect size of 0.42 of portion or tableware size on selection of food (11). There are many factors relating to tableware beyond size and shape, representative examples being color and kind of tableware (such as chopsticks, spoons, etc.). Thus, we conducted a review to investigate whether the evidence for an association between tableware in the built food environment and food consumption is consistent and important.

Method

Between January and February 2017, we systematically searched the databases MEDLINE, Web of Science, EMBASE, SCOPUS, and ProQuest Central to identify experimental and observational studies investigating tableware in relation to food consumption. The search was restricted to human studies presented in English, and to articles or reviews published since 2000. The search was based on the following index terms contained within the title or abstract: tableware OR dish OR bowl OR cup OR spoon OR fork OR chopstick AND "food intake." Furthermore, we examined additional articles by searching Google Scholar and the Cochrane Database of Systematic Reviews. The flow of studies through the systematic review process is shown in Figure 1. Electronic database searches retrieved a total of 504 studies, including duplicates. Searches of other resources identified 37 additional studies. Automatic and manual de-duplication identified 159 duplicate studies, which we discarded. Therefore, 382 unique studies entered title or abstract screening. Of these, we excluded 366 studies on full screening and reviewed 16 studies that met the inclusion criteria and formed the evidence base for this review.

Studies eligible for this systematic review were conducted in humans, investigated tableware in relation to food consumption, and employed within-subjects or between-subjects randomized controlled trial as the experimental design. We excluded publications that did not meet the inclusion criteria, such as studies performed in animals, articles in any other language than English and papers without sufficient dietary data to be able to make a conversion to the tableware in relation to food consumption.

Results

A summary of the 16 reviewed studies on tableware in relation to food is presented in Table 1. The number of individuals analyzed in each study ranged from 35 to 360. All studies included both male and female participants. The studies were designed as within-subjects randomized controlled trials (n=7; studies 1, 3, 4, 5, 6, 8, and 10) or between-subjects randomized controlled trials (n=10; studies 2, 7, 9, 10, 11, 12, 13, 14, 15, and 16). The duration of the studies varied from 1 day to 8 weeks. The types of tableware manipulated in the studies were plates (n=7; studies 1, 3, 5, 6, 7, 9, and 10), bowls (n=5; studies 11, 12, 13, 15, and 16), glasses (n=2; studies 4 and 14), cups (n=1; study 8), spoons (n=1; study 16), and chopsticks (n=1; study 2). The manipulated attributes of these items of tableware were

