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Increasing the frequency of breakfast consumption

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Abstract

Purpose – A number of interventions aimed at increasing breakfast consumption have been designed and implemented in recent years. This paper seeks to review the current research in this area with the aim of identifying common features of successful interventions and strengths and weaknesses in the current research methodology.

Design/methodology/approach – A systematic review of interventions aimed at increasing breakfast-eating frequency in a non-clinical sample was conducted.

Findings – A total of 11 interventions were identified and reviewed; of these, only three resulted in an increase in breakfast consumption at follow-up. The three studies that were successful in changing breakfast consumption all included a psychosocial component that was successful in increasing positive attitudes towards nutrition in the intervention protocol. Many of the breakfast-eating interventions included in this review have methodological weaknesses, including difficulties in implementing interventions, small sample sizes, and selection biases, which future researchers should consider when designing and evaluating their own interventions.

Research limitations/implications – These findings highlight the importance of including psychosocial components in interventions designed to increase breakfast consumption, while also signalling issues that should be addressed when designing and reporting future interventions.

Originality/value – This review was the first to investigate the efficacy of interventions aimed at increasing breakfast consumption. The identification of weaknesses in the current body of research, and of successful and unsuccessful intervention practices is an important step in developing successful interventions in the future.

Keywords Health foods, Nutrition, Diet, Consumer behaviour

Paper type Research paper

1.1 Background

Breakfast is often called the most important meal of the day, with breakfast consumption one of the “seven healthy habits” associated with increased longevity, as identified by Belloc and Breslow (1972) in their Alameda County Study. Experimental and observational studies suggest that the physical benefits of breakfast consumption include improved diabetes control (Clark et al., 2006) and the presence of fewer cardiovascular risk factors (Sakata et al., 2001). Breakfast consumers have been shown to have a lower body mass index than breakfast skippers (Ma et al., 2003), and this may be related to improvements in appetite control (Burley et al., 1993; Speechly and Buffenstein, 1999) and nutritional profile (Nicklas et al., 2000), which have also been linked to breakfast consumption over both the short- and long-term.

Further evidence for the importance of eating breakfast has been found in studies of cognitive and affective health outcomes (Michaud et al., 1991; Nicklas et al., 2000). A number of experimental studies conducted in both school and laboratory environments have shown that breakfast consumption may lead to improvements in memory over the short-term (Michaud et al., 1991; Smith et al., 1994; Wesnes et al., 2003). Both observational and experimental studies have suggested that breakfast skimming may result in a decrease in positive affective states (Lluch et al., 2000; Yang et al., 2006).

Finally, breakfast consumption has been shown to result in improvements in behaviour amongst school children. Children who regularly eat breakfast are likely to be less disruptive in class (Bro, 1994), are less likely to be absent from school and are more likely to arrive at school on time (Greenhalgh et al., 2007; Meyers et al., 1989). The consumption of breakfast has also been shown to result in improvements in academic performance (Powell et al., 1998) and school enjoyment (Ask et al., 2006).
1.2 Interventions to increase frequency of breakfast consumption

Despite the recognised importance of breakfast consumption, research into eating habits has shown that a large number of individuals do not regularly consume breakfast (ABS, 1997; Kant and Graubard, 2006). As such, it is not surprising that a number of interventions have been designed to increase the regular consumption of breakfast. The interventions targeting breakfast eating fall into two major categories: those targeting food availability, and those providing persuasive messages.

Interventions targeting food availability often take the form of school-based feeding programs (e.g. Shemilt et al., 2004). Such programs tend to centre on the provision of free breakfasts to eligible school children with few or no persuasive components (e.g. USDA, 2007). In contrast, persuasive interventions may not provide breakfast to individuals but instead seek to increase breakfast consumption by other means, such as providing information about the benefits of breakfast and/or by providing motivation and strategies to overcome barriers to breakfast consumption (Crawford, 2007; Radcliffe et al., 2005; Shi-Chang et al., 2004). Some interventions may fit into both of these categories. For example, a single intervention may target attitudes towards breakfast eating while also providing breakfast foods (Kennedy et al., 2005).

1.3 Objectives

The purpose of this paper is to conduct a rigorous and systematic review of interventions designed to increase breakfast consumption in order to identify effective strategies for increasing breakfast consumption. This paper is intended to act as a review of the current state of literature by reporting the intervention strategies that have been used in the past and also by identifying methodological challenges that should inform future research in this field. To our knowledge this is the first systematic review of the effect of breakfast eating interventions on breakfast eating frequency.

