



If at first you don't succeed: Assessing influences associated with mothers' reoffering of vegetables to preschool age children

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ABSTRACT

Repeatedly offering vegetables has been shown to be one of the most effective methods for increasing acceptance and subsequent intake in young children. In order to increase successful offerings of vegetables and resultant consumption amongst young children, it is necessary to consider the influences on maternal reoffering of vegetables. This study aimed to investigate the relationships between mothers' tendency to reoffer vegetables and a range of demographic factors and psychological variables. A cross-sectional design was used, where mothers completed questionnaires assessing how often they reoffer rejected vegetables, concerns for economic factors, and a range of possible child and maternal influences. Mothers of preschool children were recruited from toddler groups across Leicestershire, UK, as well as online. Spearman's correlations were run to look for associations between demographic and psychological factors with maternal reoffering of vegetables. Significantly associated factors were then entered into a stepwise regression to predict maternal reoffering of vegetables. Mothers were significantly less likely to reoffer rejected vegetables if they were concerned about time, money, and waste, were influenced by their child's mood, or were concerned about their child having tantrums. Moreover, mothers who consumed more vegetables themselves reoffered vegetables more frequently. Regression analyses revealed that mothers' concern about food waste and tantrums, as well as maternal vegetable consumption, all significantly predicted mothers' reoffering of vegetables. With these findings in mind, mothers should be educated and supported with how to tackle and minimise children's tantrums during feeding, as well as being made aware of effective methods for avoiding food waste. Moreover, given that mothers' own vegetable consumption is associated with lower reoffering of vegetables to their child, interventions which seek to increase familial vegetable consumption should be pursued.

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1. Introduction

Vegetable consumption in children is low and vegetables are commonly rejected by children (e.g., [Cooke & Wardle, 2005](#)). Previous research suggests that in order for children to like and accept a rejected food they may need to try it as many as 10 to 15 times (e.g., [Birch & Marlin, 1982](#); [Birch, Gunder, Grimm-Thomas, & Laing, 1998](#); [Sullivan & Birch, 1990](#)). Research suggests that early and sustained experiences with vegetables are the key to children's acceptance ([Johnson, 2016](#)), with a recent systematic review of experimental studies demonstrating that repeated exposure to the taste of vegetables is the most successful method of increasing

vegetable consumption in early childhood ([Holley, Farrow, & Haycraft, 2017](#)). Specifically, experimental research has found that young children between two and five who experience more than five taste exposures to a novel or disliked food will consume significantly more of the food than on the first exposure ([Birch & Marlin, 1982](#); [Birch, McPhee, Shoba, Pirok, & Steinberg, 1987](#); [Sullivan & Birch, 1990](#)). Experimental research also suggests that repeated taste exposure can not only increase three to six year old children's consumption of vegetables, but also their liking ([Anzman-Frasca, Savage, Marini, Fisher, & Birch, 2012](#)). These effects have been found to be pervasive in preschoolers, with support for these findings coming from various contexts including nurseries, preschools, the home and in laboratory studies (e.g., [Bouhhal, Issanchou, Chabanet, & Nicklaus, 2014](#); [Caton et al., 2013](#); [Fildes, van Jaarsveld, Wardle, & Cooke, 2013](#); [Hausner, Olsen, & Møller, 2012](#)). Moreover, questionnaire studies have consistently found

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that earlier introduction to foods is associated with higher consumption later in childhood, or with consumption of a greater variety of foods (e.g., Cashdan, 1994; Cooke et al., 2004; Skinner, Carruth, Bounds, Ziegler, & Reidy, 2002). Furthermore, a more recent narrative review suggests that even visual exposure to unfamiliar foods can increase children's willingness to try and to accept these foods in the future (Heath, Houston-Price, & Kennedy, 2011). Despite this large body of evidence for the effectiveness of repeated exposure, less than 9% of mothers of infants and toddlers reoffer new foods to their children as many as 10 times (Carruth, Ziegler, Gordon, & Barr, 2004). In light of this, it is crucial to consider the influences on caregivers' reoffering of vegetables, in order to increase children's consumption. It is optimal to investigate reoffering with preschool children, who will reap the maximal benefits resulting from increased vegetable consumption across the lifespan.

A previous qualitative study identified that the majority of influences on caregivers' offering of vegetables to preschool children fell into three categories: economic factors, child factors and maternal factors (Holley, Farrow, & Haycraft, 2016). To apply these findings more widely, it is necessary to conduct further, large scale research that determines which factors influence caregivers' reoffering of vegetables to young children. This information could then be used to inform future education for parents and interventions aimed at increasing children's vegetable consumption. For the current paper, reoffering is defined as presenting a previously rejected food to a child.

