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ORIGINAL ARTICLE

Development of a scale to measure 9–11-year-olds' attitudes towards breakfast

K Tapper, S Murphy, R Lynch, R Clark, GF Moore and L Moore

Cardiff Institute of Society, Health and Ethics, School of Social Sciences, Cardiff University, Cardiff, UK

Objective: Development and validation of a questionnaire to measure children's attitudes towards breakfast.
Design: A pilot study was used to select questionnaire items and assess test–retest reliability. The questionnaire was then administered to a larger sample of children together with a dietary recall questionnaire. Randomly selected subsets of these children also completed a dietary recall interview or their parents were asked to complete a questionnaire relating to their child's breakfast eating habits.
Setting: Primary schools in south, west and north Wales, UK.
Subjects: A total of 2495 children (199 in pilot testing, 2382 in the main study) in years 5 and 6 (aged 9–11 years).
Results: The 13-item scale showed good construct validity, high internal reliability and acceptable test–retest reliability. Boys displayed more positive attitudes towards breakfast than girls but differences between the two age groups did not reach statistical significance. Children who did not skip breakfast displayed more positive attitudes than children who skipped breakfast. In addition, more positive attitudes towards breakfast were significantly correlated with consumption of a greater number of 'healthy' foods for breakfast (i.e., fruit, bread, cereal, milk products), consumption of fewer 'unhealthy' foods for breakfast (i.e., sweet items, crisps) and parental perceptions that their child usually ate a healthy breakfast.
Conclusions: The breakfast attitudes questionnaire is a robust measure that is relatively quick to administer and simple to score. These qualities make it ideal for use where validity at the individual level is important or where more time-consuming dietary measures are not feasible.
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Breakfast consumption is associated with a range of benefits. Laboratory research shows that consumption of an adequate breakfast is linked to short-term improvements in attention (Wesnes *et al*., 2003), memory (Benton and Sargent, 1992; Smith *et al*., 1992, 1994, 1999; Benton and Parker, 1998; Wesnes *et al*., 2003), mood (Lloyd *et al*., 1996; Smith *et al*., 1994, 1999) and possibly motivation (Benton *et al*., 2001). (Though, some studies have not found effects on specific attention, memory and mood measures, Cromer *et al*., 1990; Smith *et al*., 1994; Benton *et al*., 2001) These findings are borne out by experimental studies conducted in school settings, which have shown positive effects of breakfast on memory (Vaisman *et al*., 1996), arithmetic (Powell *et al*., 1998), verbal fluency (Chandler *et al*., 1995), physical endurance, creativity (Wyon *et al*., 1997) and on-task behaviour (Bro *et al*., 1994). In a review of this literature, Pollitt (1995) concluded that breakfast consumption consistently improves the cognitive performance of undernourished children and, in the United States and Great Britain, also has cognitive benefits for well-nourished children.

Breakfast can also represent an opportunity to consume nutrient rich foods and thus contribute towards a healthy diet. Indeed, research indicates that skipping breakfast may be associated with dietary inadequacy (Morgan *et al*., 1986; Ruxton and Kirk, 1997; Nicklas *et al*., 1998a, b, 2000) and a

Correspondence: Dr K Tapper, Department of Psychology, Swansea University, Swansea, Wales SA2 8PP, UK.
E-mail: k.tapper@swansea.ac.uk
Guarantor: K Tapper.
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greater body mass index (Ruxton and Kirk, 1997; Siega-Riz *et al*., 1998), whereas breakfast consumption is linked to a healthier diet and lifestyle (Nicklas *et al*., 1998a; Smith, 1998).

