RESEARCH
Original Research

The Automated Self-Administered 24-Hour Dietary Recall for Children, 2012 Version, for Youth Aged 9 to 11 Years: A Validation Study

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ABSTRACT

Background Valid methods of diet assessment are important for nutrition research and practice, but can be difficult with children.

Objective To validate the 2012 version of the Automated Self-Administered 24-Hour Dietary Recall for Children (ASA24-Kids-2012), a self-administered web-based 24-hour dietary recall (24hDR) instrument, among children aged 9 to 11 years, in two sites.

Design Quasiexperimental.

Participants/setting In one site, trained staff members observed and recorded foods and drinks consumed by children (n=38) during school lunch. The next day, the observed children completed both ASA24-Kids-2012 and an interviewer-administered 24hDR in a randomized order. Procedures in a second site (n=31) were similar, except observations occurred during dinner in a community location.

Statistical analyses Foods were classified as matches (reported and consumed), intrusions (reported, but not consumed), or omissions (not reported, but consumed) for each participant. Rates of matches, intrusions, and omissions were calculated. Rates were compared between each recall method using repeated measures analysis of covariance. For matched foods, the authors determined correlation coefficients between observed and reported serving sizes.

Results Match, intrusion, and omission rates between ASA24-Kids-2012 and observed intakes in Site 1 were 37%, 27%, and 35%, respectively. Comparable rates for interviewer-administered 24hDRs were 57%, 20%, and 23%, respectively. In Site 2, match, intrusion, and omission rates between ASA24-Kids-2012 and observed intakes were 53%, 12%, and 36%, respectively, vs 76% matches, 9% intrusions, and 15% omissions for interviewer-administered 24hDRs. The relationship strength between reported and observed serving sizes for matched foods was 0.18 in Site 1 and 0.09 in Site 2 for ASA24-Kids-2012, and 0.46 in Site 1 and 0.11 in Site 2 for interviewer-administered 24hDRs.

Conclusions ASA24-Kids-2012 was less accurate than interviewer-administered 24hDRs when compared with observed intakes, but both performed poorly. Additional research should assess the age at which children can complete recalls without the help of a parent or guardian, as well as elucidate under which circumstances recalls can reasonably be used among children.
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VALID METHODS OF DIET ASSESSMENT ARE important for use in diet-related research, evaluations of dietary behavior change programs, and nutrition education.[1-3] Common dietary assessment methods include food frequency questionnaires, 24-hour dietary recalls (24hDRs), and dietary records.[4,5] The interviewer-administered 24hDR is considered the preferred method and is commonly used to assess children's diets.[6] This method requires a trained interviewer asking a child and/or adult caregiver (depending on the child's age) about the child's diet over the past 24 hours—often using dietary intake software—and, thus, can be expensive (both the interviewer and software involve cost) and logistically difficult to administer.[5]

Computer-based 24hDRs offer a cost-effective and efficient means for collecting diet measures.[7,8] For children, having child-generated food categories,[9-11] pictures of foods,[12] and different sizes of food images on the same screen[13] may help improve recall speed and/or accuracy.[14] Examples of computerized 24hDRs include the Food Intake Recording Software System (FIRSST),[15,16] the Young Adolescents' Nutrition Assessment on Computer,[8,17,18] and the Automated Self-Administered 24-hour Dietary Recall for Children (ASA24-Kids).[14] The last is available free of charge through the National Cancer Institute (NCI) website (http://appliedresearch.cancer.gov/asa24/respondent/childrens.html). ASA24-Kids was adapted from an adult version[19] by a collaborative team of

researchers knowledgeable in diet assessment[14,16] and collects data for all foods and drinks consumed the previous day using a web-based interface. Both the number of foods and probes in the adult version were reduced by approximately 50% to simplify responses and burden in ASA24-Kids.[20] Removals included foods not likely to be consumed by children based on data from children aged 8 to 15 years who completed the interviewer-administered 24hDRs in the 2003-2004 and 2005-2006 National Health and Nutrition Examination Survey (NHANES), and probes (such as those regarding food preparation) to which children were unlikely to know the answers based on the experiences of six registered dietitian nutritionists.[20] In ASA24-Kids, children are guided through the program with the aid of food images,[21] an animated talking penguin, and multiple passes.[22]

