Screening for dietary fat intake of grade six children: Self-assessment versus maternal assessment

Friede Wenhold*, Una MacIntyre* and Paul Rheeder†

*Department of Human Nutrition, Faculty of Health Sciences, University of Pretoria, Pretoria, South Africa, and †Division Clinical Epidemiology, School of Health Systems and Public Health, University of Pretoria, Pretoria, South Africa

Correspondence: Friede Wenhold, Department of Human Nutrition, Faculty of Health Sciences, University of Pretoria, Private Bag x323, Arcadia, 0007 Pretoria, South Africa. E-mail: friede.wenhold@up.ac.za

Abstract

As part of justifiable nutrition promotion, this study aimed to determine internal consistency of a dietary fat screener, and to compare self- to maternal assessment of fat intake of grade six (about twelve year old) learners in a South African public primary school. The children completed in school a pictorial, quantitative food frequency-type screener consisting of ten high fat food categories ; mothers individually completed a text version. Internal consistency was measured with item-total correlations, Cronbach's alpha and the split-half method. Child-mother comparison was based on Kappa (κ) statistics, McNemar tests, Wilcoxon's Signed Rank test and the Bland Altman method. In total 101 (93.5%) children and 78 (72.2%) mothers responded. The screener was internally consistent, regardless of data source and statistical technique. For portion sizes and frequency of intake, children consistently reported higher intake than mothers. This resulted in systematic error, also evidenced by a significant difference from zero for the difference between child and mother final test scores for the whole group, and for boys and girls separately (always $p<0.001$). In 76% of pairs classification into high fat or prudent intake was identical, yet the chance-corrected agreement was poor ($\kappa=0.16$) and non-agreement was non-symmetrical ($p=0.001$). Children and mothers reported high fat intakes (93% and 75% respectively). It was concluded that the dietary fat screener was internally consistent, yet children and mothers did not agree in their assessment. The high fat intakes reported by children and mothers warrants measurement refinement and implementation of primary prevention programmes.

Keywords: child, dietary assessment, internal consistency, fat intake, mother, agreement

Introduction

South Africa has a high burden of non-communicable diseases (Mayosi et al. 2009), most of which can be attributed to high blood cholesterol (Norman et al. 2007). High dietary fat intakes are a major risk factor for hypercholesterolaemia (Van Horn et al. 2008). Dietary habits originate in childhood and may track into adulthood (ADA 2004) pointing to the importance of early prevention, for example in primary school children. Furthermore, the existing relatively high prevalences of overweight and obesity, especially among white South African school children (Armstrong et al. 2006), appear to be increasing (Armstrong et al. 2011).

Focussed dietary prevention programmes should be planned around current intakes (ADA 2004). This requires food-based dietary assessment. Usually children between the ages eight and twelve can perform their own dietary assessment (Burrows et al. 2010; McPherson et al. 2000), because their cognitive abilities are adequately developed and because this age group makes many own and out-of-home food choices. In the case of the assessment of dietary fat intake specifically it is, however, possible that such an assessment may not capture the full picture. Whilst some sources of fat in the diet may be obvious, others require at least some specialised knowledge of foods, food preparation and food composition (in terms of brands and food labels) in order to differentiate between, for example, different types of dairy products, table fats and cooking methods, all of which children may not have. Also, children rely on their caregivers to provide much of their food intake (Livingstone & Robson 2000; McPherson et al. 2000).

The school setting offers numerous opportunities for nutrition promotion (Wenhold et al. 2008) - including the assessment of dietary intakes - but then this should be quick and easy, suggesting a screening approach. There are no validated dietary fat screeners available in South Africa, especially not for children. The MEDFICTS dietary assessment questionnaire, referring to intake of meat, eggs, dairy, fried foods, fats in baked goods, convenience foods, table fats and snacks, - the main contributors to fat intake – is widely used and has been validated in various US adult populations (Holmes et al. 2005; Kris-Etherton et al. 2001; Mochari et al. 2008; Schwartz et al. 2000; Teal et al. 2007; Taylor et al. 2003). Its performance in children and other contexts is however unknown. As a starting point for determining this, the question arises, whether the information obtained from children and their caregivers in a South African urban setting is comparable.