Despite these advantages, breakfast consumption among children and adults has declined (Haines *et al*., 1996; Nicklas *et al*., 1998b), with breakfast skipping becoming increasingly prevalent as children get older (Morgan *et al*., 1986; Haines *et al*., 1996; Siega-Riz *et al*., 1998). For example, it is estimated that 19% of 15-year-olds skip breakfast (Nicklas *et al*., 2000). As a consequence, there has been increasing recognition of the educational and nutritional benefits of a good breakfast and of the need to instil children with good 'breakfast-eating habits' that will continue into adolescence. In many areas this has led to government-funded school breakfast initiatives with both nutritional and educational objectives (Shemilt *et al*., 2003). However, with more emphasis being placed on evidenced-based policy, it is important that such schemes are rigorously evaluated.

The choice of outcome measures to inform such an evidence base will, in part, be dictated by the objectives of the initiative. Where educational benefits are cited, measures of children's cognitive functioning, attainment, classroom behaviour and/or school attendance will be important. Where there are nutritional goals, the obvious choice would be dietary assessment. However, dietary assessment in schools is far from simple, with many measures being either unsuitable for children or impractical for use on a large scale (Moore *et al*., 2005). Although measures have been developed in an attempt to address these difficulties (Edmunds and Ziebland, 2002; Moore *et al*., 2005), these generally assess intake during the course of just one day and therefore tend to be valid at the group level only.

An alternative means of assessing the success of a scheme is to measure attitudes. Research into attitudes tends to be underpinned by either the three-component model or the expectancy-value model. In the present study, we conceptualise attitudes using the three-component model, which states that attitudes are a combination of the individual's feelings, beliefs and past behaviours (Maio and Haddock, 2007). Although attitudes do not always reflect behaviour (Petty *et al*., 1997; Conner and Armitage, 1998), several studies have found children's attitudes towards breakfast to be predictive of their breakfast-eating behaviours. Specifically, Unsan *et al*. (2006) found that among Turkish and German 9–10-year-olds, positive attitudes towards the benefits of eating breakfast were positively associated with breakfast consumption. In a Dutch sample of 12–14-year-olds, Martens *et al*. (2005) found that a more positive attitude towards breakfast was associated with more frequent breakfast consumption. And lastly, in a group of Swedish 11–15-year-olds, Berg *et al*. (2000) found that over a 2-week period, consumption of milk and bread for breakfast was predicted by intentions, which were in turn predicted by attitudes.

Scales designed to assess attitudes offer a number of advantages: they are relatively quick and easy to administer, they can be developmentally appropriate and they are valid at the individual level. In addition, they may also be predictive of long-term habits. For example, a wide range of longitudinal studies employing the theory of planned behaviour have found many health behaviours to be predicted by behavioural intentions, which are in turn predicted by a combination of attitudes, subjective norms and perceived behavioural control (e.g., Sutton, 2004). Although no such longitudinal studies have specifically addressed children's breakfast-eating behaviours, it is possible that attitudes towards breakfast likewise contribute to breakfast-eating intentions, which may in turn predict more long-term breakfast-eating behaviours. This point is especially important in the context of school breakfast schemes, where children's food consumption will, to some degree, be determined by the foods that adults make available to them. Their actual eating behaviours in this context may therefore be less predictive of long-term habits than their attitudes and intentions. Given that breakfast skipping increases in adolescence (Siega-Riz *et al*., 1998), it is important that breakfast programmes with nutritional objectives alter long-term dietary habits.

The aim of the present study was to develop and validate a scale to measure British 9–11-year-old children's attitudes towards breakfast. The scale was developed as part of a larger evaluation of the Welsh Assembly Governments' Primary School Free Breakfast Initiative (see Tapper *et al*., 2007) and was designed to be used alongside a number of other measures assessing both nutritional and educational outcomes.

Scale development

Method

Qualitative and quantitative literature relating to both the effects of breakfast consumption and children's views of breakfast and breakfast schemes were used to devise a pool of 36 items, describing feelings, beliefs or behaviours that reflected seven different domains. The domains were feelings of well being (two items), general health (three items), concentration and behaviour (five items), energy (five items), general importance placed on breakfast (10 items), breakfast-eating behaviour (nine items) and social aspects of breakfast (two items).

