RESEARCH
Original Research

A Validation Study Concerning the Effects of Interview Content, Retention Interval, and Grade on Children's Recall Accuracy for Dietary Intake and/or Physical Activity

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ABSTRACT

Background Practitioners and researchers are interested in assessing children's dietary intake and physical activity together to maximize resources and minimize subject burden.

Objective Our aim was to investigate differences in dietary and/or physical activity recall accuracy by content (diet only; physical activity only; diet and physical activity), retention interval (same-day recalls in the afternoon; previous-day recalls in the morning), and grade (third; fifth).

Design Children (n=144; 66% African American, 13% white, 12% Hispanic, 9% other; 50% girls) from four schools were randomly selected for interviews about one of three contents. Each content group was equally divided by retention interval, each equally divided by grade, each equally divided by sex. Information concerning diet and physical activity at school was validated with school-provided breakfast and lunch observations, and accelerometry, respectively. Dietary accuracy measures were food-item omission and intrusion rates, and kilocalorie correspondence rate and inflation ratio. Physical activity accuracy measures were absolute and arithmetic differences for moderate to vigorous physical activity minutes.

Statistical analyses performed For each accuracy measure, linear models determined effects of content, retention interval, grade, and their two-way and three-way interactions; ethnicity and sex were control variables.

Results Content was significant within four interactions: intrusion rate (content×retention-interval×grade; P=0.0004), correspondence rate (content×grade; P=0.0004), inflation ratio (content×grade; P=0.0104), and arithmetic difference (content×retention-interval×grade; P=0.0070). Retention interval was significant for correspondence rate (P=0.0004), inflation ratio (P=0.0014), and three interactions: omission rate (retention-interval×grade; P=0.0095), intrusion rate, and arithmetic difference (both already mentioned). Grade was significant for absolute difference (P=0.0233) and five interactions mentioned. Content effects depended on other factors. Grade effects were mixed. Dietary accuracy was better with same-day than previous-day retention interval.

Conclusions Results do not support integrating dietary intake and physical activity in children's recalls, but do support using shorter rather than longer retention intervals to yield more accurate dietary recalls. Additional validation studies need to clarify age effects and identify evidence-based practices to improve children's accuracy for recalling dietary intake and/or physical activity.

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PARENTS REPORT CHILDREN'S DIETARY INTAKE AND/OR physical activity, but studies[1-4] underscore concerns about such reports. Children eat meals and conduct physical activity at school where parents are not present, so it is unrealistic to expect parents to accurately report children's intake and/or physical activity that occur at school. Although studies rely on children to self-report either dietary intake[5-12] or physical activity,[13] children's reporting accuracy is of concern.

Validation studies of children's dietary recalls have identified omissions (items eaten but unreported) and intrusions (items uneaten but reported)[3,14-24]; results show that dietary recall accuracy is improved when the retention interval (ie, elapsed time between to be reported meals and the interview) is minimized.[15,25,26] Accelerometers have been increasingly used to study children's physical activity objectively,[27] but self-report instruments are more

common—especially for large studies[28,29]—more economical, and provide information about the type and context of physical activity that accelerometers cannot.[30] Considering the childhood obesity epidemic[31] and that schools are common targets for obesity prevention and health promotion,[32-34] there is interest for integrating assessment of children's dietary intake and physical activity to maximize resources and minimize subject burden.[35]

Children have simultaneously reported dietary intake and physical activity in two validation studies. One study[35] evaluated self-administered recall software to simultaneously assess diet and physical activity. Seven- to 15-year-old children (n=121) wore accelerometers. The next day, children completed a self-administered diet-and-physical-activity recall, and then an interviewer-administered diet-only recall. Results showed good dietary agreement between self-administered and interviewer-administered recalls, and good physical activity agreement between the self-administered recall and accelerometry.[35] Limitations included no physical-activity-only recalls to compare with diet-and-physical-activity recalls; relative validity for dietary intake was back-to-back recalls (with self-administered recalls always first) with assessment for food groups only; and using previous-day retention interval only.