This paper has two objectives in respect of a modified ("South Africanised") MEDFICTS dietary fat screener for grade six children: First, to determine the internal consistency of the screener when completed by the children and by their mothers and, second, to compare a self-assessment to a maternal assessment in relation to reported portion sizes and frequency of intake and the resultant screener scores and classifications and implied fat intake .

Internal consistency reflects the extent to which individual items in a test (in our case the food categories in the screener) measure similar characteristics (in our case dietary fat intake) (based on Higgins & Straub 2006). Hence, should the screener be internally consistent, it would contribute to the reliability and validity thereof. Reliability is understood to be the extent to which the screener yields the same results on repeated trials, and validity addresses the question how well the screener measures what it is intended to measure. Valid measurements require consistency of observation, with reliability being a necessary but not sufficient condition for validity. Random errors show up as different results for ostensibly the same measurement, and are associated with lack of reliability. Systematic errors (bias) push the result in the same direction thereby negatively affecting validity (based on Higgins & Straub 2006).

Materials and methods

Design

The study was an observational investigation.

Subjects

The study population comprised all 108 learners of three grade six classes of a middle-class, Afrikaans medium public primary school in Pretoria, the capital city of South Africa. The racial/ethnic composition of the study population does not reflect the South African demographics, but refers to white children. Reporting accuracy of energy intake amongst children may be related to race/ethnicity (Forrestal 2011) and white South African children, a minority group, appear to be more affected by overweight and obesity (Armstrong et al. 2006). All learners who returned signed informed consent and assent forms were included in the sample.

The dietary fat screener

A "South Africanised" MEDFICTS was developed. For each food category, example foods typically consumed by the target group were identified by a team of dietitians often working with school children; the fat content of these foods was checked against the South African food composition data base (Wolmarans et al. 2010) and food wrappers. These example foods were listed as part of the tool. For the meat category only the high fat group was retained from the original MEDFICTS, because of local availability and assumed recognisability by the target group. A composite image containing photographs of all foods items included in the category was created for each food category. Based on a number of unpublished developmental evaluation studies in a school similar to the one in this study, the reference portion size was age-adjusted and appropriate portion size estimation aids were identified.

Data collection

For the ***self-assessment*** each grade six class was divided into three groups of about 12 children resulting in a total of nine groups. Data collection was done per group by one researcher (FW), in the mother tongue of the children, in the conference room of the school. A U-shaped seating arrangement was used with separators between adjacent participants to ensure privacy of response. Administration was standardised following pre-testing. It was researcher-paced and supported by visual aids. In an attempt to assess usual intake, children were requested to record their typical ("normal") eating habits since the beginning of the year (that is "since you were in grade six"), making the reference period about nine months. It was assumed that this explicit time frame would be meaningful for South African school children as it coincided with a cognitive reality, that is the school year.

For each food category, an explanatory sentence was made and the full-colour composite photograph of all the relevant foods was projected on a screen. This was to enhance visual appeal and accuracy (Wallen et al. 2011). Every food was mentioned and distinguishing features of the food category (for example *full fat / whole* milk, "*paper-wrapped*" margarines, "*lite / diet / fat free*" labels) were highlighted. A filter question "Do you eat foods such as those on the picture?" started the questioning per food category. Participants who responded "no" to the filter question were requested to put down their pens and only proceed when instructed to do so. Correct answering technique was demonstrated on a poster replica of the answer sheet.

Typical frequency of intake was requested next: *"If you eat foods like those on the picture every day, write down the number of times you usually eat it during one day on the line saying 'per day'. If you do not eat such food every day, move to the 'per week' line, and fill in there how often in the course of a week you usually eat such foods. Only write in the 'per day' or the 'per week' line."* A practical example of how to answer this was given, including a child-friendly "case study" where more than one food item from a food category was eaten in a day.

The last question for each food category dealt with usual amount consumed. For this purpose a combination of two-dimensional portion size estimation aids (geometric shapes, for example a 90 mm diameter circle for meat), household measures (cups and spoons, for example a 250 mL measuring cup for milk) and photographs (for example chocolate, nuts, chips and high fat crackers) were used. Children were instructed to mark "2" if the amount usually eaten was similar, "1" if it was about half as much, and "3" if it was one and a half times as much as the reference amount, respectively corresponding to medium, small and large portion sizes. Total contact time per group was about 45 minutes.