These items were piloted with 113 children in years 5 (aged 9–10, equivalent to US grade 4) and years 6 (aged 10–11, equivalent to US Grade 5) in three schools in south Wales. Children were asked to indicate the extent to which they agreed or disagreed with each statement by placing a tick in one of five boxes (agree a lot/agree a bit/don't agree or disagree/disagree a bit/disagree a lot). To prevent response bias, 15 of these items were reversed (i.e., disagreeing with the item was consistent with a more positive attitude towards breakfast). Children were also asked to indicate whether they had eaten breakfast that morning by placing a

tick in the appropriate box (yes/no). Responses to attitude items were coded from 1 (indicating a negative attitude towards breakfast) to 5 (indicating a positive attitude).

Results

Principal-components factor analysis was conducted on the data to examine the construct validity of the scale. The scree method (Cureton and D'Agostino, 1983) indicated that there was just one main factor that accounted for 21.95% of the variance. Both items relating to social aspects of breakfast showed negative loadings on this first factor and were therefore excluded. A further seven items showed loadings of less than 0.30 and were also excluded. This included two of the three items in the general health domain. Mean scores for each item were then calculated to determine the extent to which items were discriminating between individuals. Ten items had scores of more than 4.25, suggesting participants were using just one end of the scale and these items were excluded (none had means of less than 1.75). This included the remaining item in the general health domain. Factor analysis was then repeated and a further two items with loadings of less than 0.30 were excluded. Subsequent factor analysis showed that all items had loadings of over 0.38.

Cronbach's α was calculated to test the internal reliability of this new scale. This showed that excluding an additional item would result in a higher α-value. This item was subsequently excluded and the new 14-item scale showed an α of 0.8469. In addition, all items produced an item-total correlation of more than 0.34 and the deletion of any one item did not result in a higher α-value. Factor analysis showed that the first factor accounted for 34.16% of the variance in the remaining 14 items, with all items showing loadings of over 0.40 on this factor.

Further analysis was then conducted on this new scale to explore its external validity. Given that breakfast skipping increases with age (Morgan *et al*., 1986; Haines *et al*., 1996; Siega-Riz *et al*., 1998), especially among girls (Morgan *et al*., 1986; Siega-Riz *et al*., 1998), we predicted that girls and children in year 6 would show lower scores than boys and children in year 5, respectively. We also predicted that children who reported having no breakfast that morning would show lower scores than those who reported that they had eaten breakfast.

Of the 113 children who completed the questionnaire, one failed to indicate his/her gender and another failed to indicate whether he/she had eaten breakfast. A further eight had missing data for more than one item. These cases were excluded and mean scores across the scale items were calculated for each of the remaining 103 children. Of these 103 children nine children (9%) reported skipping breakfast (This is slightly higher than the 1–2% rates previously reported for this particular age group in the UK, but in line with other studies conducted in the US where breakfast skipping rates for this age group have ranged from 6 to 16%; Ruxton and Kirk, 1997).

A three-way independent analysis of variance (ANOVA) test was conducted to examine group differences. Independent variables were year (5 or 6), gender (boy or girl) and breakfast (eaten or skipped), whereas the dependent variable was the attitude score. As predicted, results showed a significant main effect of breakfast, $F(1, 102) = 4.48$, $P < 0.05$ with those children who had eaten breakfast displaying higher scores than those who had not (3.81, s.d. $= 0.84$, $n = 94$ versus 3.10, s.d. $= 0.84$, $n = 9$, respectively). Consistent with predictions, there was also a nonsignificant trend for gender, $F(1, 102) = 2.55$, $P = 0.11$, with boys displaying higher scores than girls (3.91, s.d. $= 0.85$, $n = 47$ versus 3.61, s.d. $= 0.85$, $n = 56$, respectively). Contrary to predictions, there was no main effect of year, $F(1, 102) = 0.225$, NS (3.59, SD $= 0.82$, $n = 41$ and 3.85, s.d. $= 0.82$, $n = 62$ for years 5 and 6, respectively).

