Appetite 89 (2015) 93–102

Contents lists available at ScienceDirect

Appetite

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

Research report

Priming healthy eating. You can't prime all the people all of the time ☆

Suzanna E. Forwood [a,*], Amy L. Ahern [b], Gareth J. Hollands [a], Yin-Lam Ng [a], Theresa M. Marteau [a]

[a] Behaviour and Health Research Unit, Institute of Public Health, University of Cambridge, Cambridge, United Kingdom
[b] Medical Research Council Human Nutrition Research, Cambridge, United Kingdom

ARTICLE INFO

Article history:
Received 22 September 2014
Received in revised form 15 January 2015
Accepted 21 January 2015
Available online 27 January 2015

Keywords:
Priming
Food choice
Advertisements
Healthy eating

ABSTRACT

Objective: In the context of a food purchasing environment filled with advertising and promotions, and an increased desire from policy makers to guide individuals toward choosing healthier foods, this study tests whether priming methods that use healthy food adverts to increase preference for healthier food generalize to a representative population. *Methods*: In two studies (Study 1 n = 143; Study 2 n = 764), participants were randomly allocated to a prime condition, where they viewed fruit and vegetable advertisements, or a control condition, with no advertisements. A subsequent forced choice task assessed preference between fruits and other sweet snacks. Additional measures included current hunger and thirst, dietary restraint, age, gender, education and self-reported weight and height. *Results*: In Study 1, hunger reduced preferences for fruits (OR (95% CI) = 0.38 (0.26–0.56), $p < 0.0001$), an effect countered by the prime (OR (95% CI) = 2.29 (1.33–3.96), $p = 0.003$). In Study 2, the effect of the prime did not generalize to a representative population. More educated participants, as used in Study 1, chose more fruit when hungry and primed (OR (95% CI) = 1.42 (1.13–1.79), $p = 0.003$), while less educated participants' fruit choice was unaffected by hunger or the prime. *Conclusion*: This study provides preliminary evidence that the effects of adverts on healthy eating choices depend on key individual traits (education level) and states (hunger), do not generalize to a broader population and have the potential to increase health inequalities arising from food choice.

Introduction

Cues in our environment alter what we eat (e.g. Bell, Meiselman, Pierson, & Reeve, 1994; Jacob, Gueguen, & Boulbry, 2010) and the amount we eat (e.g. Harris, Bargh, & Brownell, 2009). More generally, the omnipresent imagery of food in the modern built environment has been argued as contributing to rising rates of obesity (Cohen, 2008), with adverts for unhealthier foods identified as a significant driver of increased unhealthy eating behavior (Mills, Tanner, & Adams, 2013). There is now interest from policy makers in determining whether similar interventions can be used to shift food selections toward healthier foods (Marteau, Hollands, & Fletcher, 2012), raising the question of whether healthy eating can be primed by incidental cues.

Priming is a psychological effect in which exposure to a stimulus is found to increase the accessibility of semantically related concepts, reflected in faster reaction times (Neely, 1977) or in recognition of more degraded images (Gollin, 1960). Recent work in social psychology has explored priming of non-laboratory behavior. For instance, activation of a trait construct or a stereotype in one context (such as the construct of intelligence) results in modification of an unrelated behavior to be consistent with that construct (such as higher test scores) without raising conscious awareness of a link between the two (Bargh, Chen, & Burrows, 1996; Bargh & Ferguson, 2000; Dijksterhuis & van Knippenberg, 1998). A distinct but related effect is goal priming, in which a goal, the representation of a desired end-state, is activated and results in behavior consistent with goal attainment. Goal priming can contrast with other forms of priming in a number of ways (Forster, Liberman, & Friedman, 2007), for instance, priming of one goal might inhibit

☆ *Acknowledgements:* We gratefully acknowledge the participation of all NIHR Cambridge BioResource (CBR) volunteers. We thank the Cambridge BioResource staff for their help with volunteer recruitment, members of the Cambridge BioResource SAB and Management Committee for their support of our study and the National Institute for Health Research Cambridge Biomedical Research Centre for funding. Access to CBR volunteers and their data and samples is governed by the CBR SAB. Documents describing access arrangements and contact details are available at http://www.cambridgebioresource.org.uk/. We are grateful to Chris Holmes and Sarah Walker for advice, comment and discussion on this work from a marketing perspective and to Graham Finlayson for use of the food images. The study was funded by the Department of Health Policy Research Program (Policy Research Unit in Behavior and Health [PR-UN-0409-10109]). The Department of Health had no role in the study design, data collection and analysis, decision to publish, or preparation of the manuscript.

* Corresponding author.
E-mail address: Sef26@cam.ac.uk (S.E. Forwood).

http://dx.doi.org/10.1016/j.appet.2015.01.018

Table 1
Summary of current studies that evaluate the effect on food choice or intake of primes that are feasible for use within real purchasing environments (excluding subliminal primes).

Study	Location	Prime	Outcome	Participants recruited from (mean age)	Effects in
Boland et al. (2013)	Laboratory	Healthy food TV ad	↓M&Ms eaten	Students (19.3)	All
Buckland et al. (2013)	Laboratory	An orange	↓Snacks eaten on taste test	University campus (26.3)	Restrained only
Coelho et al. (2009)	Laboratory	Cookie odors	↓Cookies eaten	Students (n/a)	Restrained only
Gaillet et al. (2013)	Laboratory	Fruit odors	↑Fruit and vegetable selection	Normal weight (27.5)	All
Gaillet-Torrent et al. (2014)	Laboratory	Fruit odors	↑Fruit dessert selection	Normal weight (26.0)	All
Papies and Hamstra (2010)	Butcher's shop	Diet recipe poster	↓Meat snacks eaten	Customers (56)	Restrained only
Papies et al. (2013)	Supermarket	Diet recipe flier	↓Unhealthy snacks purchased	Lower SES customers (54.2)	Overweight only
van Koningsbruggen et al. (2011)	Laboratory	Healthy magazine covers	↑Healthy eating goal activation	Unreported (28.7)	Restrained only

activation of a competing goal (Stroebe, Mensink, Aarts, Schut, & Kruglanski, 2008).

