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Validation of the School Lunch Recall Questionnaire to Capture School Lunch Intake of Third- to Fifth-Grade Students

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ABSTRACT

Children's dietary intake is a key variable in evaluations of school-based interventions. Current methods for assessing children's intake, such as 24-hour recalls and meal observations, are time- and resource-intensive. As part of a study to evaluate the impact of farm-to-school programs, the school lunch recall was developed from a need for a valid and efficient tool to assess school lunch intake among large samples of children. A self-administered paper-and-pencil questionnaire, the school lunch recall prompts for school lunch items by asking children whether they chose a menu item, how much of it they ate, how much they liked it, and whether they would choose it again. The school lunch recall was validated during summer school in 2008 with 18 third- to fifth-grade students (8 to 11 years old) in a North Carolina elementary school. For 4 consecutive days, trained observers recorded foods and amounts students ate during school lunch. Students completed the school lunch recall immediately after lunch. Thirty-seven total observation school lunch recall sets were analyzed. Comparison of school lunch recalls against observations indicated high accuracy, with means of 6% for omission rate (items observed but unreported), 10% for intrusion rate (items unobserved but reported), and 0.63 servings for total inaccuracy (a measure that combines errors for reporting items and amounts). For amounts, accuracy was high for matches (0.06 and 0.01 servings for absolute and arithmetic differences, respectively) but lower for omissions (0.47 servings) and intrusions (0.54 servings). In this pilot study, the school lunch recall was a valid, efficient tool for assessing school lunch intake for a small sample of third- to fifth-grade students.

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With rising rates of childhood obesity (1,2) and increasing evidence of the long-term impact of childhood dietary habits (3-12), the school environment is a popular and promising target for environmental interventions to improve children's intake (13-16). To evaluate the impact that dietary interventions have on children's intake at school, there is a need for efficient, relatively inexpensive, dietary assessment tools. These tools must rely on children's self-reports because parents lack first-hand knowledge of children's intake at school.

The 24-hour dietary recall is frequently used with children who are systematically interviewed about what they ate during a 24-hour period (17,18). However, studies have shown that primary school–aged children have difficulty accurately recalling their intake (17,19-26), questioning the ability of dietary recalls to accurately capture intake among this age group. Although research has shown that children's dietary recall accuracy can be improved by study design and methodological decisions made by investigators (19), dietary recalls are expensive and time-consuming.

Meal observations are an alternative to dietary recalls and are often regarded as a gold standard for validating dietary assessment tools (19-28). Trained staff observes and records foods and amounts eaten during a specific time period. Although research has shown that observations of school meals do not affect children's dietary recalls (29,30), observations are expensive and time-consuming.

Food frequencies, food diaries, and combinations of food frequencies and 24-hour recalls have been used to assess children's intake at school (31-34). However, validation studies of these tools show that multiple days of recording are necessary and overestimated consumption is a concern (17,31). Also, food frequencies and diaries appear to place a significant response burden on children and require a high level of motivation for completion. Thus, there is need for valid and efficient tools to capture children's intake at school.

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The school lunch recall was developed to address these concerns and to evaluate the dietary impact of farm-to-school programs on fruit and vegetable consumption during school lunch in elementary schools. The school lunch recall incorporates elements proven to be helpful to children in reporting intake. For example, studies have shown that a shorter time interval between consumption and recall improves children's accuracy (19,21,26,35). Consequently, the school lunch recall is completed immediately after lunch. Also, research has shown that accuracy for recalling school lunch intake is better when children are asked to recall only school lunch vs all meals during a 24-hour period (22), and that children may be aided to recall additional items when prompted by food categories (36). The school lunch recall captures intake for a single meal and inquires about menu items offered by the National School Lunch Program (NSLP) on the day the school lunch recall is completed.

The purpose of this pilot study was to test the validity of the school lunch recall against school lunch observations. Because study design aspects were not manipulated, there was no study hypothesis.

METHODS

The Institutional Review Board at the University of North Carolina at Chapel Hill approved the study. Students from all third- to fifth-grade (8 to 11 years old) summer school classes in 2008 at one school in the Triangle Area of North Carolina were asked to participate in the study. Written child assent and parental permission were required for participation. Data were collected by school lunch observation and school lunch recalls on 4 consecutive days (Tuesday through Friday). No incentives were provided to students for participating.

School Lunch Recall

The school lunch recall, a self-administered paper-and-pencil tool, was designed with input from researchers and four elementary school teachers (two of whom distributed school lunch recalls during data collection). The school lunch recall asks about each food item on the NSLP menu for the day on which the school lunch recall is completed. The school lunch recall consists of four questions for each item, with response options shown in quotation marks:

1. Did you choose the [insert menu item]? "yes," "no";
2. How much of the [insert menu item] did you eat? "I didn't eat any of it," "I tasted it," "I ate a little bit," "I ate half of it," "I ate most of it," "I ate all of it" (19-21,23,25,26,36);
3. How much did you like [insert menu item]? "I loved it," "I liked it," "I didn't like it" (37,38);
4. Would you choose [insert menu item] again? "yes," "maybe," "no."

Because students did not have choices for lunch during summer school, the first question was eliminated for this study. Second helpings were not available. Because enjoyment of food can facilitate its recall (39-41), and information about food preferences can be useful to school foodservice, the school lunch recall was designed to ascertain the degree to which students liked each item.

Methods for observing, reporting, and recording amounts of food consumed were based on standardized school meal portions for each item, as in previous studies (19-21,23,25,26,36). Serving sizes for menu items were obtained from school foodservice. Items that students brought from home to eat during lunch were recorded in observations. Fruits and vegetables brought from home were captured by the school lunch recall through four additional questions:

1. Did you bring any vegetables from home?
2. How much of those vegetables did you eat?
3. Did you bring any fruit from home?
4. How much of the fruit did you eat?

Response options were either "yes," "no," or the same amount response options listed previously.

Immediately after students finished eating, cleaned their lunch area, and moved to another table, school lunch recalls were distributed to all participating students. Teachers on duty during lunch distributed and collected school lunch recalls and clarified questions but were instructed not to assist students. Students were asked to complete school lunch recalls without help from other students. All school lunch recalls were completed within 10 minutes after distribution.

School Lunch Observations

Four research staff members were trained in the office to estimate the amount of a serving of food items left on a plate and spent 2 training days in the school cafeteria. Using interobserver reliability procedures as described by Baglio and colleagues (42), before beginning data collection, six students were selected for observation by the four observers (two observers per student, three students per observer). Foods and amounts observed eaten were recorded and coded relative to standardized school meal portions and to correspond with student response options on the school lunch recall as none=0, taste=10%, little bit=25%, half=50%, most=75%, and all=1. Observations for the same student were compared across the pair of observers using a strategy (42) that calculates interobserver reliability as the percentage of agreement between two observers. Interobserver reliability had to exceed 85%, which it did, for data collection to proceed.

Menu items during summer school were similar to menu items during the school year. Students obtained lunches from a central table. Teachers distributed white or chocolate milk. Students in the study wore name tags with their first name and first initial of their last name. Before lunch, observers checked for menu changes. One menu item changed on each of 2 days, and those school lunch recalls were revised before distribution.

Observations covered the entire lunch period to account for food trading (43) and saving food in personal containers to take home. On each of the 4 data-collection days, each of three or four trained observers simultaneously observed and recorded lunch intake for one to three randomly selected students. If a randomly selected student was absent, a replacement was randomly selected. Students were aware of being observed but did not know who was being observed on which day. The 2 days of

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