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Apples versus brownies: A field experiment in rearranging conference snacking buffets to reduce short-term energy intake

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ABSTRACT
More and more people eat out and, therefore, foodservice business has an increasing influence on people's dietary intake. Foodservice business should, first and foremost, deliver a nice tasting meal of high quality—but health should not be neglected. Nudging and choice architecture is a field of foodservice business research that is gaining interest and this article offers original research in this field.

KEYWORDS
Behavioral economics; catering for health; choice architecture; nudging; portion size

Introduction

Obesity is fast becoming one of the 21st century's main healthcare challenges. With approximately 1.4 billion overweight adults (BMI 20–29) and 500 million obese (BMI 30+) worldwide, the problem is undeniable (WHO, 2002). Obesity is caused by an imbalance in intake and output of energy that in turn can be caused by a multitude of both behavioral and non-behavioral factors. Levels of physical activity, nutritional habits, social status, and genetic disposition all contribute to a person's risk of becoming obese (Christakis & Fowler, 2007; Farooqi & O'Rahilly, 2006; Sobal & Stunkard, 1989; Swinburn, Caterson, Seidell, & James, 2004; Wareham, van Sluijs, & Ekelund, 2005).

Recent studies have increasingly focused on snacking as a strong contributing factor to obesity (Bertéus Forslund, Torgerson, Sjöström, & Lindroos, 2005). Snacking happens in a variety of contexts but is usually associated with break situations. During breaks in working place environments, snacking can be difficult to regulate due to influence from a variety of contextual

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factors such as proximity to snacks (Wansink, Painter, & Lee, 2006) and co-worker presence (de Castro & Brewer, 1992).

Thus, the contextual factors that define various break situations need to be better understood in order to inform caterers, health professionals, and choice architects, (Hansen & Jespersen, 2013) to ensure that we reduce caloric intake from snacking preferably in ways that are as little invasive as possible.

Like other behaviors, dietary habits, and food choices are based on a combination of reflective, elaborate decision-making where choice options are carefully considered and automatic psychological processes and habitual routines that require very little active decision-making or deliberation. The dual process theories (DPTs) that have established themselves in cognitive psychology in recent years characterize these two modes of behavior as automatic/heuristic and reflective/systematic processing of the information available in choice situations or contexts (Kahneman, 2011; Stanovich, 2010).

The so-called *nudge*-approach to behavior change derives from DPTs and suggests that it is possible to re-arrange contexts and situations so as to influence the behavior of participants in one of two ways (Hansen & Jespersen, 2013): (1) Activating the reflective processing system in the choice situation, or (2) re-arranging the choice environment in a way that it engages with intuitive or automatic processing so as to promote particular wanted behaviors or their consequences and/or limit unwanted behaviors or their consequences.

Interpreted within this framework research on prompting reflective food choices in a food choice environment has mainly looked at the effect of labeling or point-of-purchase health claims (Buscher, Martin, & Crocker, 2001; Dubbert, Johnson, Schlundt, & Montague, 1984; Freedman;2011; Levin, 1996; Seymore et al, 2004; Thorndike, Riis, Sonnenberg, & Levy, 2014; Vyth et al., 2011), whereas research that alters the food choice environment to fit the heuristic processes, for example, mindless eating, has mainly been focused on altering plate size, serving utensils or by rearranging the presentation of the selection (Freedman & Brochado, 2009; Just, Wansink, Mancino, & Guthrie, 2008; Kongsbak et al., 2016; Mishra, Mishra, & Masters, 2012; Rolls, Roe, Halverson, & Meengs, 2007; Thorndike et al., 2014).

When it comes to snacking behavior, the nudge-approach readily applies to central contexts. Existing literature with regard to snacking situations has suggested that; colors and assortments plays an important role in the choice and amount of snacks eaten (Kahn & Wansink, 2004); cookie size functions as a mediator for short-term energy intake (Marchiori, Warquier & Klein, 2012); and that portion sizes are shaped by the serving spoon's and plate's size when snacking ice cream at a social

gathering (Wansink, Van Ittersum, & Painter, 2006). Although these studies indicate that people are susceptible to influence in a snacking situation when in a public food choice environment, there is still limited research on interventions that; alter the portion size; alter the convenience of choosing the healthy option; or alter their relative presentation order at a snacking buffet.

This field experiment aimed at testing how presentation of brownies and apples affects food choices in a real world setting (Geier, Rozin, & Doros. 2006), and if results would vary markedly when test-participants were comprised of higher social class people, assumed to score higher in tests relating to fluid intelligence and hence related aspects such as willpower, attention, and analytical skills (Stanovich, 2010).