Test–retest reliability

To examine test–retest reliability, the questionnaire was administered twice (with a 7–8 day gap between) to 86 children aged 9–11 years in two primary schools that had not been involved in pilot testing. Three children had missing data for one or more items and were excluded, leaving a total of 83. The correlation between questionnaire score at times 1 and 2 was $r = 0.66$ ($P < 0.01$), indicating moderate test–retest reliability.

Summary

The 14-item scale showed moderate to high levels of construct validity, internal reliability and test–retest reliability. Preliminary analysis also suggested good external validity. It was therefore deemed suitable for use in the evaluation. The next section reports on data collected during the baseline phase of this evaluation.

Further scale testing

Method

Participants. Head teachers of infant, junior and primary schools located in Communities-first (i.e., deprived) areas in nine local education authorities in north, south and west Wales were invited to participate in an evaluation of the Welsh Assembly Governments' Primary School Free Breakfast Initiative (see Tapper *et al*., 2007). Fifty-eight schools out of 152 agreed to participate. In each of these, one class of year 5 children (9–10 years, equivalent to US grade 4) and one class of year 6 children (10–11 years, equivalent to US grade 5) were randomly selected to complete baseline measures, resulting in data being obtained from 2382 children. In addition, 2–4 children from each of these classes (378 in total) were randomly selected to participate in a dietary

recall interview and 5–9 children from each (623 in total) were randomly selected and a questionnaire was sent to their parents. A total of 366 of these were returned, a response rate of 59%.

Measures. Measures were the 14-item breakfast attitudes questionnaire (completed by all children), a dietary recall questionnaire (completed by all children), a dietary recall interview (completed by a subset of children) and a parental questionnaire (completed by a subset of parents).

The dietary questionnaire (see Moore *et al*., 2007; Tapper *et al*., 2007) was a modified version of the Day in the Life Questionnaire (Edmunds and Ziebland, 2002) and asked children to describe everything they had to eat or drink at various points during the previous day and during that morning before school (e.g., at home, on the way to school, at school before class started). As a supplement to this measure, individually administered dietary interviews (see Moore *et al*., 2007; Tapper *et al*., 2007) were carried out by a trained researcher with a sub-sample of children using a standardised protocol based on that employed by Lytle *et al*. (1993).

The parental questionnaire contained 10 questions designed to assess children's breakfast-eating habits (see Tapper *et al*., 2007). Five of these asked parents how many times on school days their child usually engaged in a particular behaviour (ate breakfast at home, took something from home for breakfast to eat on the way to school or at school before the start of class, took money to buy breakfast on the way to school, ate a breakfast provided by the school, missed breakfast). These were answered by placing a tick in one of seven boxes (number of days ranging from 0 to 5 or 'don't know'). Four questions asked parents how many times at the weekend their child usually engaged in a particular behaviour (ate breakfast at home, took something from home for breakfast to eat elsewhere, took money to buy something for breakfast, missed breakfast). These were answered by placing a tick in one of four boxes (number of days ranging from 0 to 2 or 'don't know'). An additional question asked parents to rate the frequency with which they thought their child ate a healthy breakfast. This was answered by placing a tick in one of five boxes ranging from 'My child always eats a healthy breakfast' to 'My child rarely eats a healthy breakfast'.

Procedure. The breakfast attitudes and dietary questionnaires were completed as supervised classroom exercises between 9000 and 1200 h. The dietary interviews were conducted immediately after lunch. The parental questionnaire was posted to parents along with free post envelopes for their return. A second copy was posted to parents who had not responded within 3 weeks.

Results

Factor structure and internal reliability. Principal-components factor analysis was used to examine the construct validity of the scale. Again, one main factor accounted for 30.76% of the variance. All items showed loadings of between 0.37 and 0.69 on this factor, with the exception of item 2 which showed a loading of 0.24. This item related to the general importance placed on breakfast. Cronbach's α showed that excluding this item would result in a higher α-value and for these reasons it was excluded.

