3-2017

Interviews Define Face Validity of Physical Activity Survey Items with Fourth Graders

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by

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A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

Master of Science in Experimental Psychology

Department of Psychology

College of Liberal Arts

Rochester Institute of Technology

Rochester, NY

March 2017

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Acknowledgments

I would like to thank my thesis advisor and committee chair, Dr. Barbara Lohse, for her support, encouragement and guidance throughout this project. I would also like to thank my thesis committee members, Dr. Stephanie Godleski and Dr. Leslie Cunningham-Sabo for their assistance and review of my work. Thank you all for your patience and advice. In addition, I would like to thank Anna Ensslin for verifying the transcripts, Tessa Komine for assistance in resolving coding discrepancies, and Matt Cady for taking notes on some of the interviews. I thank the faculty and staff of the Wegmans School of Health and Nutrition and the Department of Psychology for making this a great place to learn. Finally, I thank my husband, daughters and friends for their support in large and small ways. This work was supported, in part, by the Rochester Institute of Technology Department of Psychology.

This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2012-68001-19603. Any opinions, findings, or recommendations in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.

Abstract

School-based and after school interventions to encourage child participation in physical activity use self-report surveys, among other methods, to assess level of physical activity. The current study investigated the face validity of nine physical activity self-report items used to evaluate the *Fuel for Fun* program, a nutrition and physical activity intervention for fourth graders administered in Colorado. A convenience sample of fourth graders demographically similar to *Fuel for Fun* participants in Colorado were cognitively interviewed to examine understanding and comprehension of survey items. Qualitative content analysis of interview transcripts revealed that 87.5% to 100% of students reported understanding the items and 50% to 92% provided responses congruent to reference definitions. Physical activity examples included in the items aided comprehension when students had vocabulary or reading issues. Minor revisions were suggested to mitigate vocabulary and format issues. Results supported face validity of the instrument with this sample.

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Chapter 1. Introduction

The objective of this study was to assess face validity of a physical activity self-report instrument for 4th graders by conducting cognitive interviews and using qualitative analysis methods. This thesis consists of two parts, manuscript and complementary information, presented in three chapters. The manuscript, in Chapter 2, will be submitted for peer review and publication. The complementary information presented in Chapters 1 and 3 is supplemental material that expands information from the manuscript. Chapter 1 provides additional background details and literature review including information on the role of validation in survey development and use and how cognitive interviews are conducted and analyzed. Considerations for using self-report with children, background on physical activity self-report instruments and children's physical activity interventions are also presented. Chapter 3 expands on methods, results and discussion from Chapter 2, including details of qualitative analysis methods, additional results, and discussion of physical activity instruments, sample size and error rate considerations.

Role of Validation in Survey Development and Use

Validity is the degree to which an instrument accomplishes its intended task (Nunnally & Bernstein, 1978). Different types of validity describe various aspects of instruments depending on the purpose of the instrument. Three main categories of validity include construct validity, criterion validity, and content validity. Construct validity describes how well an observable variable relates to an abstract, theoretical construct (Nunnally & Bernstein, 1978). Survey items that perform as predicted by theory demonstrate construct validity (Haas & Nigg, 2009). Construct validity includes the aspects of convergent validity, describing a positive relationship between a variable and a construct when predicted by theory, and divergent validity, describing

no relationship between a variable and a construct when predicted by theory. For example, Haas and Nigg (2009) assessed the construct validity of two self-report measures, stage of change for physical activity, and days per week of vigorous, moderate, and light activity, by examining the relationship between scores for each measure. Correlation between the stage of change and vigorous and moderate physical activity was hypothesized from theoretical frameworks. No relationship between stage of change and light activity was hypothesized. One-way analysis of variance followed by post-hoc comparisons were used to determine the degree of correlation between the stages and days per week of each type of activity. Vigorous and moderate activity differentiated the stages, supporting convergent validity of vigorous and moderate activity with stage of change. No relationship between light activity and stage of change was found, supporting divergent validity.

In addition to construct validity, researchers use criterion validity, which describes how well an instrument correlates with related behavior (Shephard, 2003). The more specific term predictive validity is used when the behavior is measured after the instrument is administered. In contrast, the term concurrent validity is used when measurement of the behavior occurs at the same time as administration of the instrument. For example, Cale (1994) assessed the concurrent validity of a proposed physical activity assessment instrument designed for children age 11 years and older. The instrument used interviewer assisted recall of the previous day's activity via an activity checklist. The related behavior of physical activity was measured with observational and heart rate data from the period of time coinciding with the recall. Amounts of moderate, hard and very hard physical activity, computed from the activity checklist, were correlated with the behavior measures with $\rho = .61$ ($p < .01$), suggesting concurrent validity for the instrument.