Weight and height of the children were measured with a digital scale (Tanita / Tokyo; precision 100 g) and portable height gauge (to nearest 0.1 cm) using standard techniques (Lee & Nieman 2010) by one measurer, in a private room.

For the ***maternal assessment*** the text version of the dietary fat screener was sent to the child's home together with the information letter and the informed consent form. A direct caregiver was requested to complete the screener in respect of the grade six child; hence "maternal" in this study refers to a primary caregiver.

Data analysis

The ***scoring*** of the dietary fat screener was as follows: If frequency of intake of a food category was reported as daily consumption, this was converted to weekly consumption by multiplication by seven. Weekly intake was categorised and scored as specified in the original MEDFICTS tool (Kris-Etherton et al. 2001). Non-consumption and intakes less than once per week were scored zero; once or more (up to three times per week) scored three points; more than three times per week was scored seven. When ranges (for example 1-2 times) were reported, this was coded as the midpoint (for example 1.5 times). Small, medium or large usual portions were respectively scored one, two or three. Category scores were the product of the frequency and the portion score. All ten category scores were added to create a final score. The final score, which could range from zero to 210, was categorised as 'high fat' if it was more than 68. Otherwise it was classified as 'prudent', since healthy children (as opposed to, for example, people in cardiac rehabilitation) constituted our population and because we did not include a low fat meat food category. Description of central tendency included the mode (the most frequently reported value) and the median (the value above and below which half of the values fell).

Internal consistency was determined by item-total correlations (Pearson) between all ten category scores and the final scores, Cronbach's coefficient alpha, and the split-half method, whereby the ten food categories were randomly assigned to two groups and Pearson's correlation coefficient was calculated between the mean category scores of the groups.

The comparison of the ***self-assessment to the maternal assessment*** involved determining the percentage of pairs with perfect (= identical) agreement, the kappa statistic (κ) to estimate chance-corrected proportional agreement of categorical variables (portion size, categorised frequency of intake, categorised final score) interpreted according to the guidelines suggested by Altman (1991), McNemar's Test for Symmetry, Spearman correlation coefficients, Wilcoxon's Signed Rank Test for assessing the significance of the difference between children's and mothers' final scores, and the Bland Altman method for assessing agreement (Altman 1991).

Data were analysed using SAS (mainframe version 8.2), and BMDP statistical software release 7.1. For the anthropometric description of the participants, the CDC 2000 growth data files for boys and girls aged two to 20 years and the accompanying SAS software were used for describing mean age, weight, height, body mass index (BMI, in kg/m^2) Z-scores (http://www.cdc.gov/nchs/about/major/nhanes/growthcharts/datafiles.htm). Age was calculated in months based on the actual date of assessment and date of birth as obtained from school records.

Ethics

The Research Ethics Committee of the Faculty of Health Sciences (University of Pretoria) approved the project. Permission to do the study was obtained from the relevant school authorities, and informed maternal consent and child assent were obtained. No incentives, apart from a (unannounced) pen and a snack for the children following the data collection, were offered.

Results

Sample

Maternal consent, assent and complete screener data were obtained from 101 (93.5%) of the children. A total of 78 (72.2%) caregivers returned a completed dietary fat screener for their child. Of these, six contained at least one missing value and were not included in the child-mother final score comparison because the final scores would reflect less than ten category scores. Table 1 summarises the anthropometric information of the children for whom self-assessment and maternal fat screeners were available. The positive mean BMI for age z-scores confirm the importance of monitoring weight gain in this group.

Internal consistency

In Table 2 the item-total correlations, Cronbach's alpha and the correlations between two random halves of the fat screener are given for the child self-assessment and for the maternal assessment. Item-total correlations for children ranged from r=0.35 (table fats) to r=0.66 (cheese). When excluding eggs, the range for mothers was slightly narrower (r=0.48 [meat] to r=0.63 [milk])..

