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Research review

Facilitating or undermining? The effect of reward on food acceptance. A narrative review

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ABSTRACT

Using rewards in child feeding is commonplace and viewed as effective by parents, although some express concern about using 'bribery'. Psychological and economic theorists emphasize the beneficial effects of rewards in enhancing performance, although, there is evidence that the offer of rewards undermines intrinsic motivation and decreases enjoyment of the rewarded task. In the food domain, results have been mixed, but this may be explained, at least partly in terms of the measured outcome (liking *vs* intake) and the initial level of motivation towards the target foods (liked *vs* disliked). Where *intake* is the outcome, rewards have had broadly positive effects, but when it is *liking*, rewards can have negative effects if the target food is already liked. Another issue concerns the type of reward offered. While offering food as a reward appear to be universally negative, there is evidence to suggest that non-food tangible rewards (e.g., stickers), or non-tangible rewards (praise) can be highly effective in encouraging children to taste new or less liked foods sufficiently often to benefit from the 'mere exposure' effect. We suggest that the judicious use of rewards may facilitate children's acceptance of healthy foods.

Contents

Introduction

Children have an innate liking for sweet tastes (Cowart, 1981) and readily learn a preference for energy-dense foods (Johnson, McPhee, & Birch, 1991; Kern, McPhee, Fisher, Johnson, & Birch, 1993). In contemporary environments where sweet, energy-dense foods are abundant and vigorously marketed, many parents struggle to get their children to eat a healthy diet.

Almost every parent has at some time tried incentives[1]; occasionally termed 'instrumental feeding' by child feeding researchers (if you eat x, you can have y). Use of instrumental

[1] A distinction can be drawn between an incentive, defined as the offer of a reward made *before* performance of the behaviour, and a reward, which is given *on completion* of the desired behaviour. However, in the child feeding literature, the terms are often used interchangeably, perhaps because one rarely occurs without the other.

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feeding has been documented across Europe, Australia and North America (Kaiser, Martinez, Harwood, & Garcia, 1999; Sherry et al., 2004). In a survey in the United States, 55% of parents of 3-year-olds reported using rewards to influence their child's food intake (Casey & Rozin, 1989) and qualitative studies in the UK (Moore, Tapper, & Murphy, 2007), Australia (Campbell, Crawford, & Hesketh, 2007), and Canada (Tucker, Irwin, He, Bouck, & Pollett, 2006) have found similar levels of use. Many parents view rewards as effective, but there is also an element of concern about what is often termed 'bribery', and worry that this approach could 'backfire' and result in the child liking the rewarded food less in the long term. This review aims to summarize the research evidence and to shed further light on the actual impact of rewards on food acceptance.

Effects of reward on hedonic evaluation of foods

Research into the role of reward in food acceptance began in the 1980s. A series of elegant studies, carried out in controlled research settings, appeared to give support to the 'backfiring' model. Children who were rewarded for tasting a novel drink were found to like the drink less in a subsequent taste-test than children who tasted it without the offer of reward (Birch, Birch, Marlin, & Kramer, 1982). A second study replicated this adverse effect and also showed that the type of reward (tickets to watch a movie or verbal praise) did not affect the magnitude of the decrease in liking (Birch, Marlin, & Rotter, 1984). In these studies, the target foods were sweet milk or fruit-based drinks that were not initially disliked by the children. The results were interpreted within an evaluative conditioning framework, which proposed that the instrumental feeding was experienced as negative or artificial, and this caused the decrease in liking (Birch, 1989).

Other research has used food as the reward – mimicking the typical family context which often involves children being offered dessert contingent on them eating the main course of the meal. Mikula (1989) examined preschool children's liking of foods used as both the target and the reward. Two moderately liked foods were selected for each child, one to be eaten as the means to acquire the other. In two of the studies, there was no evidence for a significant change in liking for the 'means' food, although liking for the reward food increased. Similar results were found in a small study in which preschool children were given toy reinforcements in exchange for eating novel dried fruits; there was no reduction in preferences one month later (Hendy, 2002). However, Mikula's third study compared liking for unfamiliar and familiar fruits, presented on only one occasion either as 'means' and reward, and found that the 'means' fruits were less liked after instrumental feeding, regardless of familiarity (Mikula, 1989). Newman and Taylor (1992) also demonstrated that liking for a moderately-liked snack presented once as the means to acquire an equally liked snack was reduced, while giving the snacks sequentially without the contingency or presenting both at the same time, produced no changes in preference. Overall these studies found a mix of negative and null effects, but none demonstrated the positive effect of reward that might be expected.