The items on the final scale, together with details of the attitude component they are measuring, their domain and summary statistics, are displayed in Table 1. Factor analysis on this revised scale showed that the first factor accounted for 32.74% of the variance with all items showing loadings between 0.38 and 0.69 on this factor. Cronbach's α showed a coefficient of 0.82 and the deletion of any one item did not result in a higher α-value. All items showed an item-total correlation of over 0.30 and mean scores for each item ranged from 3.38 to 4.23. Re-analysis of the test–retest data using this 13-item scale showed a coefficient of $r = 0.65$ ($P < 0.01$).

Table 1 Domains, factor 1 loadings, means and standard deviations for items on the breakfast attitudes questionnaire

Item	*Attitude component*	*Domain*	*Factor 1 loading*	*Mean (s.d.)*
1. I usually eat healthy foods for breakfast	Behaviour	Eating behaviour	0.38	3.97 (1.02)
2. I often miss breakfast	Behaviour	Eating behaviour	0.58	3.58 (1.57)
3. It's okay to miss breakfast	Belief	Importance of breakfast	0.52	3.91 (1.28)
4. I hardly eat anything for breakfast	Behaviour	Eating behaviour	0.63	3.64 (1.48)
5. I hate eating breakfast	Feeling	Importance of breakfast	0.66	4.23 (1.23)
6. I usually eat unhealthy foods for breakfast	Behaviour	Eating behaviour	0.44	3.67 (1.36)
7. I can concentrate in class even when I've missed breakfast	Belief	Concentration	0.57	3.38 (1.55)
8. I usually have a snack at morning break instead of breakfast	Behaviour	Eating behaviour	0.61	3.81 (1.45)
9. I feel okay in the mornings even if I haven't eaten breakfast	Belief	Feelings of well-being	0.63	3.47 (1.52)
10. Eating breakfast is boring	Feeling	Importance of breakfast	0.62	4.12 (1.22)
11. I'd rather have a snack at morning break than eat breakfast	Feeling	Importance of breakfast	0.70	3.99 (1.33)
12. If I miss breakfast I feel more tired in the morning	Belief	Energy	0.43	3.80 (1.45)
13. I usually eat a good breakfast	Behaviour	Eating behaviour	0.59	4.22 (1.17)

Abbreviation: s.d., standard deviation.

Group differences. Of the 2382 children who completed the questionnaire, data items for 163 children and gender data for three children were missing. These were excluded from subsequent analysis and mean scores across the scale items were calculated for each of the remaining 2216 children.

Calculation of overall group means showed more positive attitudes among boys (3.87, s.d. = 0.77, $n = 1093$) than girls (3.79, s.d. = 0.77, $n = 1123$) and among year 5 children (3.85. s.d. = 0.74, $n = 1033$) than year 6 children (3.82, s.d. = 0.80, $n = 1183$). A two-way ANOVA test showed a significant main effect of gender, $F(1, 2215) = 4.78$, $P < 0.05$ but no main effect of year, $F(1, 2215) = 1.02$, NS and no interaction between gender and year, $F(1, 2215) = 0.82$, NS. (Note: These and subsequent group tests were also analysed using random effects regression models with school fitted as a random effect. However, as these had minimal impact on the outcomes they are not reported).

Relation to dietary recall questionnaire. Breakfast data from the dietary questionnaire were coded into the following seven categories: fruit, bread, cereal, milk/milk products, sweet items (e.g., sweets, chocolate, biscuits, cakes, desserts), crisps (equivalent to US 'potato chips') and other food items. Data from the two breakfasts (i.e., same day and previous day) were then used to compute the following measures: (1) level of breakfast skipping (i.e., no foods consumed on 0, 1 or 2 days), (2) average number of items consumed for breakfast, (3) average number of 'healthy' items consumed for breakfast (i.e., fruit, bread, cereal, milk) and (4) average number of 'unhealthy' items consumed for breakfast (i.e., sweet items, crisps).