Comparison of child self-assessment to maternal assessment

Portion sizes*:* For all ten food categories the medium size was most commonly chosen by the mothers. In the case of the children the large portion was most frequently selected for dessert, fried foods, convenience foods and table fats. For the rest of the food categories most of the children also chose the medium option (Table 3). The percentage perfect agreements between mothers and children in terms of reported usual portion size eaten by the children varied from as low as 18% for fried foods to about 72% for eggs (Table 3) with an average percentage agreement over the ten food categories of 45%. Chance corrected agreement based on kappa values was moderate for eggs and fair for cheese. For all other food categories agreement was poor. Most non-agreeing responses tended to be non-symmetrical (see McNemar results).

Frequency of intake : From Table 3 it is evident that the percentage child-mother pairs that reported identical frequency of intake ranged from 42% for convenience foods to 74% for milk. This represents an average of 60% across all ten food categories. For four of the ten food categories (eggs, dessert, cheese and fried foods) the chance corrected agreement (κ) was fair. For the remaining food categories this agreement was poor. For seven food categories non-agreement around the diagonal of perfect matches was not symmetrical (always $p<0.05$) with eggs, baked foods and snacks being the exception, where p=0.91, p=0.10 and p=0.25 respectively.

Category scores: For all food categories the mean category score of the children was lower than that of the mothers. A statistically significant (always $p<0.05$) linear relationship between mothers' and children's category scores was found for meat, milk and cheese. For all other food categories the correlation coefficient was 0.22 or lower, and in all cases this was not statistically significant (see Table 4 for exact p-values).

***Final scores**:* The correlation coefficient between the final scores of children and their mothers was 0.23 (p=0.04) (Table 4). For boys the correlation coefficient was non-significant (r=0.13; p=0.46) whilst for girls it was higher than for the group as a whole (r=0.33; p=0.04). The mean difference between children's and mothers' final scores was 32.0±35.1. The mean difference between children and mothers was very similar for boys (31.6±42.4) and girls (32.4±27.9), but greater variability (see standard deviations) was apparent in the case of boys. Nevertheless, the difference in final scores between children and mothers differed significantly from zero for the group as a whole and for the genders separately (p<0.001 in all three instances).

The data points on the Bland Altman plot (Figure 1) emphasise the variability (random error) and the presence of bias (systematic error) by the magnitude of the standard deviation and mean difference respectively.

Screener classification: Ninety three percent of the children's self-assessment resulted in a "high fat" intake classification, whereas the maternal assessment of their children led to a figure for high fat consumption of 75%. The percentage identical classifications (shaded cells in Table 5) into both, high fat or prudent fat intake, was 76%. When corrected for chance the overall agreement was, however, poor (κ=0.16; 95% confidence interval: [-0.06; 0.39]) and the McNemar test indicated a departure from symmetry (p=0.001): more mothers reported prudent fat intake when the children reported a high fat intake, than mothers who reported high fat intake when their child indicated a prudent intake (evident by a non-symmetry around the non-shaded cells).

Discussion

This study represents a first-time investigation of the "South Africanised" MEDFICTS dietary fat screener in grade six children and their mothers. Our first objective was to determine the internal consistency of the screener, i.e. the degree to which the individual food categories measured the same characteristic. Since all item-total correlations were well above 0.2 and the Cronbach alpha was close to 0.7 for children and for mothers (Keller et al. 2000), we conclude that all the food categories included in the screener can be retained and that they fully cover the construct that we are interested in, namely fat intake. The alpha obtained in this study was higher than the range of 0.13 to 0.62 reported in the review by Yaroch et al. (2000) for dietary fat indices, but not as high as the cut-off of 0.80 or higher recommended by Higgins and Straub (2006) for well-established and widely used instruments.

Apart from measuring internal consistency, item-total correlations have been used as an indication of convergent validity (Johnson et al. 2002; Heller et al. 2000) (Higgins & Straub 2006). Regardless of who completed the dietary fat screener - children or their mothers - and regardless of the statistical technique used for measuring internal consistency (see Table 2), the screener showed characteristics of reliability. This will contribute to validity of measurement when using this instrument, as reliability is a necessary but not sufficient condition for validity (Higgins & Straub 2006). It has been reasoned that variance among scores in an internally consistent instrument indicates subject differences and not error (McNulty et al. 2001). In the original pilot testing of MEDFICTS Srinath et al. (1993) noted that self-administered and interviewer-administered application of the tool amongst adults resulted in similar findings.