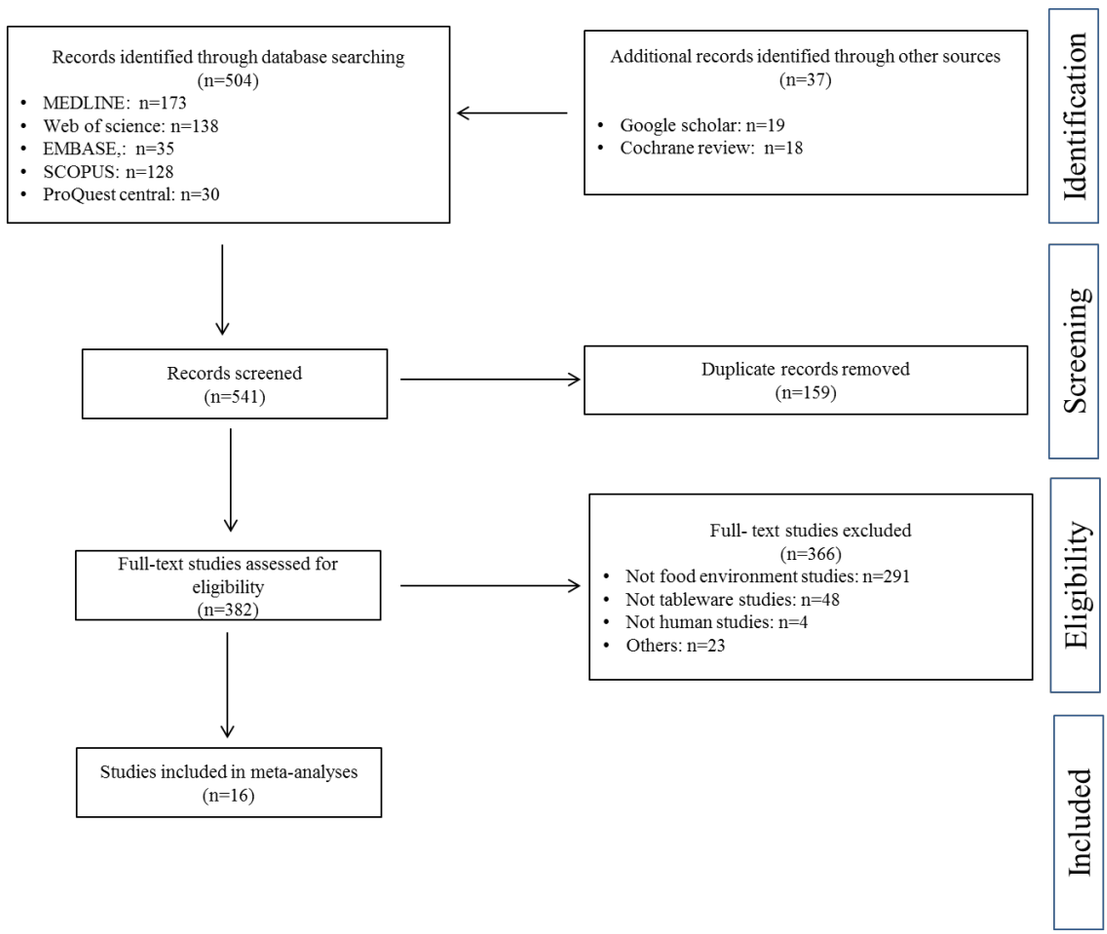

Figure 1. Flow diagram of studies through the systematic review process.

size (n=9; studies 1, 2, 3, 4, 5, 10, 11, 12, and 16), color (n=6; studies 3, 6, 7, 8, 9, and 10), shape (n=5; studies 4, 6, 9, 14, and 15), and type (n=1; study 13).

Discussion

Many people have difficulty monitoring how much they eat during a meal (7, 12, 13). They may employ visual cues to estimate how much they have consumed; thus, visual cues can influence people to consume either more or less than they intended (7). Tableware is likely to be used as one of these visual cues in judging the amount of food consumed (5). Because the shape and size of tableware can influence how much is served, the size of food portions served to construct a platescape is related to the amount of food actually consumed. The shape and size of plates or bowls delineate norms for appropriate amounts of food to eat at a meal. Finally, the shape and size of glasses or cups also influence the amount of liquid people perceive (14, 15).

There is some evidence for an effect of awareness of tableware shape and size on food consumption. The Ebbinghaus-Tichener size-contrast illusion or the Delboeuf illusion could explain why the same amount of food is perceived as more filling when eaten from a small bowl rather than from a larger bowl (16). Larger tableware increases consumption because people tend to follow consumption norms and will anchor their judgment of the appropriate amount of food on the presented portion (12, 13, 17). In one study, experimenters asked people to pour as much of a cereal as they would like and gave them 12-, 16-, or

Table 1 Summary of 16 studies on the tableware in relation to food consumption

	Study	Study design	Subject	Manipulation	Intervention	Duration	Meal	Assessment	Outcome
1	DiSantis et al. [1]	Within-subjects	Children n = 41 (male = 16, female = 25)	Plate; size	Child-size dishware (plate 7.25 inch + bowl 8 oz) vs. adult-size dishware (plate 10.25 inch + bowl 16 oz)	8 weeks (once a week)	Amorphous entrée (pasta with meat sauce) or unit entrée (chicken nuggets) + side dishes (frui; applesauce + vegetable; mixed vegetables with butter)	Served calorie	When subjects were given an adult-size dishware, they served more energy than a child-size dishware (90.1 kcal more).
2	Lin et al. [2]	Between-subjects	Adults n = 78 (male = 34, female = 44)	Chopsticks; length	Short chopsticks (19 cm) vs. long chopsticks (23 ㎝)	Immediate (≤ 1 day)	Rice	Liking, comfort, effort, purchase intension, eating time and mouthful number	When subjects used long chopsticks, they showed greater liking ($r^2 = 0.27$, $p < 0.05$), higher purchase intention ($r^2 = 0.29$, $p < 0.05$), more eating time ($r^2 = 0.49$, $p < 0.001$) and higher mouthful number ($r^2 = 0.35$, $p < 0.01$).
3	Lin et al. [2]	Within-subjects	Adults n = 78	Plate (rim); size and color	Study 1; 42 trials (7 food portion sizes; 170, 175, 180, 185, 190, 195 and 200 pixels × 6 rim widths; no rim, and 1/8, 1/4, 1/3, 3/8 and 1/2 rim) Study 2; 28 trials (7 food portion sizes; 170, 175, 180, 185, 190, 195 and 200 pixels × 4 rim colors; plain, solid blue, blue single line and blue double lines)	Immediate (≤ 1 day)	Macaroni and cheese or fruit salad	Perceived volume	Study 1; subjects overestimated the diameter of food portions by 5% and the visual area of food portions by 10% on plates with wider rims compared with plates with very thin rims ($p < 0.0001$).