As with most self-reported diet assessment methods, there are limits on knowledge and memory, especially for children.[5,23] Children younger than age 8 years usually require a proxy reporter, such as a parent. Older children and adolescents are more able to report their own intake, although the ages and level of assistance vary based on the study.[6,24] In NHANES, children aged 6 to 11 years provide their own dietary intake information with the assistance of an adult household member.[25] Other complicating factors include retention interval (ie, elapsed time between meal and recall), reporting order (ie, evening to morning vs morning to evening), and number of days of recall.[5,26] Aside from reporting what was eaten, reporting portion sizes is also challenging[27] and may be confounded by participant characteristics (eg, body weight and sex) and food characteristics (eg, type of food and size).[27] Formative research collected using the 2009 beta version of ASA24 revealed that children aged 8 and 9 years had difficulties completing it and required assistance,[14] so ASA24-Kids is currently recommended for use by children aged 10 years or older, or by proxy reporters for younger children.[28] However, because modifications were made to ASA24 to adapt it for children (eg, reducing the food list and number of probes), further evaluation is needed to determine whether children younger than age 10 years can independently complete a recall using ASA24-Kids.

The availability of ASA24-Kids-2012, the version available at the time the study was conducted, provided an opportunity to evaluate whether, at what age, and with what level of assistance, children can use ASA24-Kids, and the accuracy of their reported dietary intakes. The primary aims of the current study were to evaluate the accuracy of dietary intakes reported using ASA24-Kids-2012, the first available version of ASA24-Kids (ASA24-Kids-2014 is the current version), among children aged 9 to 11 years and to compare its performance to a standardized interviewer-administered 24hDR. We also assessed differences by age, sex, race (white vs nonwhite), recall method order, and site (for one site, the focus was lunch and for the other site, the focus was dinner). We hypothesized that, compared with observed food intake, the accuracy of recalls collected using ASA24-Kids-2012 would be comparable to the accuracy of recalls collected via an interviewer-administered 24hDR.

METHODS

Study Sample

This was a quasi-experimental study conducted from January to May 2013 with 69 children in two sites: 38 in Site 1 and 31 in Site 2. Participants were children aged 9 to 11 years; both the children and their parent provided written informed assent and consent, respectively. Study procedures were approved by institutional review boards at Baylor College of Medicine and University of Arizona.

In Site 1, participants were fourth- or fifth-graders, aged 9 to 11 years, enrolled in an elementary school in Texas. Exclusion criteria included having a physical, mental, or visual limitation that would inhibit dietary recall or computer use; not being able to read or answer questions; not being able to speak, read, and write in English; and not eating school lunch. Information packets were sent home to parents of all fourth- and fifth-graders in that school; the packets included a letter to parents, flyer, information sheet, consent form, and family demographic characteristics form. Students who returned packets to school during the study period with a family demographic characteristics form and signed consent form with both parent and child signatures were screened and, if eligible, included in the study.

In Site 2, children were identified and recruited through information sessions at Cooperative Extension nutrition education programs (eg, Garden Kitchen, 4-H, and Expanded Food and Nutrition Education Program) in one Arizona county. Exclusion criteria were similar to Site 1, but instead of school lunch, children had to be available to eat a study-provided dinner. Children who provided assent, whose parents provided consent, and who completed the family demographic characteristics form were enrolled in the study.

This design enabled an assessment of the validity of ASA24-Kids-2012 and an interviewer-administered 24hDR over different meals (lunch in Site 1 vs dinner in Site 2), which vary in time from occurrence to time of recall.

Procedures and Measures

In Site 1, trained staff (n=3) unobtrusively observed children during school lunch, recording on a standardized form what food children selected, food portions obtained and consumed, and any food spilled or exchanged. Each observer watched no more than two children at a time across 19 days. At the end of the meal, observers recorded the amount of food left on the tray. Before lunch started each day, study staff looked through the lunch menu and walked through the lunch line to verify foods served. Over the course of the study, there were 16 different lunch menus, with an average of 13 available foods and drinks per meal, not including snack items (eg, chips or ice cream). An example lunch meal was fresh garden salad, tostada, applesauce, milk, and pinto beans. School recipes were obtained directly from the school district, and all staff members were trained in meal observations by the principal investigator before data collection began. These procedures have been employed as the criterion method in several studies.[6]

Procedures in Site 2 were similar, except observations occurred during a dinner in a community teaching kitchen. Dinner always consisted of a customizable pizza (for which participants chose their toppings), mixed fresh fruit (watermelon and grapes), and water or iced tea (sweetened or unsweetened). All foods were prepared by employees of the teaching kitchen. Study staff (n=5) observed no more than 11 families each night for a total of four nights.