The use of priming to guide people toward making healthier food choices with primes that are feasible for use in real food choice environments has a modest but growing literature associated with it (Table 1). While these studies are quite heterogeneous in their design, they do suggest some potential in using primes to improve the healthiness of food choices, predominantly by reducing the rate of purchase and consumption of high fat and sugar snack foods. However, published studies do not yet tell us whether such interventions could be effective across a population and in particular among those who are more socially deprived and who purchase a poorer quality diet (Pechey et al., 2013).

It is notable that in many of the existing studies the priming effect is selectively observed in a subset of individuals: those with a food related trait of being either overweight (Papies, Potjes, Keesman, Schwinghammer, & van Koningsbruggen, 2013) or a restrained eater (Buckland, Finlayson, & Hetherington, 2013; Coelho, Polivy, Herman, & Pliner, 2009; Papies & Hamstra, 2010; van Koningsbruggen, Stroebe, & Aarts, 2011). The remaining studies don't report interactions between restraint status and the effect of the prime, or do not report dietary restraint (Boland, Connell, & Vallen, 2013; Gaillet, Sulmont-Rosse, Issanchou, Chabanet, & Chambaron, 2013; Gaillet-Torrent, Sulmont-Rosse, Issanchou, Chabanet, & Chambaron, 2014). These data suggest that the presence of primes to improve the health profile of food choices in a real food retail environment will be particularly effective for those with higher levels of dietary restraint. But since individuals who stand to gain from such an intervention, such as those with a high body mass index (BMI) or a lower socio-economic status, show the same levels of dietary restraint as the remainder of the population (Dykes, Brunner, Martikainen, & Wardle, 2004; Johnson, Pratt, & Wardle, 2012), such selectively effective interventions will not necessarily benefit those who need it most.

Additionally, papers seldom report sufficient demographic detail to determine the extent to which study participants are representative of the wider population, and the recruitment procedure described suggest the use of a convenience sample rather than a representative sample. Three studies recruited participants from within their university (Boland et al., 2013; Buckland et al., 2013; Coelho et al., 2009), likely biasing recruitment in favor of 18 to 25 year-olds with post-18 education to a level that is not seen in the wider population, and only one of the priming studies (Papies et al., 2013) reported a measure of socio-economic status.

In an effort to identify a prime to influence grocery shopping in a general population, our study sought to assess the effectiveness of a prime for healthy eating that was designed to increase preference for fruit over high fat and sugar snacks without being contingent on restraint status (Study 1). Alongside this outcome measure, participants were asked to make size estimates of foods which were congruent and incongruent with a healthy eating goal as increased size estimation of goal-congruent items has been used as a measure for assessing goal activation (Bruner, 1957; Veltkamp, Aarts, & Custers, 2008b; see Measures). This prime was then tested within a sample representative of the population (Study 2).

Study 1

This study used two prime components designed to prime a healthy eating goal by presenting healthy eating (specifically fruit and vegetable consumption) in a positive manner not contingent upon restraint or dieting status. Three adverts were designed to enhance the motivational value of fruits and vegetables by pairing their consumption with positive affect (Veltkamp et al., 2008b) and highlighting it as a social norm (Thaler & Sunstein, 2008). Similarly, a banner containing images of fruit and vegetables alongside wording indicative of positive mood was presented above a questionnaire.

Participants were told that they were being asked to complete a number of unrelated tasks on the topic of food. This served to reduce the likelihood that participants would be aware of a link between the prime adverts and the food preference outcome, therefore reducing demand effects on the primary outcome. For the same reason, participants received an additional task (the questionnaire below the banner image) asking them to report their food shopping habits.

Work carried out by Veltkamp et al. (2008b) indicates that primes only alter behavior when in a state of raised motivation, such as when hungry; therefore, in our study we did not predict a main effect of prime on the outcome measure. Instead, we predicted that the effect of prime would be moderated by self-reported hunger. A second factor, cognitive load, was also hypothesized to interact with the prime in influencing food preference. Loading cognitive capacity, e.g. by requiring a string of numbers to be held in working memory, has been shown to cause pre-existing latent or implicit goals to drive behavior (Shiv & Fedorikhin, 1999), with these goals driving behavior through their affective value rather than a cognitive value judgment. Loading cognitive capacity therefore has the potential to facilitate the expression of a prime that links healthier eating with positive mood, such as the one used in the current study.

In order to capture the generalized effect of the prime on a goal of eating the broader category of fruits and vegetables, rather than on the goal of eating the particular foods in the prime material, the outcome measures assessed increased preference for fruits (fresh pineapple, apple, peaches, melon slices, cherries, strawberries, dried apricots) that did not feature in the prime (banana, orange juice, vegetable soup). In addition, fruits made a more plausible alternative to sweet snacks in the food preference task than vegetables.

We tested two hypotheses:

(1) The prime activates the goal of eating fruits and vegetables in participants with high hunger, as measured by (a) an increased size estimation of a fruit, and (b) an increased frequency of fruit selection in a food preference task.