For achieving our second objective the scores of the mothers were compared to those from the children. We found the following: First, for the two building blocks of the screener (that is the reported usual portion size and weekly consumption) there was limited agreement between mothers and children (Table 3). In some cases the kappa value was even negative, meaning worse than chance agreement. According to Hoehler (2000) the presence of bias reduces kappa values. The following point shows that systematic error (bias) was present for reported portion size and weekly consumption, thus explaining some of the poor chance corrected agreement obtained between children and mothers.

The second finding regarding child versus parent assessment was that there appeared to be a systematic error: most of the non-agreeing responses were not symmetrical (McNemar data in Table 3). Typically mothers reported smaller portion sizes and less frequent consumption. This would have a carry-over-effect to the category and final scores as evident from Tables 4 and 5 and Figure 1. The lower scores of the mothers may be due to under-reporting by the mothers (common among adult females in terms of their own intake – Scagliusi et al. [2009]) or over-reporting by the children (more common among children than among adults [Forrestal 2011]) or both. The difference was more evident for the food categories to which the mothers may have had an ‘unhealthy’ connotation (for example dessert, convenience foods, fried and baked foods, as compared to meat, milk and cheese) whereas amongst the children these foods may have been popular and possibly over-reported. This has previously been suggested by Koehler et al. (2000). The lack of agreement in our study was more pronounced for portion size compared to frequency of intake. Matheson et al.

(2002) assessed the validity of eight to twelve year old African American girls' self-report of food portion estimates and found "sizable errors in quantitative estimates". This emphasises the need for cautious interpretation of children's self-reports of portion sizes. The actual consumption of large portions as featured in food advertisements and the availability of super-sized portions of foods (for example at the school tuck shop, i.e. kiosk) acquired by children in the absence of their mothers is, however, also a possibility. This creates the potential for food category-specific maternal misreporting about food intake of children of this age group (Livingstone & Robson 2000). Finally, based on the cognitive challenges involved in responding to food frequency questionnaires, the general finding that such questionnaires may overestimate intake (McPherson et al. 2000) could also have applied. The above makes it difficult to interpret our findings relative to those of Murakami et al. (2012), who associated younger age (from range 6 to 15 years), normal weight (International Obesity Task Force classification), low parental education and completion of the assessment alone (as opposed to parental assistance) with overreporting.
The correlation between the final scores of mothers versus children was small (r=0.23), yet statistically significant (p=0.04). It is tempting to emphasise the stronger correlation (r=0.33, p=0.04) for girls as sub-group, but our follow-up analyses showed that correlations are not enough: agreement is needed. The mean difference between mother-daughter pairs' final scores also differed significantly from zero suggesting systematic error, and also highlighting considerable variability. Children's self-assessment resulted in higher estimates of fat intake than the assessment of their mothers.

There was a relatively high percentage (76%) of identical classifications into high fat or prudent intake. A percentage perfect match above 70% has sometimes been considered an indication of validity (Snyder et al. 2004). However, statistically, the chance-corrected agreement (κ) between mothers' and children's final classifications in our study was poor. According to Hoehler (2000) this may - again - be due to the presence of bias, as noted in this study. It could also be a result of prevalence effects: a high percentage of participants in our study had high fat intakes. The prevalence effect appears to occur when the model is based on an underlying continuous variable: in our case the final score (Hoehler 2000).

Usually the aim of a dietary fat screener is to classify fat intakes into high versus prudent. Using classification agreement and calculating a tool's diagnostic accuracy would thus be appropriate. Since at least one of the two data sources in our study (children or mothers) appeared to be inaccurate and since it is unknown which one of these, it is not meaningful to use either as a "gold standard" for determining diagnostic accuracy. This study cannot be considered a validation study, because the truth regarding fat intake of the children is not known. On the other hand we believe the study highlights aspects of the methodological and statistical analytical complexity of dietary assessment, for example, how - in spite of good psychometric properties – the credibility of the measurements in a particular target group requires careful attention. Furthermore, a contribution of the study lies in uncovering the nature and extent of some errors that can occur when performing dietary screening based on food frequency type assessment in children of this age group. At the same time the potential and practical developmental opportunities of the MEDFICTS dietary fat screener in school children in new contexts have been uncovered, ranging from novel, pictorial presentation (similar to Wallen et al. [2011]) to group administration in school, which resulted in good response rates and few missing values, both measures of feasibility (Raat et al. 2002).