(continued)

	Study	Study design	Subject	Manipulation	Intervention	Duration	Meal	Assessment	Outcome
4	Pechey et al. [4]	Within-subjects	Adult n = 360 (male = 242, female = 118)	Glass; size and shape	Reference glass (125, 175 and 250 ml) vs. wide glass (20% wider), large glass (25% greater) or wide-and-large glass (20% wider and 25% greater)	Immediate (≤ 1 day)	Wine	Matching the volume	Subjects under-filled a wide glass for larger reference volumes, and over-filled a large glass for all reference volumes. Subjects tended to fill the comparison glass less, relative to trials with smaller reference volumes for the same comparison glass.
5	Penaforte et al. [5]	Within-subjects	Adult n = 48 (male = 16, female = 32)	Plate; size	Small plate (9.0 cm) vs. large plate (24.0 cm)	Immediate (≤ 1 day)	Pasta with tomato sauce	Visual estimation	When subjects evaluated the amount arranged on a large plate, they classified the portion size as 'large' more than a small plate (47.9 vs. 22.9%, $p < 0.05$).
6	Piqueras-Fiszman et al. [6]	Within-subjects	Study 1; adults n = 53 (male = 19, female = 34) Study 2; adults n = 51 (male = 24, female = 27)	Plate; color and shape	Study 1; white plate vs. black plate Study 2; triangular plate vs. square plate vs. round plate	Immediate (≤ 1 day)	Strawberry mousse	Perception of flavor, sweetness, quality and liking	Study 1: when subjects were given a white plate, they perceived significantly more intense (6.57 vs. 5.29, $p < 0.001$) and sweeter (5.59 vs. 4.88, $p < 0.05$) and also liked more (7.04 vs. 6.17, $p < 0.001$) than a black plate. Study 2; the effect of plate shape did not reach significance in terms of perception.
7	Piquer-as-Fiszman et al. [7]	Be-tween-sub-jects	Adults n = 253 (male = 111, female = 142)	Plate; color	White plate vs. black plate	2 weeks (3 days a week)	3 desserts; fraisier, fraicheur and vacherin glacé	Perception of appetizing, presentation, color intensity, flavor, sweetness and liking	The color of the plate exerted a significant influence on the perception of the food, but that this effect varied as a function of the type of dessert; color intensity were highly correlated with flavor intensity (for the white and black plates, $r^2 = 0.36$ and $r^2 = 0.29$, respectively).

(continued)

	Study	Study design	Subject	Manipulation	Intervention	Duration	Meal	Assessment	Outcome
8	Piquer-as-Fiszman and Spence [8]	Within-subjects	Adults n = 57 (male = 31, female = 26)	Cup; color	Red cup vs. orange cup vs. white cup vs. dark cream cup	Immediate (≤ 1 day)	Hot chocolate (sweet or non-sweet)	Perception of flavor, aroma, sweetness and liking	When subjects were given an orange cup, they perceived significantly more flavor and also liked more than other cups. The sweetness and chocolate aroma were less influenced by the cup color.
9	Stewart and Goss [9]	Between-subjects	Adults n = 48 (male = 27, female = 21)	Plate; color and shape	White round plate vs. white square plate vs. black round plate vs. black square plate vs.	Immediate (≤ 1 day)	Cheese cake	Perception of flavor intensity, sweetness, quality, liking and hunger	The sweetness and intensity were enhanced by a white round plate while quality and liking were enhanced by both white round and black square plates.
10	Van Ittersum and Wansink [10]	Within-subjects and between-subjects Study 1; between subjects Study 2; within-subjects Study 3; within and between subjects Study 4; within and between subjects Study 5; between subjects	Study 1; adults n = 225 (male = 124, female = 101) Study 2; adults n = 47 (male = 28, female = 19) Study 3; adults n = 91 (male = 53, female = 38) Study 4; adults n = 101 (male = 59, female = 42) Study 5; adults n = 60 (male = 30, female = 30)	Plate; size and color	Study 1; 7 size bowls (12-36 cm) Study 2; bowl size (small: 17.0 cm vs. large: 26.4 cm) and color contrast (low: white plate on a white tablecloth vs. high: white plate on a black tablecloth) Study 3; plate size (small: 17.0 cm vs. large: 26.4 cm) and focused attention (low vs. high) Study 4; plate size (small: 17.0 cm vs. large: 26.4 cm) and education (uneducation vs. education) Study 5; plate color contrast (low: white-sauce pasta on a white plate or red-sauce pasta on a red plate vs. high: white-sauce pasta on a red plate or red-sauce pasta on a white plate)	Immediate (≤ 1 day)	Study 1; soup Study 2; cereal Study 3; cereal Study 4; cereal Study 5; pasta with tomato sauce or Alfredo sauce	Poured volume	Study 1; the relationship between the diameter ratios and the serving biases follows a sinus shape and the estimation and serving biases follow an inverse pattern. Study 2; the reduction in color contrast significantly reduced overserving on large plates (9.8 vs. 0.3%; $p < 0.05$). Study 3; the plate size and attention were interacted significantly ($p < 0.01$). Study 4; the plate size and education were interacted significantly ($p < 0.05$). Study 5; subjects overserved more pasta when given the same color plate than when given a contrasting color plate.

