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Changing children's eating behaviour - A review of experimental research

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ABSTRACT

The interest in children's eating behaviours and how to change them has been growing in recent years. This review examines the following questions: What strategies have been used to change children's eating behaviours? Have their effects been experimentally demonstrated? And, are the effects transient or enduring? Medline and Cab abstract (Ovid) and Web of Science (Thomson Reuters) were used to identify the experimental studies. A total of 120 experimental studies were identified and they are presented grouped within these 11 topics; parental control, reward, social facilitation, cooking programs, school gardens, sensory education, availability and accessibility, choice architecture and nudging, branding and food packaging, preparation and serving style, and offering a choice. In conclusion, controlling strategies for changing children's eating behaviour in a positive direction appear to be counterproductive. Hands-on approaches such as gardening and cooking programs may encourage greater vegetable consumption and may have a larger effect compared to nutrition education. Providing children with free, accessible fruits and vegetables have been experimentally shown to positively affect long-term eating behaviour. The authors recommend future research to examine how taste and palatability can positively affect children's attitudes and eating behaviour.

Contents

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1. Introduction

In this review, the term *eating behaviour* has been used to encompass a range of variables (i.e., food intake, choice, preference, hedonic response [liking], acceptance [intake], willingness to taste, and neophobia). Besides food intake, other measures provide insight into children's eating behaviour: *Preference* describes how a food is ranked in relation to other food items. Followingly, choice of certain foods over others indicates greater preference. *Liking* quantifies the attitude or degree of liking, or disliking, towards a food, and *neophobia* describes a reluctance to try novel foods.

Currently, great attention is paid to children's eating behaviour and how to change it in a desirable direction. From a political and a public health perspective, this is undoubtedly due to the rise in childhood obesity rates and the concerns of the long-term health consequences this may have (Must & Strauss, 1999). The rise in childhood obesity is worrying, not solely in connection with the increased risk of non-communicable diseases these children face but also due to the notion that children themselves cannot be held accountable for this unfortunate development. Although not all factors influencing eating behaviour are modifiable, many are: environment and food-related experiences have consistently been shown to be central to the development of children's eating behaviour (Birch, 1999). Furthermore, preferences formed early in life tend to continue into adult life (Nicklaus, Boggio, Chabanet, & Issanchou, 2004). As preferences are the main predictor of food intake in children (Gibson, Wardle, & Watts, 1998), understanding how these preferences are shaped through children's food experiences is central to understanding how parents, environment, and greater structural contexts might affect and shape children's current and long-term eating behaviour.

Public health interventions have predominately focused on nutrition education, guidelines, and legislation regarding food served at schools, nurseries etc. and often focused on increasing intake of fruit and vegetables and discouraging intake of energy-dense food that is high in sugar and fat (Jaime & Lock, 2009). At the same time, children's food intake remains a central parental concern: a large observational study examining the structure of 142 children's mealtime environment found that 85% of parents used varying strategies to encourage children to consume more food (Orrell-Valente et al., 2007). Common parental strategies used to influence or control children's food intake include prompting to eat, restriction/portion control, pressure to eat, reasoning, reward (praise and food), and punishments (withholding desired food or play privileges) (Orrell-Valente et al., 2007).

The strategies applied, knowingly or unknowingly, by governments, schools, parents, and other stakeholders concerned with childhood nutrition may affect children's dietary behaviour in a way that is judged to be positive (increased dietary variety and intake of fruit and vegetables, decreased pickiness and neophobia etc.) or negative (decreased intake of fruit and vegetables, increased levels of neophobia etc.) or simply have no effect on children's eating behaviour. Given the great public health focus, as well as parents' controlling approach to children's food intake, it is crucial to experimentally examine the outcome of these different approaches to changing children's eating behaviour. Accordingly, ***the objective*** of this review is to examine the following questions: What strategies are used to change children's eating behaviour? Have their effects been experimentally demonstrated (positive or negative)? And, if so, are the effects transient or enduring?

A range of variables has been *associated* with positive or negative effects on children's eating behaviour. However, in order to gain a better understanding on causality, the focus in this review is on experimental studies that include an intervention. All experimental studies that fitted the inclusion criteria were included in the review. This review does not consider the effect of socioeconomic status and wider political and structural influences on children's eating behaviour.

Evidence of the effects of non-associative (i.e. repeated exposure [RE]) and conditioned learning (i.e. flavour-flavour learning [FFL], and flavour nutrient learning [FNL]) have not been included in this review, as these approaches have recently been reviewed elsewhere (Appleton, Gentry, & Shepherd, 2006; Cooke, 2007; Keller, 2014). RE has been shown to positively change children's preferences for, and intake of, a new or initially disliked target food (Cooke, 2007). FFL learning, where a novel or disliked target food is combined with a food that is already liked, has also been demonstrated to positively affect children's accept of a novel food (Caton et al., 2013; Hausner, Olsen, & Møller, 2012; Remy, Issanchou, Chabanet, & Nicklaus, 2013). It should be noted that considerable individual differences in children's response to RE, FFL, and FNL have been demonstrated in a recent study (Caton et al., 2014). FNL pairs a novel or disliked flavour with a nutrient (e.g. fat), leading the flavour to be associated with the positive post-ingestive effects of the ingested nutrient. However, several studies have failed to show any great effect of FNL in human subjects (Yeomans, 2012). This review will examine *additional* strategies or behaviour that might facilitate a change in children's eating behaviour.

2. Method

The search was conducted using Medline (Ovid)/Cab abstract (Ovid) and Web of Science (Core Collection) in September to December 2015 and updated in January 2017. "Limit to English language" and "remove duplicates" was applied to all searches. An initial search in Web of Science, was done in order to identify key words/concepts within the topic of changing children's food preference, liking, intake, willingness to taste, and neophobia. Subsequently, an individual search was carried out for each identified approach. For all identified approaches, a general search word was applied, for instance (child* OR teenage* OR adolescen*) AND (food preference* OR taste preference* OR intake OR liking) combined with each specific approach, e.g. (social facilitation or peer influence* or friend* or peer model* social context*) etc. In addition to the studies identified during the search procedure, further studies were identified from the reference lists of the included studies. As this review encompassed an extensive search on 11 topics, the full search log cannot be included here, but can be obtained from the authors upon request.

Inclusion criteria: Studies included in the review were published in a peer-reviewed journal, primary research in English, and intervention/experimental studies measuring one or more of the