Independent *t*-tests showed that those who skipped breakfast on both days held more negative attitudes towards breakfast than those who skipped breakfast on just one day (M = 2.86, s.d. = 0.78, $n = 116$ versus M = 3.47, s.d. = 0.82, $n = 335$, $t = 6.97$, $P < 0.001$), whereas those who skipped breakfast on one day held more negative attitudes than those who ate breakfast on both days (3.47, s.d. = 0.82, $n = 335$ versus 3.98, s.d. = 0.68, $n = 1646$, $t = 10.59$, $P < 0.001$).

Correlation coefficients were then calculated between attitude scores and each of the other three measures (Spearman's was used for the 'unhealthy' measure as these data were positively skewed, Pearson's was employed for the other two measures). Attitudes showed a significant positive correlation with the number of items eaten ($r = 0.26$, $P < 0.01$, $n = 2097$), a significant positive correlation with the number of 'healthy' items eaten ($r = 0.33$, $P < 0.01$, $n = 2097$) and a significant negative correlation with the number of 'unhealthy' items eaten ($r = -0.11$, $P < 0.01$, $n = 2097$).

Relation to dietary recall interview. Breakfast data from the dietary interview were coded into 15 food categories: fruit, vegetables, pulses, bread, sugared cereal, sugar-free cereal, cereal bars, milk, milk drinks, yogurt, sweet items, crisps, spreads, eggs/cheese/meat and other food items. Fruit juice was also recorded as a drink item. In line with the dietary questionnaire, data from the two breakfasts were then used to compute the following measures: (1) level of breakfast skipping, (2) average number of food items consumed, (3) average number of 'healthy' items consumed (i.e., fruit, vegetables, pulses, bread, sugar-free cereal, milk, milk drinks, yogurts, fruit juice) and (4) average number of 'unhealthy' items consumed (i.e., sweet items, crisps).

The data showed that only five children skipped breakfast on both days. This group was therefore combined with those who skipped breakfast on one of the two days, resulting in two groups; those who did not skip breakfast ($n = 313$) and those who skipped breakfast at least once ($n = 31$). An independent *t*-test showed that those who skipped breakfast held more negative attitudes than those who did not skip breakfast (M = 3.33, s.d. = 0.59 versus M = 3.80, s.d. = 0.80, $t = 4.12$, $P < 0.001$).

Correlation coefficients were then calculated between attitude scores and each of the other three measures (Spearman's for the 'unhealthy' measure as these data were positively skewed, Pearson's for the other two measures). Attitudes showed no correlation with the number of items eaten for breakfast ($r = 0.10$, NS, $n = 344$), but a significant positive correlation with the number of 'healthy' items eaten ($r = 0.18$, $P < 0.001$, $n = 344$) and a significant negative correlation with the number of 'unhealthy' items eaten ($r = -0.17$, $P < 0.005$, $n = 344$).

The above show that the correlation between attitudes and 'healthy' items consumed was slightly lower for the dietary interview ($r = 0.18$) than for the dietary questionnaire ($r = 0.33$). However, the questionnaire did not distinguish between sugared and sugar-free cereals (both were coded as 'healthy'), whereas the interview did (only sugar-free cereal was coded as 'healthy'). For this reason, an additional set of 'healthy' items were formed from the dietary interview; this consisted of all items included above, but with the addition of sugared cereal. The correlation between attitudes and this new 'healthy' category was 0.25 ($P < 0.001$, $n = 344$).

Relation to parental questionnaire. Data from the parental questionnaire were collapsed to form two measures (1) total number of breakfasts per week usually eaten by the child (up to a maximum of seven) and (2) total number of days per week the child usually skipped breakfast. However, these data were highly skewed with 80% of parents reporting that their child usually ate seven breakfasts per week and 74% reporting that their child never usually skipped breakfast during the week. Each data set was therefore recoded as binary data (seven breakfasts per week versus less than seven and no skipped breakfasts versus one or more skipped breakfasts) and used in two independent *t*-tests. Results showed that children whose parents reported that they consumed seven breakfasts per week had more positive

attitudes than those whose parents reported that they consumed less than seven per week ($t=4.84$, $P<0.001$, $M=3.96$, s.d. $=0.70$, $n=220$ versus $M=3.53$, s.d. $=0.77$, $n=33$). Similarly, children whose parents reported that they did not usually skip any breakfasts during the week showed more positive attitudes than children whose parents reported that they skipped at least one breakfast per week ($t=4.37$, $P<0.001$, $M=4.02$, s.d. $=0.67$, $n=206$ versus $M=3.56$, s.d. $=0.73$, $n=54$).