2.1 Methods

Electronic literature searches were performed using the Medline, PUBMED, SCOPUS, Web of Science, CINAHL, and PsycINFO databases up to July 2008. In order to identify relevant grey literature, searches were also conducted using Google Scholar and the Dissertations & Theses: Full Text database. In all databases the initial search was conducted using the term “breakfast”, results were then refined by the use of the term “intervention”. The term intervention was valid in the PsycINFO, CINAHL, and Medline databases and exploded to include, “intervention” and “school-based intervention” in PsycINFO, “early intervention” and “intervention trials” in CINAHL and “early intervention (education)” and “intervention studies” in Medline. Reference lists of identified papers and of reviews in related areas were manually searched for additional studies. All studies that described and/or evaluated a breakfast eating intervention in a non-clinical sample were potentially eligible for inclusion in this review. In order to be eligible for inclusion studies must have reported the frequency of breakfast eating at follow-up. Only studies that were published in English were reviewed. The titles and abstracts of all identified records were screened. Articles were rejected if it was determined from the title and abstract that the study failed to meet the selection criteria. When a title/abstract could not be rejected with certainty, the full text of the article was obtained for further evaluation.

In total, 11 studies were included in the review (Ask et al., 2006; Bayne-Smith et al., 2004; Crawford, 2007; Crepinsek et al., 2006; Devaney and Stuart, 1998; Kennedy et al., 2005; Martens et al., 2007; Murphy et al., 2007; Radcliffe et al., 2005; Shemilt et al., 2004; Shi-Chang et al., 2004). See Table I for a description of each of the included studies. One of the included studies, identified through electronic database searching, was reported in a Master’s thesis (Crawford, 2007). A second paper included in the review was a report by the Cardiff Institute for Society, Health and Ethics (Murphy et al., 2007). The remainder of the included studies were reported in published journal articles. Breakfast eating frequency was assessed in all studies. Other outcome measures included in the reviewed studies were: assessment of breakfast quality, overall dietary quality, attitudes and beliefs surrounding breakfast and nutrition, knowledge of general nutrition, and physiological outcomes such as body mass index (BMI) and blood pressure. Since it was considered important that interventions not have negative impact on dietary quality or on attitudes towards breakfast, these outcomes were considered along with breakfast eating frequency for the purpose of this review. Since one of the aims of this review was to identify common methodological challenges encountered by researchers in this field no criteria were developed to include or exclude studies on the basis of study design or methodological quality.
3.1 Results
Each of the 11 studies included in this review evaluated a single intervention. No studies evaluated multiple intervention strategies. Interventions incorporated a range of different components. Interventions included food provision n = 5, persuasive messages n = 4, or a combination of both n = 2.

3.2 Breakfast consumption
Five studies considered the provision of breakfast to study participants with no persuasive component (Ask et al., 2006; Crepinsek et al., 2006; Devaney and Stuart, 1998; Murphy et al., 2007; Shemilt et al., 2004). In all five studies breakfast was provided to children in a school setting. Ask et al., for example, reported a study in which breakfast was provided to 14 year-old students before school for four months (Ask et al., 2006). Similarly, the programmes reported by Shemilt et al. and Murphy et al. provided funding for schools to establish school-based breakfast clubs (Murphy et al., 2007; Shemilt et al., 2004). The remaining two reports described the provision of free or subsidised breakfasts to American school students. In the first study, free or subsidised breakfast was offered to eligible students at treatment schools (Devaney and Stuart, 1998). Students’ eligibility was assessed on the basis of socioeconomic status. In the second study free school breakfasts were made available to all students in treatment schools, regardless of family income, for three consecutive school years (Crepinsek et al., 2006). Participants from control schools continued to receive subsidised and free school breakfasts where eligible. No interventions of this type reported an effect of school feeding on breakfast eating frequency.

Two studies have investigated the effect of interventions that included school feeding with persuasive messages; the effects of such strategies were mixed. One study, an observational cohort design which provided an eight-week stage-based intervention, supplemented by breakfast smoothies, to residential university students, demonstrated an increase in breakfast consumption compared to the control group (Kennedy et al., 2005). The second study, a cluster randomised controlled design, utilised the Health Promoting Schools approach (Radcliffe et al., 2005). Schools designed and implemented their own breakfast eating interventions, some of which included school feeding and/or persuasive messages (Radcliffe et al., 2005). That study found no evidence for an effect of the intervention on breakfast eating frequency. The results of this study may have been influenced by the use of a variety of intervention strategies from school to school. Unfortunately, the effect of individual strategies was not evaluated, meaning that some successful strategies may have been overlooked in the final evaluation.