Method

Theoretical framework

Choice architectural nudges are a relative new theoretical concept that derives from the nudge-approach to behavioral change as advocated by Thaler and Sunstein in 2008 in their influential book *Nudge: Improving Decisions about Health, Wealth & Happiness* (Thaler & Sunstein, 2008). Their synthesis of research from psychology and behavioral economics has caused widespread interest in choice architecture and its applicability in promoting various policy goals. Choice architectural nudges are a relatively new theoretical concept that derive from the nudge-approach to behavioral change as advocated by Thaler and Sunstein in their influential book *Nudge: Improving Decisions About Health, Wealth & Happiness* (Thaler & Sunstein, 2008). Their synthesis of research from psychology and behavioral economics has caused widespread interest in choice architecture and its applicability in promoting various policy goals. A choice architectural nudge is originally defined as a change in the choice environment that prompts behavioral change in a predictable way without restricting options and providing financial, social, or other incentives for that specific behavior change. A more precise definition though is that a nudge is a function of any attempt at influencing people's judgment, choice, or behavior in a predictable way, that is made possible because of cognitive boundaries, biases, routines, and habits in individual and social decision-making posing barriers for people to perform rationally in their own self-declared interests, and which works by making use of those boundaries, biases, routines, and habits as integral parts of such attempts (Hansen, 2016).

Context

The experiment took place during a 20-minute break between two sessions at a conference for business leaders in Denmark. The 2-day conference was organized by professional conference organizers and the conference venue had 550 Danish CEO's attending (19.2% women). The experiment "apples versus brownies" was one of 11 behavioral experiments conducted during the conference. The participants were not aware of the interventions, but were briefed on their results afterward.

Participants

Of the 550 conference participants, 391 people had a snack during the coffee break. One hundred eighty-nine people had their snack at the control buffet and 202 at the intervention buffet.

Materials

The break featured two identical serving tables with both brownies and apples, placed at separate locations of the conference venue. One table served as control with brownies (88 g/one piece of cake) arranged standardly on silver trays as specified by the caterer plus whole apples, the other served as intervention with brownies cut in half (44 g/half a piece of cake) and apples cut into four (see Figure 1).

Both buffets had the same available free options of apples and brownies and were continuously replenished by trained staff.

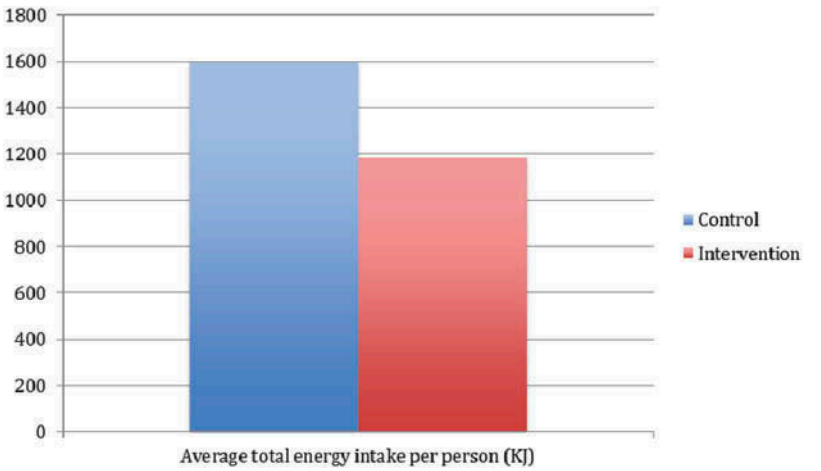

Figure 1. Showing the average total energy intake per person compared between intervention buffet and control buffet.

Procedure

Participants at the conference exited the main conference hall and took either of two identical stairs from a symmetrical foyer leading up to the floor featuring the cake and apple buffets. No attempt was made to interfere with participants' randomly personal choice of stairs.

The stairs and buffets were monitored by trained assistants who counted each visit to the buffet as well as total amount of visitors. The two buffets were in principal accessible from each other, but none of the participants from the control mixed with the intervention or vice versa.

When the break ended assistants counted the remaining pieces of brownie and apples in order to calculate the total amount consumed.

Analysis

Data from each of the observations was put into excel and consumed volumes were calculated. The Danish Food Composition Databank ed. 7.01 from the National Food Institute, Denmark was used for the consumed energy analysis based on the served products nutritional content.