In addition, Pearson's correlations showed that children's attitudes were positively correlated with their parents' ratings of the frequency that they usually ate a healthy breakfast ($r=0.30$, $P<0.01$, $n=271$).

The three attitude components. Further exploration of the data described above indicated that although, in general, the behavioural items on the attitudes questionnaire were most closely associated with the other measures, the items relating to feelings and beliefs showed a very similar pattern and in some instances actually showed stronger associations with the other measures compared with the behavioural items. For example, for the dietary recall interview the means all showed more positive attitudes among those who did not skip breakfast compared with those who skipped breakfast at least once. This was the case for the mean of the items relating to feelings (4.03 versus 3.67), beliefs (3.60 versus 3.23) and behaviours (3.80 versus 3.22). (However, only the latter of these differences was statistically significant; $t=5.30$, $P<0.05$).

Likewise, analysis showed significantly positive Pearson's correlation coefficients between each of the three attitude components and the number of 'healthy' items eaten (feelings: $r=0.18$, $P<0.001$; beliefs: $r=0.16$, $P<0.005$; behaviours: $r=0.17$, $P<0.005$), significantly positive Pearson's correlation coefficients between each of the three attitude components and the number of 'healthy' items including sugar-coated cereals consumed (feelings: $r=0.16$, $P<0.005$; beliefs: $r=0.20$, $P<0.001$; behaviours: $r=0.24$, $P<0.001$) and significantly negative Spearman's correlation coefficients between each of the attitude components and the number of 'unhealthy' items consumed (feelings: $r=-0.13$, $P<0.05$; beliefs: $r=-0.11$, $P<0.05$; behaviours: $r=-0.20$, $P<0.001$).

Discussion

The 13-item breakfast attitudes scale showed good construct validity, high internal reliability and acceptable test–retest reliability. Comparisons with other data also revealed good external validity. First, in accordance with existing literature indicating lower levels of breakfast skipping among boys than girls (Morgan *et al*., 1986; Siega-Riz *et al*., 1998), boys displayed more positive attitudes towards breakfast than girls. Second, comparisons with two dietary measures and a parental report measure indicated that children who skipped breakfast showed more negative attitudes towards breakfast. Third, comparisons with the two dietary measures showed that children who consumed more 'unhealthy' foods for breakfast displayed more negative attitudes whereas children who consumed more 'healthy' foods displayed more positive attitudes. Finally, comparisons with a parental measure showed that parent's perceptions that their child usually ate a healthy breakfast were associated with a more positive attitude on the part of the child.

However, in contrast to literature indicating that breakfast skipping increases with age (Morgan *et al*., 1986; Haines *et al*., 1996; Siega-Riz *et al*., 1998), year 5 children did not show more positive attitudes than year 6 children. Nevertheless, the means were in the predicted direction and, given the limited age difference between these two groups, the failure to find a significant difference was perhaps not surprising. (Data from the parental questionnaire showed significantly higher levels of breakfast skipping among year 6 children compared with year 5 children but data from the two dietary measures did not.) It would be informative to administer the questionnaire to an older group of children to establish whether they held more negative attitudes than the current sample.

The number of different items eaten for breakfast also showed an inconsistent association with attitudes. According to the dietary questionnaire, there was a positive correlation. However, this was not replicated with data from the interview. It is possible that the interview picked up on a larger number of less significant breakfast items such as spreads and that these had limited association with attitudes. However, it is also possible that attitudes towards breakfast are more closely associated with total quantity of food consumed. As portion size was not assessed, it is not possible to determine if this was the case. Nevertheless, given differences in children's appetites it is possible that any such association would be smaller than that found between attitudes and types of foods eaten.