Four studies evaluated the effect of persuasive messages without food provision on breakfast consumption. One cohort study provided evidence of a decline in breakfast skipping after the intervention (Crawford, 2007). That study considered the breakfast consumption patterns of students from a nutrition class compared to students from other classes. The intervention group took part in a high school nutrition course using standard curricula. A second study reported mixed success of persuasive message interventions with regard to breakfast consumption (Shi-Chang et al., 2004). Intervention schools established school-based working groups for nutrition, school staff received nutrition training, materials were distributed to students and parents, and students took part in extra nutrition education classes (Shi-Chang et al., 2004). At the conclusion of the study, parents and school staff but not students displayed increased breakfast eating frequency. The remaining two studies, both cluster randomised controlled studies which provided nutrition education in a classroom setting, found no evidence of a change in breakfast consumption after a persuasive message intervention (Bayne-Smith et al., 2004; Martens et al., 2007).

Table I. Impact of interventions on breakfast eating frequency in non-clinical samples
<table>
<thead>
<tr>
<th>Reference</th>
<th>Design</th>
<th>Country</th>
<th>Sample</th>
<th>Intervention</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask et al.</td>
<td>Pre-test/post-test</td>
<td>Norway</td>
<td>64 (C: n = 28; T: n = 26) students from a rural school, mean age 15 yrs</td>
<td>Breakfast was served to intervention participants before school for four months. Information about the benefits of breakfast was provided to participants in both groups</td>
<td>No change in breakfast eating amongst intervention group</td>
</tr>
<tr>
<td>Bayne et al.</td>
<td>Randomised controlled trial (cluster randomised)</td>
<td>US</td>
<td>422 (C: n = 132; T: n = 30) female students from 5 New York City high schools, mean age 16.2 yrs in intervention group, 15.9 yrs in control group</td>
<td>Intervention participants took part in a personal health course that integrated exercise, health and nutrition education and behaviour modification. Information about smoking cessation and stress management techniques was also provided. Intervention took place in 90-minute classes, five times a week for 12 weeks. Control participants underwent physical education classes as normal.</td>
<td>No significant differences in breakfast consumption between control and intervention groups. Higher consumption amongst the intervention group compared with a 2.7% increase in the control group</td>
</tr>
<tr>
<td>Crawford</td>
<td>Observational cohort study</td>
<td>US</td>
<td>75 (C: n = 45; T: n = 30) 9th-12th grade students (14-19 yrs) at a Texas high school. Intervention group took part in a 90-minute class on nutrition once a week.</td>
<td>Intervention group took part in a high school nutrition course using an online curriculum. The 90-minute classes took place five times a week for 18 weeks. Control participants received no nutrition education.</td>
<td>No significant differences in breakfast consumption between control and intervention groups.</td>
</tr>
<tr>
<td>Crieneck et al.</td>
<td>Observational cohort study</td>
<td>US</td>
<td>436 students from 33 elementary schools, mean age 9.8 yrs</td>
<td>Free school breakfast were made available to all students in treatment schools, regardless of family income, for three consecutive school years. Control participants continued to receive subsidized and free school breakfasts where eligible.</td>
<td>No significant differences in breakfast consumption between control and intervention groups.</td>
</tr>
</tbody>
</table>

(continued)
3.3 Diet and nutrition

Three studies considered the effects of reviewed breakfast eating interventions on the nutritional value of breakfast (Crepinsek et al., 2006; Devaney and Stuart, 1998; Murphy et al., 2007). All three studies utilised school feeding intervention strategies. Although no study provided evidence for an overall increase in breakfast eating frequency, all three provided evidence for an increase in breakfast quality as a result of school feeding programmes. One study found that the provision of free school breakfast to all students, regardless of income, led to improvements in nutritional quality of breakfast when compared to students from schools at which subsided and free breakfasts were provided to students, only when eligible (Crepinsek et al., 2006). The second study found that the provision of free or subsided breakfast to eligible students via the school breakfast programme led to an increase in nutritionally substantive breakfasts amongst individuals from low-income households (Devaney and Stuart, 1998). In that study, students at School Breakfast Programme schools from the low income subsample were more likely to consume a breakfast of at least 10 per cent of the recommended dietary allowance (RDA), and more likely to consume at least 10 per cent of the RDA and a breakfast consisting of at least two food groups. Finally, the Welsh School Breakfast Initiative found that students at schools with free breakfast clubs reported higher numbers of healthy food items eaten at breakfast than students from control group schools.
Six studies considered the effects of interventions, spanning all three intervention methodologies, on diet and nutrition across the day. Two studies reported that the reviewed intervention was not successful in modifying intake across the day (Crepinsek et al., 2006; Murphy et al., 2007). The remaining studies, consisting of randomised controlled trials and cohort studies, demonstrated a positive effect of interventions on fruit and fruit juice consumption (Martens et al., 2007; Shemilt et al., 2004), milk consumption (Crawford, 2007), and energy dense micronutrient poor food consumption (Radcliffe et al., 2005).

