



Invited Commentary

Issues in dietary intake assessment of children and adolescents

What children and adolescents say they eat is what they eat and up until the late 1980s, this was the status quo with regard to the assessment of their dietary intakes. It was widely assumed that errors in the dietary assessment of both adults and young people were random, and in the absence of objective and independent markers of food intake, dietary data were tacitly assumed to provide valid measures of usual intake. However, during the 1990s, objective validation studies using estimates of energy expenditure by the doubly labelled water method as a biomarker of energy intake conclusively demonstrated that much of the dietary data of young people were prone to biased reporting, mostly under-reporting.

Clearly what children and adolescents said they were eating was *not* what they were eating!

Unfortunately, these validation studies provided few insights into either the nature or the implications of misreporting by young people. While it is likely that some of reporting issues are similar to those observed in adults, dietary assessment in children and adolescents is particularly challenging because of the many unique respondent and observer considerations which surface at different stages from early childhood to late adolescence.

This background provided the context for the review paper that was designed to evaluate the state of the art in the dietary assessment of children and adolescents. It aimed to identify what research should be undertaken to address the gaps in the evidence base in order to improve the quality of dietary data obtained from children and adolescents in the future.

In summary, the literature highlighted the need to draw on perspectives from the behavioural sciences to fully appreciate the complexities of dietary reporting by young people. The cognitive abilities required to accurately self-report food intake include an adequately developed concept of time, a good memory and attention span, an extensive food vocabulary and ability to accurately estimate size of portions consumed. Before the age of 8 years, proxy reporting of children's food intakes by parents and other care givers is required but introduces an unknown degree of reporting bias. From the age of 8 years, there is a rapid increase in the ability of children to self-report their food intake. However, while the requisite cognitive skills should be fully developed by adolescence, issues of motivation, unstructured eating behaviour, social desirability and body image may hinder willingness to accurately report food intake. Patterns of under-reporting uncovered by objective validation studies varied with age and were influenced by weight status and the dietary survey method used. However, these studies could only identify bias in the reporting of energy intake but provided no clues as to whether this reflected under-reporting of

the diet as a whole or if there was bias in estimating nutrient intakes through altered food choices and/or selective misreporting of foods. Furthermore, evidence for the existence of subject-specific responding in dietary assessment challenged the prevailing assumption that repeated measurements of dietary intake would eventually obtain valid data. Areas for future research were identified including the need to focus on refining dietary survey methods to make them more sensitive to different developmental stages and cognitive abilities. In particular, the need to develop novel methods of estimating portion sizes that are sensitive to the cognitive abilities of young people was highlighted. The need to improve techniques for the identification of mis-reporters and investigation of the issue of differential reporting of foods were also identified as priorities.

Clearly this synopsis of the evidence base had special resonance just at the stage when it was widely acknowledged that biased reporting was endemic across all ages in dietary surveys. No longer could the integrity of food intake data be accepted at face value.

In the two decades since the publication of the review, it is evident that greater cognisance has been taken of the need to consider developmental, cognitive, social and behavioural characteristics that impact on reporting accuracy of dietary intakes. Progress has been made in understanding the variables associated with misreporting by children and adolescents, the associated biases in estimating nutrient intakes and the most appropriate statistical techniques for interpreting unrepresentative dietary data. Researchers have risen to the challenge of developing easily accessible on-line comprehensive tool kits, including those dedicated to measuring young people's food intakes, allowing users to collect the highest quality data possible in a variety of contexts⁽¹⁾.

Without doubt, however, the most dynamic and fast moving developments in dietary assessment over the past 20 years have been in the harnessing of new applications of information and communication technologies, especially mobile phone and internet applications. In principle, information and communication technologies may offer a viable solution to current methodological shortcomings because of their potential to reduce researcher and respondent burden, improve adherence and communication, automate and standardise coding and upgrade data quality, consistency and completeness at lower cost. Intuitively, dietary assessment methods that incorporate these new technologies should be particularly appealing and engaging for children and adolescents and facilitate compliance with dietary reporting because they are non-intrusive and easy and fast to complete. At the same time, the inclusion of various techniques to enhance accuracy of portion size estimation in real



time is thought to reduce recall bias and provide additional information on eating behaviours.

However, while there is now an extensive and growing portfolio of research demonstrating the potential of information and communication technologies to mitigate measurement errors in dietary assessment of children and adolescents the evidence base presents a very mixed picture. Specific concerns remain regarding their validity, feasibility, reliability and cost-effectiveness and harmonisation with established methodology. A popular misconception is that these new technologies in dietary assessment represent new methods of collecting dietary information. Thus, when compared with traditional methods of dietary assessment and in a limited number of objective validation studies, none of the technology-assisted approaches appeared to demonstrate significant improvements in the accuracy of dietary reporting by children and adolescents⁽²⁾ In fact, most of them remain hostage to the same shortcomings as conventional methods of assessment, and their adoption and integration into the dietary assessment of children and adolescents is unlikely to bring resolution to the inherent individual bias related to self-reported data.

Unquestionably, the application of information and communication technologies will become a common feature of dietary assessment in the future, but it would also be naïve to expect that these new technologies can or will solve all the challenges of dietary assessment. Particular care needs to be taken to ensure that evidence-based and validated tools are used for this purpose. However, until recently, an informed evaluation of their potential to enhance or replace traditional methodologies has been constrained by the absence of best practice guidelines and a structured framework for reporting and assessing their efficacy⁽³⁾

The accurate assessment of food intakes in children and adolescents remains an essential prerequisite for monitoring their nutritional status, as well as for conducting epidemiological and clinical research on the links between diet and health.

Unfortunately, all dietary assessments are fraught with inherent and extrinsic methodological problems. Critically, they all share the same fundamental weakness: they are entirely subjective, and the validity of the data ultimately depends on the ability and/or motivation of respondents to faithfully report and recall what they have eaten. While there is not, and probably never will be, a method that can estimate dietary intake without error this does not mean that dietary intake assessments of children and adolescents should be abandoned because the measurement of food intake is integral to the study of nutrition. The goal of capturing the highest quality data by following best practice guidelines for data collection, analysis and interpretation, while at the same time remaining alert to the potential for ongoing enhancements remains the best advice moving forward.

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