



ELSEVIER

Contents lists available at ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

Research report

The influence of plate size on meal composition. Literature review and experiment



E. Libotte, M. Siegrist, T. Bucher *

ETH Zürich, Institute of Food, Nutrition and Health (IFNH), Zürich, Switzerland

ARTICLE INFO

Article history:

Received 23 December 2013

Received in revised form 3 July 2014

Accepted 10 July 2014

Available online 15 July 2014

Keywords:

Fake food buffet

Meal composition

Plate size

Container size

Portion size

Nudge

ABSTRACT

Environmental factors, such as the size of containers, can influence our energy intake. Even though different sized food containers are often recommended to control portion sizes, the evidence to support this is contradictory. In the present study, we conducted a literature review and a controlled laboratory experiment to investigate whether plate size influences the composition of a meal and the total meal energy. The results of the review suggest that distraction factors, the type of container, the food-serving mode (self-service or being served) and the type of food offered all influenced the results observed in the various published studies. For the experiment in this study, eighty-three participants were individually invited to serve themselves a lunch from a buffet containing 55 replica food items. Either a standard size plate (27 cm) or a large plate (32 cm) was provided to the participants. The results of the experiment suggest that the plate size had no significant effect on the total energy of the meal ($F_{(1,81)} = 0.782$, $P > .05$). However, participants using a large plate served themselves significantly more vegetables ($F_{(1,81)} = 4.786$, $P < .05$), particularly vegetables generally eaten as side dishes ($F_{(1,81)} = 6.804$, $P < .05$). Therefore, reducing the plate size does not seem to be an appropriate intervention to reduce the total energy intake in order to promote weight loss. Rather, using a large plate might be a simple and inexpensive strategy to increase vegetable consumption.

© 2014 Elsevier Ltd. All rights reserved.

Introduction

Overweight and obesity, along with related diseases such as diabetes, ischaemic heart diseases and cancer, are a public health challenge affecting low-, middle- and high-income countries in the twenty-first century (World Health Organization, 2009). Our environment has contributed to the current obesity epidemic in Western societies; highly palatable, energy-dense foods are accessible everywhere while jobs and lifestyles require low levels of physical activity (Hill & Peters, 1998; Young & Nestle, 2002). Furthermore, portion sizes have increased both inside and outside the home (Nielsen & Popkin, 2003), and larger dinner plates have become common in both domestic and public eating settings (Van Ittersum & Wansink, 2012).

Even small environmental details can affect consumer behaviour (Thaler & Sunstein, 2008). For example, distraction factors such as watching TV or the presence of other people during a meal can increase our food intake (De Castro & Brewer, 1992; Hetherington, Anderson, Norton, & Newson, 2006). Therefore, altering environmental factors to nudge consumers towards better food choices seems to be a promising intervention (Thaler & Sunstein, 2008). One such environmental factor is thought to be the size of food

containers (Wansink, 2004). There is a commonly held belief that people consume more food from larger plates (Wansink, 2007). Therefore, many important organisations and dieting programs recommend using smaller plates to control portion sizes (U.S. Department of Agriculture, 2002; Weight Watchers, 2013).

The evidence for the recommendation to use smaller plates is not clear, however. Experimental studies that investigated whether container size, including plates and bowls, influences the total energy intake produced contradictory results. For example, Wansink and colleagues showed that participants who received a large bowl served and consumed more ice cream than those who received a small bowl (Wansink, van Ittersum, & Painter, 2006). But Rolls, Roe, Halverson, and Meengs (2007) showed that participants' food intake during three different occasions did not differ significantly when using three different sized plates. However, it is necessary to focus not only on the total amount of food but also on the type of food that people choose.

In order to find out if there is a systematic difference between the studies in which the size of the container had an effect and those in which no effect was found, we conducted a review of the published literature on this topic using PubMed and Web of Science. The keywords 'plate size', 'bowl size', 'container size' and 'portion size' were used. We compared the design (setting, participants, container type and size, type of food, serving mode and distractions) and the results of fifteen experimental studies (Table 1). The literature review was conducted between March 2013 and July 2013.

* Corresponding author.

E-mail address: tbucher@ethz.ch (T. Bucher).

Table 1
Characteristics of studies focusing on container size.