3.4 Attitudes towards breakfast
Two studies reviewed here considered the effect of interventions on attitudes towards breakfast (Kennedy et al., 2005; Murphy et al., 2007). Both studies found that a breakfast consumption intervention led to an increase in positive attitudes towards breakfast. Such that, participants who completed the interventions were more likely than those in the control group to believe that breakfast was associated with health benefits, and/or that eating breakfast would make them feel less hungry throughout the day. Evidence from three other studies indicates that interventions were also linked to an overall increase in positive attitudes towards general nutrition, and to increases in nutrition knowledge (Bayne-Smith et al., 2004; Crawford, 2007; Shi-Chang et al., 2004). However, of the six interventions that included a persuasive component, two did not report the effect of that intervention on beliefs surrounding breakfast or nutrition.

4.1 Discussion
The evidence regarding the effectiveness of the reviewed interventions on breakfast eating frequency was inconclusive. Results from food availability interventions showed no evidence that school feeding programmes lead to an increase in breakfast eating frequency. There was limited evidence to suggest that persuasive messages with and without the provision of breakfast may lead to increases in breakfast consumption. This finding is consistent with research that suggests that food scarcity is rarely cited as a reason for breakfast skipping. For example, in one study of breakfast consumption patterns in impoverished youth, only 3 per cent of breakfast skippers indicated that breakfast foods were unavailable (Sweeney and Horishita, 2005). Similarly, a study of breakfast eating habits of Australian school children reported that just 5 per cent of breakfast skippers reported that they did not eat breakfast because there was no food at home (Shaw, 1998). In both studies, breakfast skippers were most likely to report that they skipped breakfast because of attitudes and beliefs they held about breakfast, including a dislike for breakfast, and a belief that they lacked time in the morning to eat (Shaw, 1998; Sweeney and Horishita, 2005). It is plausible to argue that interventions that include a persuasive component would be more likely to address such attitudes/beliefs and, therefore, would have a greater degree of success in increasing the frequency of breakfast consumption.

Such a supposition is partially supported by the results of this review. There was evidence to suggest that interventions that included persuasive messages led to increases in positive beliefs about breakfast and overall nutrition. However, only one study using a food only intervention reported the effect of the intervention on attitudes towards breakfast (Murphy et al., 2007). This study provides preliminary evidence that food only interventions may modify those attitudes, which previous studies have suggested, may be relevant in influencing breakfast eating. Importantly, of the five interventions that reported increased positive beliefs about breakfast and/or overall nutrition as a result of the intervention, three interventions also led to increases in breakfast eating frequency. No interventions led to improvements in breakfast eating frequency without also reporting an improvement in positive beliefs about nutrition and/or breakfast. This is consistent with research into breakfast consumption that suggests that breakfast consumption is predicted, at least in part, by an individual’s positive attitudes towards breakfast consumption (Wong and Mullan, 2008).

Evidence from the reviewed studies suggests that interventions from all three categories can lead to improvements in dietary quality. This pattern of results suggest that the interventions reviewed here, while not always improving overall breakfast consumption, have still lead to meaningful improvements in the nutritional content of breakfast. Importantly, it appears that the impact of these interventions was not limited to a single meal occasion but rather led to improvements in dietary quality throughout the day. This is of particular importance, as it shows that the food consumed at breakfast acted as an addition to, rather than a replacement of, food consumed later in the day.

However, when interpreting these results, and the data regarding attitudes towards breakfast, it should be considered that neither outcome was the main outcome measure of any of the studies under review. As such, insignificant results may not have been reported, and/or findings relating to the effects of interventions on dietary quality and attitudes towards breakfast may have been reported as separate papers. It is certainly the
case that a number of studies have considered these outcomes without measuring changes in breakfast eating frequency.