Thus, overall the questionnaire displayed good external validity. It was also relatively quick to administer (approximately 10 min), easy for children to complete with limited assistance and simple to score. In addition, a class-based measure such as this helps avoid problems of low, and potentially biased, response rates that are often associated with other measures such as parental report. These qualities make the questionnaire ideal for use on a large scale where time-consuming dietary measures are not feasible. For example, it would be suitable as a measure of intervention success in a cluster randomised controlled trial where large subject numbers prohibit the use of detailed dietary measures (though see below). It could also be administered to large numbers as a screening tool to identify those who would most benefit from intervention. In addition, many dietary measures collect details of foods eaten during the course of just one day and thus have limited validity at the individual level. In contrast, the results of the reliability test

conducted in the present study indicated that the breakfast attitudes questionnaire assesses a relatively stable trait and thus can be employed where individual level validity is important.

Nevertheless, it is important to bear in mind the limitations of the questionnaire and of the data collected. First, two of the items use the term 'healthy' (see Table 1) and thus children's understanding of this term may influence the results. For example, in the present study comparisons with the dietary measures indicated that positive attitudes towards breakfast were associated with consumption of cereals containing sugar. Although such cereals tend to be fortified, they often contain high levels of sugar and salt making it debatable as to whether they are the healthiest breakfast foods. Nevertheless, their marketing frequently focuses on the fact that they are fortified and for this reason are likely to be perceived as healthy by both children and parents. Although such cereals would normally be considered better for breakfast than something like crisps, the example illustrates the point that the questionnaire may not always be sensitive to subtle differences in the quality of breakfasts consumed. This may extend to larger differences where children have a poor understanding of the term 'healthy'.

Second, the present study evaluated the questionnaire in the absence of any intervention. As attitudes will not always reflect behaviour (Petty *et al*., 1997; Conner and Armitage, 1998), it is possible that some types of interventions may change attitudes towards breakfast in the absence of a change in behaviour and *vice versa*. Given the number of items relating to behaviour in the breakfast questionnaire (see Table 1) this seems unlikely in this case. Nevertheless, we intend to explore this possibility in future work (see Tapper *et al*., 2007).

Third, although questionnaire items assessing feelings, beliefs and behaviours were all associated with other measures of breakfast eating, the strongest associations occurred with the behavioural items. As there were a greater number of behavioural items (six items), compared with items relating to feelings (three items) and beliefs (four items), the behavioural items would have made an important contribution to the questionnaire's relationship to actual breakfast-eating behaviours. Thus, from the perspective of intervention assessment (see above) these items are critical. However, many health interventions employ the expectancy-value model in which attitudes are comprised of evaluative beliefs only (Ajzen, 1985; Maio and Haddock, 2007). It is therefore important to note that the breakfast attitudes questionnaire would be less appropriate for this type of research.

Data collected from older children would also be informative. Although the questionnaire was designed for use with children aged 9–11 years, there is nothing that prohibits its use with older children, or even, with some modifications (i.e., items 7, 8 and 11) with adults. It would also be useful to examine its suitability for younger children. In addition, it would be valuable to explore its predictive ability. Given that breakfast skipping increases with age (Siega-Riz *et al*., 1998), it may be that attitudes towards breakfast in childhood predict breakfast skipping in adolescence. This may further justify the use of the questionnaire as a screening tool to identify those most at risk of a poor diet later in life.

To summarise, breakfast consumption not only contributes to a healthy diet, it also impacts positively on cognitive functioning. Nevertheless, it is frequently skipped. As such, breakfast initiatives are becoming increasingly popular, bringing with them a need for evaluation. The questionnaire described in this paper represents a robust measure that is feasible for use on a large scale with limited time and resources.

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