Authors	Design	Effect of container	Subjects	Type of container	Size of container		Difference of container	Type of food	Serving mode	Distractions	
					Small	Large					
Wansink and Cheney (2005)	Quasi-experimental between-subjects design Serving food from small/large bowl on plate (25 cm) and consumption of food	Yes	35 Students	Bowl	2000 ml	4000 ml	2000 ml	Nuts, pretzels, chips	Self-service	Super Bowl party	
Wansink and Kim (2005)	Between-subjects experimental design Consumption of pre-served food portion	Yes	158 Moviegoers	Popcorn container	120 g	240 g	120 g	Fresh and stale popcorn Ice cream	Food provided	Movie watching	
Wansink et al. (2006)	Between-subjects experimental design Serving and consuming food	Yes	85 Nutrition experts	Bowl	482 g	964 g	482 g	M&M's	Self-service	Colleague celebration	
Marchiori et al. (2012)	Between-subjects experimental design Consumption of pre-served food portion	Yes	88 Students	Aluminium container	250 ml	750 ml	500 ml		Food provided	TV show watching	
Sharp and Sobal (2012)	Quasi-experimental between-subjects design Drawing food portions	Yes	270 Students	Paper plate	23 cm 415 cm ²	28 cm 615 cm ²	200 cm ²	What the participants enjoy for dinner Soup	Drawing	During class	
Van Ittersum and Wansink (2012)	Between-subjects experimental design Serving food with defined and shown diameter	Yes	225 Students	Bowl	12 cm, 13.8 cm, 16.4 cm, 18 cm, 20 cm, 25.7 cm, 36 cm		–		Self-service	Unclear	
van Kleef et al. (2012)	Between-subjects experimental design Serving food from small/large bowl on plate (23 cm) and consumption of food	Yes	68 Students	Bowl	3800 ml	6900 ml	3100 ml	Pasta with tomato sauce	Self-service	Other participants	
DiSantis et al. (2013)	Within-subjects experimental design Serving and consuming food	Yes	42 Children	Plate	18.4 cm 266 cm ²	26.0 cm 531 cm ²	265 cm ²	Buffet ^a	Self-service	Ate in classroom	
Rolls et al. (2007)	Within-subjects cross-over experimental design Serving and consuming food	No	45 Adults	Bowl Plate	227 g 17 cm 227 cm ²	454 g 22 cm 380 cm ²	227 g 153 cm ² 151 cm ² 304 cm ²	Macaroni and cheese	Self-service	No	
Rolls et al. (2007)	Within-subjects cross-over experimental design Consumption of pre-served portion	No	30 Adults	Plate	22 cm 380 cm ²	26 cm 531 cm ²	151 cm ²	Macaroni and cheese	Food provided	No	
Rolls et al. (2007)	Within-subjects cross-over experimental design Serving and consuming food	No	44 Adults	Plate	17 cm 227 cm ²	22 cm 380 cm ²	26 cm 531 cm ²	153 cm ² 151 cm ² 304 cm ²	Buffet ^b	Self-service	No
Koh and Pliner (2009)	Between-subjects experimental design Serving and consuming food	No	57 Pairs of females (students and friends)	Plate	18.2 cm 260 cm ²	23.5 cm 434 cm ²	174 cm ²	Pasta with tomato sauce	Self-service	Friend or stranger	
Shah et al. (2011)	Within-subjects cross-over experimental design Serving and consuming food	No	20 Normal, overweight/obese women	Plate	21.6 cm 366 cm ²	27.4 cm 589 cm ²	223 cm ²	Pasta with tomato sauce	Self-service	No	
Yip et al. (2013)	Within-subjects cross-over experimental design Serving and consuming food	No*	20 Overweight/obese women	Plate	19.5 cm 298 cm ²	26.5 cm 551 cm ²	253 cm ²	Buffet ^c	Self-service	No	
Penaforte et al. (2013)	Cross-sectional design Food portion estimation	No	48 Students	Plate	9 cm 64 cm ²	24 cm 452 cm ²	388 cm ²	Pasta with tomato sauce	Self-service	No	

^a Buffet: pasta with meat sauce, chicken nuggets, apple sauce and mixed vegetables with butter. In addition, there was a fixed portion of milk and bread.

^b Buffet: chicken and noodles, macaroni and cheese, green bean casserole, broccoli salad, sweet potato casserole and water.

^c Buffet: real hot pasta and meat sauce, sliced bread, cold chicken, ham, cheese, salad items, Madeira cake, tinned peaches, margarine, mayonnaise and water.

* No plate size effect on protein and starchy sources.

Download English Version:

<https://daneshyari.com/en/article/939468>

Download Persian Version:

<https://daneshyari.com/article/939468>

[Daneshyari.com](https://daneshyari.com)