(continued)

	Study	Study design	Subject	Manipulation	Intervention	Duration	Meal	Assessment	Outcome
11	Van Kleef et al. [11]	Between-subjects	Adult n = 67 (male = 35, female = 32)	Bowl; size	Medium bowl (3.8 L) vs. large bowl (6.9 L)	Immediate (≤ 1 day)	Pasta with tomato sauce	Served volume/calories Consumed volume/calories	When subjects were given a large bowl, they served 77% (158.5 calories, $p < 0.01$) more and consumed 71% (124.6 calories, $p < 0.01$) more than a small bowl.
12	Wansink and Cheney [12]	Between-subjects	Adult n = 35 (male = 21, female = 14)	Bowl; size	Medium bowl (2 L) vs. large bowl (4 L)	Immediate (≤ 1 day)	Snacks (nuts and a pretzel, chip variety mix)	Served volume/calories Consumed volume/calories	When subjects were given a large bowl, they served 53% (146 calories, $p < 0.05$) more and consumed 56% (142 calories, $p < 0.05$) more than a small bowl.
13	Wansink et al. [13]	Between-subjects	Adults n = 54 (male = 39, female = 15)	Bowl; type	Normal bowl vs. self-refilled bowl	Immediate (≤ 1 day)	Soup	Intake volume Intake estimation Satiety	When subjects were served from a self-refilling bowl, they ate more than a normal bowl (14.7 vs. 8.5 oz; $p < 0.01$). However, they did not perceive themselves as more sated than those eating from normal bowls.
14	Wansink and Van Ittersum [14]	Between-subjects	Study 1; children n = 97 (male = 44, female = 53) Study 2; adults n = 89 (male = 69, female = 20) Study 3; bartenders n = 45 (male = 24, female = 21)	Glass; shape	Study 1, 2; short and wide glass (10.6 cm) vs. tall and slender glass (18.9 cm) Study 3; short and wide glass (tumbler) vs. tall and slender glass (highball)	Immediate (≤ 1 day)	Study 1, 2; juice Study 3: liquor	Poured volume Perceived pouring volume Thirsty	When children and adults were given a short and wide glass, they poured more juice than a tall and slender glass (children; 9.66 vs. 5.54 oz; $p < 0.05$, adult; 6.88 vs. 5.75 oz, $p < 0.05$), but they perceived themselves as having poured less. When bartenders were given a short and wide glass, they poured more liquor than a tall and slender glass; less experienced bartenders (2.23 vs. 1.59 oz; $p < 0.01$), more experienced bartenders (1.80 vs. 1.65 oz; $p < 0.05$).