From a research perspective it is recommended that refinement of the instrument continues. This includes test-retest reproducibility so as to demonstrate instrument responsiveness, and validation, with particular emphasis on portion size estimation. Should a combination of child and maternal data bring us closer to the truth as suggested by Murakami et al. (2012), this would require evidence about the relative quantitative and qualitative contribution of both data sources. Future studies need to consider the prevalence of high fat intakes in the target group during sample planning (Yi et al. 2004). More characterisation of the children and their caregivers as potential over- or underreporters respectively in general (Forrestal 2011) or for specific food categories, is needed. The inherent limitations of this instrument as a dietary fat screener (Kris-Etherton et al. 2001) need to be kept in mind.

On the practical side, even though accurate screening of usual fat intake in this target group may remain illusive for some time, it is recommended that school-based, comprehensive primary prevention of non-communicable diseases programmes should be developed and implemented. These should target children, their caregivers and schools, since in this age group many choices are made by the children themselves - for example in school tuck shops (kiosks) - in the absence of their mothers, whilst, at the same time, children rely on their caregivers to acquire and make food available. Monitoring the impact of such nutrition promotion programmes and achievement of dietary goals, does, however, require reliable and valid tools. It is time for action on both fronts: measurement refinement and intervention.

Key messages

The dietary fat screener was internally consistent, when completed by grade six children and by their mothers.

Mothers and their twelve-year old children did not agree about the fat intake of the child; there was variability and systematic error. Mothers reported lower frequencies of intake and, in particular, smaller portion sizes of high fat food categories.

Assessments by children and their mothers suggest high fat intakes. Implementation of nutrition promotion programmes for school children and refined measurement techniques for fat intake are needed.

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TABLES & FIGURE

Table 1. Anthropometric description of sample (mean ± standard deviation) (n=78)

	Age (Months)	Weight (kg)	Weight for age z-score[a]	Height (m)	Height for age z-score[a]	BMI (kg/m^2)	BMI for age z-score[a]
Boys (n=36)	148.7±4.3	49.1±15.3	0.36±1.3	1.52±0.08	-0.01±0.9	21.1±5.3	0.51±1.2
Girls (n=42)	147.7±3.5	48.8±10.2	0.43±0.9	1.55±0.06	0.19±0.8	20.3±3.4	0.42±0.9
Total (N=78)	148.2±3.9	48.9±12.7	0.40±1.1	1.53±0.07	0.09±0.9	20.7±4.4	0.47±1.1

[a] Reference data: CDC 2000 (National Centre Health Statistics).

Table 2. Internal consistency coefficients (r) of the dietary fat screener for child self- and maternal assessment

Internal consistency measure		**Child: Self-assessment (n=101)**		**Maternal assessment (n=78)**	
	Food category	**r**	**p**	**r**	**p**
Item-total correlation[a]	Meat	0.55	<0.001	0.48	<0.001
	Eggs	0.41	<0.001	0.09	0.47
	Dairy, milk, high fat	0.54	<0.001	0.63	<0.001
	Dairy, cheese, high fat	0.66	<0.001	0.50	<0.001
	Dairy, dessert, high fat	0.55	<0.001	0.64	<0.001
	Fried foods	0.38	<0.001	0.52	<0.001
	In baked goods	0.64	<0.001	0.61	<0.001
	Convenience foods	0.51	<0.001	0.54	<0.001
	Table fats, high fat	0.35	<0.001	0.50	<0.001
	Snacks, high fat	0.65	<0.001	0.59	<0.001
Cronbach's alpha	All category scores included	0.70	<0.001	0.69	<0.001
	One category deleted [b]	0.72	<0.001	0.71	<0.001
Split halves[a]		0.57	<0.001	0.48	<0.001

[a] Pearson.

[b] Deletion: For children: table fats; For mothers: eggs.