Economic influences on reoffering of vegetables can take several forms. One of these influences is time, where adults in previous research have reported that they do not have the time available to shop for fresh fruits and vegetables on a regular basis (Anderson & Cox, 2000), and both high and low socioeconomic status (SES) groups report that preparing vegetables is time consuming (Holley et al., 2016; Kilcast, Cathro, & Morris, 1996). Another economic influence is food waste. Previous research has highlighted the significant effect that potential food waste has on low SES and low vegetable consumers' choice to buy vegetables (Kilcast et al., 1996). Moreover, parents of three to five year old children with unhealthy food preferences have stated that reoffering previously rejected (typically healthy) foods to their child was wasteful, as their child would again refuse the food (Russell, Worsley, & Campbell, 2015).

As well as time and food waste, the financial cost of vegetables can also be important, with some evidence suggesting that a diet rich in fruits and vegetables can cost more than a diet higher in sugar and fats (Drewnowski, Darmon, & Briend, 2004). This factor impacts upon families of lower SES more significantly than those of higher SES, with a consistent body of literature demonstrating that lower parental SES is significantly associated with less frequent consumption of vegetables (see Rasmussen et al., 2006; for a review). The cost of vegetables has previously been shown to be a potential barrier to individuals increasing their vegetable consumption (Cox, Anderson, & Lean, 1998). Moreover, evidence suggests that food cost can be a barrier to consumption in both low and high SES families (Cox et al., 1998). It is therefore important that such factors be considered in populations other than the lowest SES groups. Furthermore, this literature suggests that caregivers' concerns about the cost of vegetables should be assessed as a possible significant factor in reoffering of vegetables to their child. With public and private funding sources for food scarce and current food policies not improving the cost of healthy eating, food cost is particularly pertinent (Brambila-Macias & Shankar, 2011).

A range of child factors may also influence caregivers' reoffering of previously rejected vegetables. Previous research has posited that children's general eating behaviours are related to their vegetable consumption, where fussiness is associated with lower

consumption among seven to nine year olds (Galloway, Fiorito, Lee, & Birch, 2005), and enjoyment of food is associated with higher consumption of vegetables among five to seven year olds (Cooke et al., 2004). Moreover, research from Farrow, Galloway, and Fraser (2009) suggests that parents use different feeding practices with fussy three to six year old children compared to their less fussy siblings. Taking this research into consideration, it is possible that caregivers' reoffering of vegetables may be related to children's eating behaviours, such as fussiness. A previous qualitative study revealed additional child factors which may influence reoffering to preschool age children (Holley et al., 2016). Caregivers reported that they may be dissuaded from reoffering vegetables to their child if their child was not particularly hungry or if they believed there was a possibility of their child having a tantrum (Holley et al., 2016). Such findings need elucidating with quantitative research to further understand whether these influence caregivers' reoffering practices more broadly.

A final group of possible influences on reoffering of vegetables is caregiver factors, such as caregivers' own preferences for and consumption of vegetables, which may influence children's consumption of vegetables. Indeed, literature suggests that children's and adolescents' vegetable intake may be positively related to parental intake (Cooke et al., 2004; Hanson, Neumark-Sztainer, Eisenberg, Story, & Wall, 2005; Palfreyman, Haycraft, & Meyer, 2014). However, while maternal factors may influence children's consumption of vegetables, it is important to note that research also suggests that this relationship may be bi-directional or even iterative (e.g., Webber, Hill, & Wardle, 2010). Research has suggested that children's eating behaviour can influence maternal feeding practices (Farrow & Blissett, 2008; Haycraft & Blissett, 2012) and that feeding practices may well be a consequence of children's eating rather than a cause of eating behaviours (Holley, Haycraft, & Farrow, 2017; Webber et al., 2010). With this in mind, it is important to investigate the combined and separate associations of these possible influences on caregivers' reoffering of vegetables.

The current study seeks to extend previous research, such as that of Carruth et al. (2004), by exploring how frequently mothers reoffer vegetables to preschool children (aged 2–5 years), and which factors might influence reoffering of vegetables to preschool children. Specifically, the study had two aims. The first aim was to investigate whether the frequency of reoffering of vegetables is associated with maternal concern about economic factors (time, waste and money), child factors (eating behaviours, hunger, and maternal concern about children's mood and tantrums), and maternal factors (their own dislike of vegetables and vegetable consumption). It was hypothesised that mothers would reoffer rejected vegetables fewer times if they: were concerned about the financial costs of offering (including waste); described their children as fussier eaters; ate fewer vegetables themselves. A second aim of the study was to assess which factors could best predict mothers' frequency of reoffering of previously rejected vegetables.

2. Method

2.1. Participants

Caregivers of two to five year old children were invited to take part in the study. Using Cohen's (1992) guidelines on appropriate sample size, recruitment was set for a minimum sample of 177 caregivers. Due to the small numbers of other types of caregivers, non-mothers were excluded ($n = 18$), leaving a final sample of 256 mothers who participated in this study.

Mothers' age ranged from 21.0 to 49.3 years ($M = 35.5$; $SD = 5.16$) and child age ranged from 19.0 to 62.0 months ($M = 38.5$; $SD = 10.76$).

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