Results

A total of 269 pieces of cake and 139.5 whole apples were consumed during the snack break. The control buffet served 154 pieces of cake, while the intervention buffet served 115 pieces of cake, hence a reduction of 30.2% per person. Furthermore, 92.5 apples were consumed at the intervention buffet and 47 at the control buffet, which is an increase of 83.9% in apple consumption per person at the intervention site. Figures 1 and 2 show the effect size in energy consumption and specified nutritional intake.

There were no reports of any participants noticing any difference between the two buffets and no reports of dissatisfaction of the buffet arrangements (on both control and intervention).

Discussion

As the costs and scope of severe obesity increases, so does public and professional interest in developing solutions that can counteract it. In recent years there has been an increased focus on understanding behavior, particularly relating to health, as the result of a complex interplay of various psychological and social factors, as well as public policies (Sallis, Carlson, Mignano, Lemes, & Wagner, 2013). Much of this research focuses on the individual and seeks to promote strategies for behavior change that enables him or her in achieving behavioral goals through better self-regulation of nutrition and exercising habits.

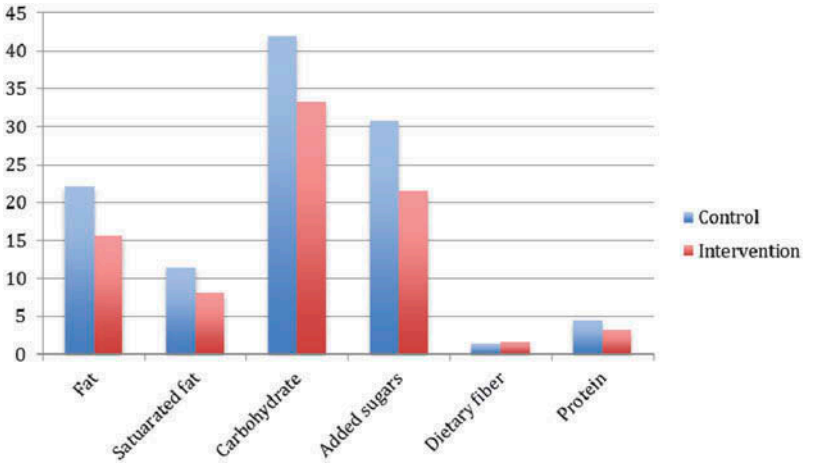

Figure 2. Showing the nutritional change between intervention and control serving in grams.

This field experiment however underlines how people still engage in highly automatic dietary behavior despite having the knowledge and skills to eat healthily.

This field experiment's findings support the hypothesis that snacking behavior can be made healthier through the use of simple choice architectural interventions that incorporate our understanding of how automatic processing affects dietary choices without limiting choices or costs. These findings are supported by the work of Marchiori et al. (2012). They similarly split the portion size of the unhealthy snack and achieved a reduction of 25% in gram intake among children and approximately 50% among university students. Although their sample sizes were markedly smaller than those in this experiment, it is interesting to find that an effect is achievable across ages, cognitive development and socio economic status. One of the explanations for these results might lie in the "1-unit bias." A previous study has suggested that when serving high fat/high sugar snacks for free, people tend to serve them self and eat 1 unit (Geier et al., 2006). It can likewise be discussed whether our dissection of apples increased apple consumption due to the same bias. A whole apple as a unit might not be convenient as a snack, whereas if it is divided into four units it becomes an increasingly appropriate snack unit size.

Another tendency in recent research has been a strong focus on contextual factors and how they can increase the success of policy aims without tasking the individual decision maker with maintaining new routines or limiting their available options (eufic.org, 2014).

Although there is an increased awareness on food choices in micro environment uncertainty still remains in regard to the methodology and definition of nudging (Hollands et al., 2013) as well as a low quality of existing field experiments (Skov, Lourenço, Hansen, Mikkelsen, &

Schofield, 2013). This cake–apple experiment underscores the importance paying more attention to contextual factors when designing policies which seek to reduce caloric intake.

Conclusion

Choice architectural nudges offer a new way of thinking when promoting healthier dietary behavior. This one serving field experiment shows a drastic improvement in promoting a healthy snack, apple, while at the same time reducing the unhealthy alternative, cake. These significant changes were achieved at no costs for the caterer, the conference organizer or the participants. This study puts itself in the current and on-going research on the topic with identifying choice architecture as a potential effective way to promote healthier eating among high social class adults in Denmark. Future research should emphasize a longer intervention period as well as adjusting for potential dietary compensation outside the food arena.

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