Table 3. Child and maternal assessment of portion size and frequency of intake for all food categories (n=77)

Food categories	Portion size[a]						Frequency of intake					
	Mode portion according to…		Child versus mother				Median weekly intake according to…		Child versus mother [b]			
	…child	...mother	Identical (% pairs)	Kappa statistic[c]		McNemar[d]	…child	...mother	Identical (% pairs)	Kappa statistic[c]		McNemar[d]
	Portion (% children)	Portion (% mothers)		κ	p	p	Times per week (range)	Times per week (range)		κ	p	p
Meat	M (57)	M (64)	46.7	0.07 (Poor)	0.42	0.01	5 (0-35)	5 (2-11)	68.8	0.07 (Poor)	0.36	0.00
Eggs	M (51)	M (54)	71.6	0.44 (Moderate)	0.00	0.18	1.5 (0-7)	2 (1-7)	68.8	0.22 (Fair)	0.01	0.91
Dairy, milk, high fat	M (44)	M (57)	49.3	0.17 (Poor)	0.05	0.07	12 (0-49)	5.5 (1-14)	74.0	0.21 (Fair)	0.01	0.04
Dairy, cheese, high fat	M (63)	M (64)	63.2	0.30 (Fair)	0.00	0.05	3.5 (0-21)	2.5 (1-7)	59.7	0.32 (Fair)	0.00	0.00
Dairy, dessert, high fat	L (72)	M (61)	31.7	0.05 (Poor)	0.37	0.00	1.5 (0-49)	0.5 (1-7)	56.9	0.00 (Poor)	0.98	0.00
Fried foods	L (79)	M (66)	18.4	-0.08 (Poor)	0.07	0.00	2.5 (0-28)	2.5 (1-7)	58.4	0.21 (Fair)	0.03	0.05
In baked goods	M (59)	M (68)	53.7	0.14 (Poor)	0.12	0.20	2.5 (0.5-35)	1.5 (0.5-7)	48.1	0.05 (Poor)	0.56	0.10
Convenience foods	L (52)	M (76)	39.7	0.03 (Poor)	0.60	0.00	2.75 (0-42)	0.75 (0.5-5)	41.6	-0.06 (Poor)	0.38	0.00
Table fats, high fat	L (44)	M (53)	29.2	-0.02 (Poor)	0.73	0.00	10.5 (0-63)	2.75 (0.5-20)	66.2	0.05 (Poor)	0.34	0.00
Snacks, high fat	M (51)	M (63)	46.7	0.14 (Poor)	0.04	0.00	4.5 (0-28)	1.75 (1-7)	58.4	0.18 (Poor)	0.10	0.25

[a] Portion size: S=Small; M=Medium; L=Large.
[b] Scored frequency of weekly consumption: Rarely or never = 0; Up to 3 times = 3; More than 3 times = 7.
[c] Kappa statistic for chance-corrected agreement.
[d] McNemar's Test for Symmetry.

Table 4. Children's and mothers' category[a] and final[b] scores: means and correlations[c]

Food category		Mean ±SD[d]	Correlations[e]	
			r	p
Meat	Children	13.4±6.2	0.25	0.03
	Mothers	13.2±4.9		
Eggs	Children	5.2±3.9	0.12	0.28
	Mothers	4.4±3.1		
Dairy, milk, high fat	Children	13.9±6.2	0.40	0.00
	Mothers	11.2±6.4		
Dairy, cheese, high fat	Children	10.4±6.4	0.41	0.00
	Mothers	8.2±5.5		
Dairy, dessert, high fat	Children	10.8±5.2	-0.03	0.84
	Mothers	5.3±3.8		
Fried foods	Children	12.6±6.9	0.15	0.20
	Mothers	8.4±4.6		
In baked goods	Children	8.6±5.2	0.09	0.42
	Mothers	7.0±5.2		
Convenience foods	Children	10.8±6.4	0.04	0.70
	Mothers	5.0±3.3		
Table fats, high fat	Children	16.1±6.2	0.22	0.05
	Mothers	9.9±6.2		
Snacks, high fat	Children	12.3±6.1	0.22	0.06
	Mothers	9.1±5.0		
Final score	Children	114.4±30.7	0.23	0.04
	Mothers	82.0±25.2		

[a] Frequency score multiplied by portion size score (see Table 3).
[b] Sum of category scores.
[c] N=77 for category scores; n=72 for final score because of incomplete screeners by caregivers.
[d] Standard deviation.
[e] Spearman.