One feature that was common to all the early studies was the use of relatively palatable foods as the targets (sweet drinks, fruits). There is now an emerging literature examining the impact of rewards on liking for less palatable foods; commonly vegetables. In one study that randomized children to either 'exposure alone' or 'exposure plus reward', two weeks of daily tasting of an initially moderately disliked vegetable resulted in increases in liking in the 'exposure plus reward' group; albeit slightly lower than in the 'exposure alone' group (Wardle, Herrera, Cooke, & Gibson, 2003), a finding that might be explained by the inadvertent delivery of social rewards alongside exposure. Two interventions carried out in school settings which also included a reward component obtained similar positive effects. 'Food Dudes' was a peer-modelling and reward-based intervention in which 4–11 year old children watched video adventures of heroic cartoon characters eating fruits and vegetables, and were given rewards for tasting the fruits and vegetables that the Food Dudes ate. Liking for both fruits and vegetables increased significantly, although the design of the study meant that the contribution of the reward component could not be distinguished from peer modelling (Horne et al., 2004; Lowe, Horne, Tapper, Bowdery, & Egerton, 2004; Lowe, Horne, Hardman, & Tapper, 2006). In 'Kids Choice', children received token reinforcements exchangeable for small prizes for trying new fruits and vegetables and this also produced significant increases in liking (Hendy, Williams, & Camise, 2005).

Effects of reward on food intake

In contrast to the inconsistent results in studies with liking as the outcome, positive results have emerged from the majority of studies with *intake* as the outcome. Clinical studies of children with eating-related problems such as food refusal have shown that rewards produce immediate increases in food intake (Bernal, 1972; Coe et al., 1997; Kern & Marder, 1996). Similarly, a number of non-clinical studies have successfully used rewards to influence children's intake of healthy foods. Two early experiments found that rewards (hugs, tickles, swings, lifts or stickers) encouraged pre-school children to select healthy over non-healthy snacks (Baer, Blount, Detrich, & Stokes, 1987; Stark, Collins, Jr., Osnes, & Stokes, 1986) and an observational family study found that the offer of a food reward at a meal increased children's intake of the main meal (Orrell-Valente et al., 2007). In our study involving taste exposures to red pepper, significant increases in intake were observed after two weeks of daily tasting rewarded with stickers (Wardle, Herrera, et al., 2003).

Incentives offered in the school context have also increased intake of fruits and vegetables. Hendy (1999) compared five teacher actions (offering dessert reward, insisting on one bite, choice-offering, exposure, and modelling) over three occasions. Dessert reward was the most effective strategy in terms of the number of novel fruits and vegetables tried at subsequent meals. In 'Kids Choice', consumption of fruit and vegetables increased for the duration of the reward program (Hendy et al., 2005), and the combination of rewards and peer modelling in Food Dudes (described above) increased consumption of fruits and vegetables both immediately after the intervention and at four month follow-up (Horne et al., 2004, 2009; Lowe et al., 2004, 2006).

Theoretical approaches to reward in food acceptance

The idea that contingent rewards increase performance of the rewarded behaviour is the central tenet of instrumental learning (Thorndike, 1911). Incentive effects on performance are equally fundamental to classical economic accounts of human behaviour (Benabou & Tirole, 2003). The Premack principle offers another way to understand improvements in performance, predicting that higher probability behaviours will reinforce lower probability behaviours. Classical learning may also affect performance through conditioned preferences and expectations (Baeyens, Eelen, Crombez, & Van den Bergh, 1992), ultimately resulting from the rewarded food taking on the positive motivational properties of the reward (Bindra, 1978; Toates, 1986). On the face of it, there is no reason to suppose that rewarding children for eating should not have these same positive effects.

However, social psychologists and economists have observed a paradoxical effect of rewards in some situations. Behaviour is believed to be determined by the combination of intrinsic motivation (e.g. enjoyment of the task) and extrinsic motivation