4.2 Methodological quality of included studies
Another important factor to consider when interpreting the results of this review is that of study quality. Of the 11 included studies, five were randomised controlled trials of interventions. All five randomised controlled studies used a cluster randomisation procedure. Four controlled studies used a cohort design, and of these, three were observational studies with no allocation to condition. The remaining study did not report randomisation/allocation procedure. Two studies, although nominally designed as controlled studies, are more appropriately classified as quasi-experimental pre/post intervention designs (Ask et al., 2006; Shi-Chang et al., 2004). These two studies compared outcomes pre-intervention and post-intervention between control and intervention but did not carry out statistical tests to compare intervention and control groups with each other. As such, these studies were not entitled to draw conclusions about differences between the efficacy of the control and intervention procedures. Both studies did in fact report results as if control and interventions had been appropriately compared. This represents a serious methodological flaw in these studies. For the purpose of this review, comparisons between control and intervention groups were disregarded for both studies. Even more seriously, one of the studies conducted separate recruitment phases Time 1 and Time 2 (Shi-Chang et al., 2004). In this study, despite the fact that there was a high degree of overlap between participants at Time 1 and Time 2, independent samples tests were used to measure change in outcome variables over the course of the intervention. This procedure is highly suspect as the assumptions of such tests were violated in this case (Howell, 2008).

Selection issues were a potential source of bias for a number of studies. Only three studies reported response rates post-intervention, with rates of completion ranging from 75-96 per cent. Although no studies reported data that would allow for the evaluation of differential dropout some potentially confounding selection issues are still evident. One study used students from an elective nutrition course as the intervention group and students from other courses as the control group (Crawford, 2007). In another study, the school at which the intervention was conducted had requested that the study take place at the school because of a high incidence of behavioural problems in the student population (Ask et al., 2006). In both cases the manner in which participants were recruited may have introduced bias into the results and reduced the extent to which these findings can be generalised to other populations.

Another cause for concern was the incomplete implementation of interventions in many of the studies included in this review. In one study over two-thirds of intervention schools did not operate breakfast clubs continuously between the baseline and second follow-up points (Shemilt et al., 2004). In the same study a high proportion of schools in the control group chose to implement a breakfast intervention during the course of the study. By the end of the intervention as many control schools as intervention schools were operating breakfast interventions. An additional two studies reported problems with the consistent implementation of the planned intervention (Ask et al., 2006; Shi-Chang et al., 2004). These problems may have lead to non-significant findings with regard to interventions that are beneficial when implemented as designed. Whilst these studies reflect problems that are common to many public health interventions implemented in the community, it is worth noting that incomplete implementation of interventions may have lead to non-significant findings with regard to interventions that are beneficial when implemented as intended. The incomplete reporting of statistical tests in many of the studies reported here further complicates this matter, making it difficult to determine whether non-significant results are merely a result of lack of power.

4.3 Study limitations and strengths
When interpreting these findings the limitations of our review should be noted. First, although some effort was made to identify “grey literature”, this review relied primarily on published studies and hence may be subject to publication bias. In addition, there may be relevant studies published in languages other than English that have not been indexed by the bibliographic databases utilised here. Further, many interventions do not examine breakfast eating frequency, the primary outcome measure and an inclusion criteria for this review. This is important when considering the impact of a breakfast eating intervention on other outcomes, which, although largely outside of the scope of the present review, are briefly considered here.

This review is the first paper to systematically identify and evaluate interventions aimed at increasing the frequency of breakfast consumption in a non-clinical sample. The small number of papers identified by this review, and the significant methodological weaknesses identified in the paper reviews, could be viewed as a weakness of the present undertaking. However, identifying the limitations of current level of research in this field is an important step in improving research in this area. The results of this review are important in that
they identify areas in need of improvement in both the design and evaluation of future breakfast consumption interventions, as well as providing guidance on intervention methodologies that are most likely to be effective.

5.1 Implications for research and practice
Owing to the myriad methodological concerns and the inconsistency in results, even when comparing similar programmes, it was difficult to draw robust conclusions based on the available evidence. In general, there is a need for improvements in the reporting of intervention studies in this area. Reporting of such features would also allow serious methodological flaws, such as those evident in some papers reviewed here, to be more easily identified and more easily overcome.
Overall, it appears that interventions with a persuasive component, with or without food provision, were the most successful method of modifying individual’s beliefs associated with breakfast consumption. It also appears that these changes in beliefs were associated with increases in breakfast consumption in most cases. In light of this body of research, future interventions that aim to increase breakfast eating frequency should endeavour to include a persuasive component. The current balance of evidence would suggest that such persuasive messages are likely to be the most effective method of modifying breakfast eating frequency while also having the potential to lead to increases in overall diet and positive beliefs about nutrition and/or breakfast.

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