(continued)

	Study	Study design	Subject	Manipulation	Intervention	Duration	Meal	Assessment	Outcome
15	Wansink and Van Ittersum [15]	Between-subjects	Study 1; Adult n = 198 (male = 113, female = 85) Study 2; Bartenders n = 95 (male = 59, female = 36)	Glass; shape	Short and wide glass vs. tall and slender glass	Immediate (≤ 1 day)	Liquor	Poured volume Perceived pouring volume	Both non-bartenders and bartenders poured more into a short, wide glass than into a tall slender glass (46.1 vs. 44.7 ml and 54.6 vs. 46.4 ml, respectively). Practice reduced the tendency to over pour, but not for short, wide glasses.
16	Wnaskink et al. [16]	Between-subjects	Adults n = 85 (male = 27, female = 58)	Bowl and spoon; size	Study 1; small bowl (17 oz) vs. large bowl (34 oz) Study 2; small spoon (2 oz) vs. large spoon (3 oz)	Immediate (≤ 1 day)	Ice cream	Served volume Spoonfuls number Bowl and spoon size perceptions	When subjects were given a large bowl, they served 31.0% more than a small bowl (6.25 vs. 4.77 oz, $p < 0.01$). When subjects were given a large spoon, they served 14.5% more than a small spoon (5.77 vs. 5.04 oz, $p = 0.10$).

24-oz capacity bowls; participants poured increasing amounts into the bowls (9, 12, and 15 oz, respectively), while the fill level of the bowls was similar for each bowl size (77%, 74%, and 64%, respectively) (17). It has been shown that people pour larger amounts of a beverage into a wide cup than a tall one, and they consume more from a wider cup (18, 19). Across a wide range of contexts, it has been shown that people generally eat approximately 92% of the food that they personally serve themselves (12).

Research on the effects of using implements in food intake is not as extensive as the study of plates and bowls. Wansink et al. (17) examined whether spoon size exerts a visual bias leading to overeating. Empirical evidence showed that individuals ate 14.5% more ice cream when using 3-oz spoons when compared to those using 2-oz spoons. Another experiment reported that children dealt with larger food portions by taking more food onto their implements (20). The explanation for this pattern is that people who are given large serving spoons tend to underestimate how much they are consuming relative to those given smaller serving spoons. With regard to fork size, Mishra, Mishra, and Masters (21) investigated the role of bite size on the quantity of food consumed. They observed that diners consumed more from a smaller fork than from a larger fork and posited that when diners have a well-defined hunger goal to satisfy and have a willingness to reach that goal, a smaller fork gives the feeling that they are not making much progress in satiating their hunger, which results in more total consumption compared to when they use a larger fork.

Furthermore, this review demonstrates that color of tableware affects perception of other tableware attributes, mainly those based on visual judgments. Van Ittersum and Wansink (13) found that participants in a high color contrast condition served 9.8% ($p < 0.01$) more than the target serving size on a larger plate, and 13.5% ($p < 0.01$) less than the target serving size on a smaller plate. Meanwhile, in another experiment (13), they tested the effect of color contrast between the food and the plate on serving sizes in a realistic serving situation. Their results revealed that participants in the low color contrast condition served themselves significantly ($p < 0.01$) more pasta than participants in the high color contrast condition. It has been shown that the Delboeuf illusion is enhanced by color contrast, and it could therefore provide a possible explanation for why and how plate size can influence people's serving behavior in a variety of real life situations (22).

Conclusion

Overall, there is a tendency to use tableware as an indication of how much should be served and consumed. Simply using smaller tableware might be all that is required to make an environment less conducive to overeating. In addition to size and shape of tableware, its color affected food consumption. It therefore seems reasonable to suggest that both the food industry and home dining practices should pay far more attention to tableware in order to optimize the dining experience.

References

1. Lemstra M, Fox J, Klassen R, Dodge D. The Healthy Weights Initiative: the first 1,000 participants. Patient Prefer Adherence. 2017; 20: 283–9.
2. Kouris-Blazos A, Wahlqvist ML. Health economics of weight management: evidence and cost. Asia Pac J Clin Nutr 2007;16 :329–38.
3. Marteau TM, Hollands GJ, Fletcher PC. Changing human behavior to prevent disease: the importance of targeting automatic processes. Science 2012; 337: 1492–5.
4. Wood W, Rünger D. Psychology of Habit. Annu Rev Psychol 2016;67:289–314.
5. Sobal J, Wansink B. Kitchenscapes, tablescapes, platescapes, and foodscapes: influences of microscale built environments on food intake. Environ Behav 2007; 39: 124–42.
6. Das P, Horton R. Rethinking our approach to physical activity. Lancet 2012; 380: 189–90.
7. Wansink B. Environmental factors that increase the food intake and consumption volume of unknowing consumers. Annu Rev Nutr 2004; 24: 455–79.
8. Wu MT, Wu CF, Chen BH. Behavioral Intervention and Decreased Daily Melamine Exposure from Melamine Tableware. Environ Sci Technol 2015; 18: 9964–70.
9. Wansink B. Can package size accelerate usage volume? The Journal of Marketing 1996; : 1–14.
10. Wu MT, Wu CF, Chen BH. Behavioral Intervention and Decreased Daily Melamine Exposure from Melamine Tableware. Environ Sci Technol. 2015; 18: 9964–70.
11. Hollands GJ, Shemilt I, Marteau TM, Jebb SA, Lewis HB, Wei Y, Higgins JP, Ogilvie D. Portion, package or tableware

