Factors Related to the Accuracy of Self-Reported Dietary Intake of Children Aged 6 to 12 Years Elicited with Interviews: A Systematic Review

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ABSTRACT

Background Understanding the relationship between children's dietary consumption and health is important. As such, it is crucial to explore factors related to the accuracy of children's reports of what they consumed.

Objective The objective was to evaluate factors related to the accuracy of self-reported dietary intake information elicited by interview methods from children aged 6 to 12 years.

Methods A systematic review of English articles using PsycINFO, PsycARTICLES, PsycEXTRA, PsycBOOKS, CINAHL Complete, Global Health, and MEDLINE Complete was performed. Search terms included *interview*, *diet*, *children*, and *recall*; studies were limited to those published from 1970 onward. Additional studies were identified using the reference lists of published articles. Studies that assessed children's dietary intake using direct observation, doubly labeled water, or the double-portion method and compared it with their recall of that intake (unassisted by parents) using an interview were included.

Results The 45 studies that met the inclusion criteria showed that specific interview techniques designed to enhance children's recall accuracy had little effect. Rather, the timing of the interview appeared most important: The shorter the retention interval between children's consumption and their recall, the more accurate their memories. Children's age, body mass index, social desirability, food preferences, and cognitive ability were also related to accuracy.

Conclusions Factors related to the accuracy of children's dietary reporting should be taken into consideration when asking about consumption. Further research is required to examine whether other interview techniques, such as those developed to enhance children's recall of repeated staged events, can improve children's dietary reporting accuracy.
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EXAMINING CHILDREN'S DIETARY INTAKE IS ESSENtial to understanding its relationship with health, including the adverse effects of childhood obesity.[1,2] Investigating dietary intake also provides a method of evaluating the effects of dietary intervention programs, such as those designed to improve dietary intake in school-aged children over a 3-year period[3] or to assess whether gluten- and casein-free diets improve core symptoms in children with autism spectrum disorders.[4] Dietary interviews are one method used to examine dietary intake; clinicians and researchers rely on them to gather information about children's diet because they are time-efficient and relatively inexpensive.[5] These interviews rely on children's memories of their intake during a particular time period (eg, 24-hour recalls conducted using computer-based software applications such as the Nutrition Data System for Research [University of Minnesota Nutrition Coordinating Center]). Thus, children may accurately recall foods that match what they consumed (ie, matches); they may fail to report foods that they consumed (ie, omissions); or they may inaccurately report foods that they did not consume (ie, intrusions). Recalling dietary intake can be difficult because children may not encode the foods into their memories (eg, if they are not paying attention to what they are eating) or they may not retain memories of what they consumed (eg, due to forgetting over time; see Baranowski and Domel,[5] for a description of the encoding, storage, and retrieval of dietary information).

Remembering what was consumed during a specific meal is particularly difficult because eating typically occurs on at least three occasions daily (breakfast, lunch, and dinner). These occasions are then repeated on a daily basis. Because eating events are repeated over time, specific memories about what was consumed during a particular meal become part of a network of generic dietary information.[6] Although children are asked to recall specific memories about target meals, what they report may be a compromise between their specific memories and their general knowledge about their

diet.[6] Thus, they may omit items that they consumed but were not part of their generic dietary network or they may intrude other items that were not consumed but were part of their dietary network.

When asking children to remember what they consumed, the questions asked influence the accuracy and completeness of their responses (see the research examining interviewing children about repeated staged events[7-9]).* For example, children provide more accurate and detailed information in response to open questions (that encourage a descriptive answer; for example, "Tell me about the [item]") than to closed questions (that encourage a specific one-or two-word answer; for example, "Was the [item] red?").[10-12] The influence of question type has been investigated in research examining children's dietary recall; for example, children provided with open-format prompts (to report what they had consumed starting with the first item that they ate or drank) had a lower intrusion rate than those provided with meal-format prompts (to report what they had consumed starting with breakfast).[13]

The aim of our systematic review was to examine factors related to the accuracy of children's dietary recall. More specifically, it was to examine the accuracy of reports of dietary intake by children aged 6 to 12 years gathered using existing interview methods and the factors that were related to this accuracy, including interview conditions, interview techniques, environment-related factors, and child variables. Although the child variables (and some environment factors) were not experimentally manipulated, they were included because they demonstrated some statistically significant group differences, either alone or in combination with experimentally manipulated variables.

If the reviewed interview techniques increased the accuracy of children's dietary recall, they may be incorporated into clinicians and researchers' questions when asking children about what they consumed. In turn, improved accuracy of recall data would enable researchers to better evaluate the effect of dietary interventions, such as those that encourage children to eat more fruit and vegetables, in an effort to reduce childhood obesity.[14]

METHOD

No protocol for this review has been published. This review was informed by the preferred reporting items for systematic reviews and meta-analyses guidelines.[15]

Eligibility Criteria

Participants were children aged 6 to 12 years who participated in studies that measured dietary intake using gold-standard methods and were later interviewed about their intake. Gold-standard methods included observation, double portions, and doubly labeled water. Observations were made by trained observers who recorded children's consumption by taking notes[16-20] or taking photographs.[21] In the double-portion method, children's meals were duplicated; any leftovers were weighed to determine exactly how much of each food was consumed.[22,23] In the doubly labeled water method, energy intake was estimated through examining the urine of children after they had consumed the water.[24]

Studies needed to assess the accuracy of children's dietary recall by examining the correspondence between the observed and recalled items (reported as a match rate [percentage] or as a correlation), the omission rate (percentage of items that the children were observed to have eaten, yet did not recall), and/or the intrusion rate (the percentage of items that children recalled as being consumed, but were not observed). No attempt was made to contact authors regarding unpublished articles or results because the focus of our review was published articles.

Information Sources

Studies were identified through electronic database searches and reference lists of articles. Studies were limited to those published in English from 1970 onward. This search was applied to PsycINFO, PsycARTICLES, PsycEXTRA, PsycBOOKS, CINAHL Complete, Global Health, MEDLINE Complete, Health Source-Consumer Edition, and Health Source: Nursing/Academic Edition. The last search was run on November 5, 2014.

Search

The following search terms were used in all databases: *interview*, *diet*, *children*, *school*, *breakfast*, *lunch*, and *recall*. Limiters were age group (6 to 12 years) and language (English). See Figure 1 for an example search strategy.

Study Selection

Two reviewers independently performed the eligibility assessment; disagreements were resolved through discussion. The articles identified from the database search were screened for suitability via their titles and abstracts. First-level screening excluded articles if they did not include children aged 6 to 12 years; did not focus on recall accuracy established using interviews; if parents or caregivers assisted children; or if they did not assess dietary intake using direct observation, doubly labeled water, or the double-portion method. Second-level screening was completed if eligibility could not be determined on the basis of title and abstract, with studies read in full to deem whether they fit the criteria. The references lists of these articles were used to find other articles, which were also screened.

Data Collection Process. Data were extracted independently by two authors of this review; disagreements were resolved through discussion. To avoid double counting data from multiple reports of the same studies, studies that re-analyzed previously published data that answered the same research questions were not included in the review.[25-28] There were a number of articles that described secondary analyses conducted on previously collected datasets; these were included because they answered new research questions[29-42] (these studies are indicated in the Table).

Studies that determined the effect of data collection methods (eg, in-person vs telephone interviews[43]) were

*It should be noted that the research examining children's memories for repeated events contains many differences to the research examining children's memories for dietary intake. The main difference is that in the former, investigators have complete control over the event(s) that the children experience; in the latter, investigators have no control because children's meals are typically provided by the school or their parents.