Table 5. Screener classification of fat intake: Children versus mothers (n=75)

		Mothers		Total n (%)
		High fat intake n (%)	Prudent fat intake n (%)	
Children	High fat intake	54 (72)	16 (21)	70 (93)
	Prudent fat intake	2 (3)	3 (4)	5 (67)
	Total	56 (75)	19 (25)	75 (100)

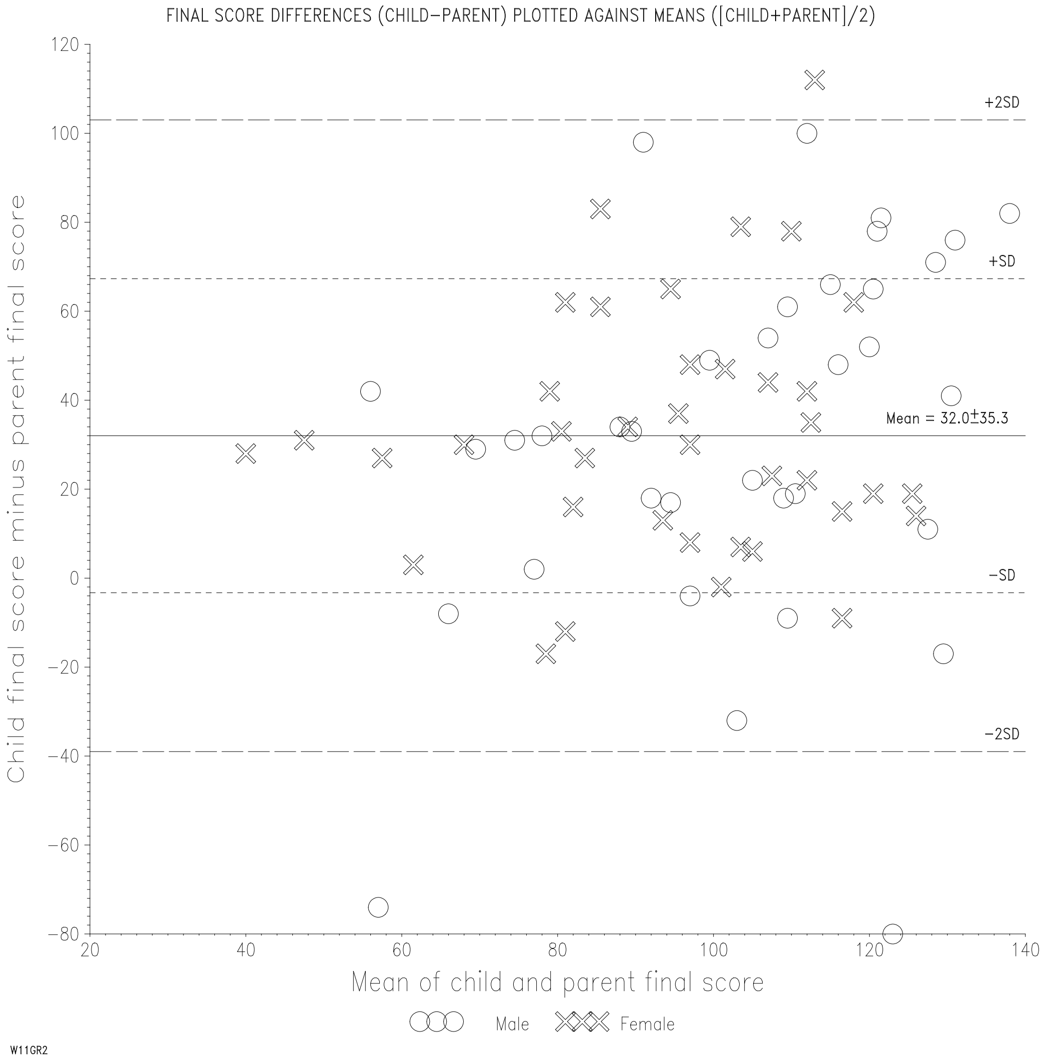

Figure 1. Final score differences (child minus mother) plotted against mean final scores ([child + mother]/2)