size for changing selection and consumption of food, alcohol and tobacco. Cochrane Database Syst Rev 2015; 14: CD011045.
12. Wansink B, Cheney MM. Super bowls: serving bowl size and food consumption. JAMA 2005; 293: 1723–8.
13. Van Ittersum K, Wansink B. Plate size and color suggestibility: the Delboeuf Illusion's bias on serving and eating behavior. J Consum Res 2012; 39: 215–28.
14. Raghubir P, Krishna A. Vital dimensions in volume perception: can the eye fool the stomach? J Mark Res 1999: 313–26.
15. Lawless HT, Bender S, Oman C, Pelletier C. Gender, age, vessel size, cup vs. straw sipping, and sequence effects on sip volume. Dysphagia 2003; 18: 196–202.
16. Spence C, Harrar V, Piqueras-Fiszman B. Assessing the impact of the tableware and other contextual variables on multisensory flavour perception. Flavour 2012; 1: 7.
17. Wansink B, Van Ittersum K, Painter JE. Ice cream illusions: bowls, spoons, and self-served portion sizes. Am J Prev Med 2006; 31: 240–3.
18. Wansink B, Van Ittersum K. Bottoms up! The influence of elongation on pouring and consumption volume. J Consum Res 2003; 30: 455–63.
19. Wansink B, Van Ittersum K. Shape of glass and amount of alcohol poured: comparative study of effect of practice and concentration. BMJ 2005; 331: 1512–4.
20. Fisher JO, Rolls BJ, Birch LL. Children's bite size and intake of an entree are greater with large portions than with age-appropriate or self-selected portions. Am J Clin Nutr 2003; 77: 1164–70.
21. Mishra A, Mishra H, Masters TM. The influence of bite size on quantity of food consumed: a field study. J Consum Res 2012; 38: 791–5.
22. Piqueras-Fiszman B, Giboreau A, Spence C. Assessing the influence of the color of the plate on the perception of a complex food in a restaurant setting. Flavour 2013; 2: 24.
23. DiSantis KI, Birch LL, Davey A, Serrano EL, Zhang J, Bruton Y, Fisher JO. Plate size and children's appetite: effects of larger dishware on self-served portions and intake. Pediatrics 2013; 131: e1451–8.
24. Lin HM, Lin CH, Hung HH. Influence of chopstick size on taste evaluations. Psychol Rep 2015; 116: 381–7.
25. McClain AD, van den Bos W, Matheson D, Desai M, McClure SM, Robinson TN. Visual illusions and plate design: the effects of plate rim widths and rim coloring on perceived food portion size. Int J Obes 2014; 38: 657–62.
26. Pechey R, Attwood AS, Couturier DL, Munafò MR, Scott-Samuel NE, Woods A, Marteau TM. Does glass size and shape influence judgements of the volume of wine? PloS one 2015; 23: e0144536.
27. Penaforte FR, Japur CC, Diez-Garcia RW, Hernandez JC, Palmma-Linares I, Chiarello PG. Plate size does not affect perception of food portion size. J Hum Nutr Diet 2014; 27: 214–9.
28. Piqueras-Fiszman B, Alcaide J, Roura E, Spence C. Is it the plate or is it the food? assessing the influence of the color (black or white) and shape of the plate on the perception of the food placed on it. Food Qual Prefer 2012; 24: 205–8.
29. Piqueras-Fiszman B, Spence C. The influence of the color of the cup on consumers' perception of a hot beverage. J Sens Stud 2012; 27: 324–31.
30. Stewart PC, Goss E. Plate shape and colour interact to influence taste and quality judgments. Flavour 2013; 2: 27.
31. Van Kleef E, Shimizu M, Wansink B. Serving bowl selection biases the amount of food served. J Nur Educ Behav 2012; 44: 66–70.
32. Wansink B, Painter JE, North J. Bottomless bowls: why visual cues of portion size may influence intake. Obes Res 2005; 13: 93–100.