Another study, a pilot,[36] observed 32 children (third grade and fifth grade) eating school-provided meals, and interviewed each child once (in the afternoon about that day or in the morning about the previous day) to obtain a diet-only or diet-and-physical-activity recall. Dietary accuracy results showed differences by retention interval (better for same day than previous day) but not by content or grade. Confidence intervals suggested that larger studies would find no difference by content, but might by grade.[36] Limitations included the small sample and no assessment of physical activity recall accuracy.

This study's objective was to investigate differences in dietary and/or physical activity recall accuracy by content (diet only; physical activity only; diet and physical activity), retention interval (same-day recalls in the afternoon; previous-day recalls in the morning), and grade (third; fifth). Dietary intake and physical activity at school were validated with direct observation of school-provided meals and accelerometry, respectively. Accuracy was hypothesized to be better for the integrated (diet-and-physical-activity) than single (diet-only or physical-activity-only) content, shorter (same-day recalls in the afternoon) than longer (previous-day recalls in the morning) retention interval, and older (fifth-grade) than younger (third-grade) children. Interview length was anticipated to be longer with the integrated than single content.

METHODS

The Institutional Review Board for research involving humans approved the study. Written parental consent and child assent were obtained.

Sample Size Calculations

Before data collection, past studies' results[15,18-20] were used to estimate omission rates of 28% for same-day recalls in the afternoon and 57% for previous-day recalls in the morning, and intrusion rates of 12% for same-day recalls in the afternoon and 36% for previous-day recalls in the morning. With 144 children overall, within a fixed-effects analysis of variance including two grades, three contents (although the eventual models considered only two at a time), and two retention intervals, main effects tests had 75% and 89% power to reject equality for omission rates and intrusion rates, respectively, in models with two- and three-way interactions (where s=0.25 for unspecified effects). Power calculations used PASS software (2005 version, NCSS Statistical Software).

Participants

Data were collected during the 2010-2011 school year. Children from 21 third-grade and 21 fifth-grade classes at four elementary schools in one district were invited to participate. At these schools, eligibility to receive free or reduced-price school-provided meals was 40.3% to 54.0%. Of the 877 children invited to participate, 513 children (58.5%) agreed. Grade, ethnicity, and sex composition of participants was similar to that of children invited.

From the consented children across all schools and grades, three subsets of children were randomly selected. Children in subsets 1 and 3 were observed eating school-provided breakfast and lunch in the cafeteria on a school day; children in subset 3 also wore accelerometers at school that same day. Children in subset 2 wore accelerometers at school on a school day. Each subset child was interviewed only once about time at school for his or her observation and/or accelerometer day (ie, from arrival at school until school dismissed) with content as diet only (subset 1), physical activity only (subset 2), or diet and physical activity (subset 3). Data collection continued until 144 children were interviewed and, as Figure 1 shows, each subset had 48 children with 24 per retention interval, and within retention interval, 12 per grade with 6 per sex. School staff and children did not know in advance when observations and/or interviews would occur, when accelerometers would be worn, nor assignment to content and/or retention interval. More children were recruited than needed to ensure random selection so children could not determine who specifically was being observed, and so more children wore accelerometers than were interviewed. When recruited, children were told that they might each be interviewed zero to two times, so that being interviewed did not indicate that a child would not be interviewed again.

Direct Meal Observations

School-provided meals were observed by three researchers trained to follow a written protocol using established procedures through practice and assessment of pre-data collection of inter-observer reliability.[15,18-20,25,36] Before and weekly throughout data collection, inter-observer reliability was assessed for pairs of observers using established procedures.[15,19,20,25,36,37] During data collection, inter-observer reliability was assessed on 23 children (12 girls) for breakfast and 20 children (10 girls) for lunch; mean agreement between observers to within one-fourth serving on amounts eaten was acceptable (98% breakfast; 94% lunch). For non–inter-observer reliability observations, each researcher observed one to three children simultaneously during regular meal periods. Children were seated using their school's typical arrangement. Observations covered entire meal periods to account for food trading.[21,38-40] Researchers used