In contrast to concurrent validity, content validity describes the degree to which an instrument represents the domain of content being studied (Nunnally & Bernstein, 1978). A program evaluation survey demonstrates content validity if experts determine the survey adequately covered the competencies the program was designed to develop. Content validity is ensured by determining that a representative sample of items was included and by following a principled method of construction. For example, Marcus, Rakowski, and Rossi (1992) followed a principled method of construction to ensure content validity for the Decisional Balance measure for exercise. A small, diverse group including men, women, researchers, non-researchers, exercisers and non-exercisers produced an initial pool of statements on the aspects of exercise under study. Researchers revised the statements for clarity and verified that statements adequately covered the domain areas recommended by experts to provide content validity.

Face validity. Face validity is an aspect of content validity and is determined by the judgement of the audience to which the instrument is administered (Nunnally & Bernstein, 1978). The items in the instrument must be understood by the audience to enable the researcher to draw conclusions about the results of survey administration. Cognitive interviews can determine face validity of an instrument by assessing how well the intended recipients understand the content of the instrument.

Cognitive Interviewing

Cognitive interviews can be used to learn what the participant is feeling and thinking (Willis, 2005). In practice, cognitive interviews include think-aloud to induce the participant to express thoughts regarding an item response and verbal probing to elicit specific details. Think-aloud is widely used in developing and pre-testing survey questions and is used in interviews

with children, who naturally think-aloud, e.g., during play (de Leeuw, Borgers, & Smits, 2004). For example, Lohse, Cunningham-Sabo, Walters, and Stacey (2011) used think-aloud techniques during cognitive interviews with 4th and 5th graders to inform development of survey questions assessing fruit and vegetable preferences, cooking self-efficacy, and cooking attitude.

In contrast to the free flow of thoughts characteristic of think-aloud, verbal probing can be used to direct the flow of the information (Willis, 2005). The interviewer asks a question, the participant answers, and the interviewer follows with a more specific question directed at another aspect of the original question. Usually verbal probing and think-aloud are combined during a cognitive interview. Think-aloud offers the advantages of minimal interviewer induced bias and open-ended format. Less interviewer training is required for think-aloud than for verbal probing. However, more participant training is required for think-aloud than for verbal probing, increasing the burden on the participant. In addition, think-aloud proficiency may vary from participant to participant. An advantage of verbal probing is that the interviewer maintains control of the interview.

Cognitive interviews can be used successfully with children in the development, revision, and validation of instruments, although techniques must be adapted (de Leeuw et al., 2004). Children need more verbal probing than adults to elicit detailed descriptions (de Leeuw et al., 2004). In addition, children need more detailed introduction and explanation of the purpose of the interview and are more susceptible to demand characteristics and suggestibility than adults (de Leeuw et al., 2004). Interview questions must be designed with the consideration that children interpret statements literally (de Leeuw et al., 2004). In their study validating the “Day in the Life Questionnaire-Colorado,” a dietary recall instrument, Wallen, Cunningham-Sabo, Auld, and Romaniello (2011) used cognitive interviews with 10 Colorado fourth grade students

to inform revision of the "Day in the Life Questionnaire," which was developed and validated in the United Kingdom.

Cognitive interviews with children can also assess face validity. Lohse et al. (2011) interviewed 123 fourth and fifth graders using think-aloud and probing cognitive interview techniques to establish face validity of an instrument administered to evaluate classroom-based cooking interventions. The instrument included questions on attitude toward cooking, cooking self-efficacy, as well as fruit and vegetable preferences. Researchers asked participants questions about their understanding of survey items and used qualitative methods to analyze the data to determine comprehension of the instrument.

Qualitative Analysis

Cognitive interview data are analyzed with qualitative research methods. Qualitative research uses principled and systematic methods to collect and analyze data gathered in a natural setting (Creswell, 2013). Data sources include interviews, fieldnotes of observations, and verbal, pictorial or multi-media documents. Qualitative data are often verbal, focusing on the meaning participants give to situations, events, and experiences, in contrast to concise numerical measures of quantitative data. Qualitative analysis may use deductive or inductive methods. Deductive methods begin with a hypothesis then collect and analyze data to test the hypothesis. Inductive methods construct patterns and themes from the data, producing a multi-faceted holistic account of the research investigation. Qualitative analysis methods provide in-depth descriptions of participants' perspectives. For example, Bisogni, Jastran, Seligson, and Thompson (2012) reviewed qualitative studies on interpretations of healthy eating to provide a broad description of perspectives on healthy eating, giving researchers a deeper understanding of their audience. Shan et al. (2015) identified themes relating to social media use in communications between

consumers and food and nutrition organizations from interviews with 16 organization representatives. Eli, Howell, Fisher, and Nowicka (2014) qualitatively analyzed interviews with 49 adults to learn in-depth insights into the emergence of body-weight awareness. All of these examples show the depth of understanding accessible through qualitative analysis.

Qualitative methods include analytical coding to describe the data, using the codes to categorize the data into emerging themes, recoding to develop the themes, and memoing as a reflexive method for defining themes and recognizing patterns (Emerson, Fretz, & Shaw, 2011; Saldaña, 2013). Saldaña (2013) presented 32 coding methods, demonstrating their use with examples and suggesting appropriate types of studies for each. Methods ranged from initial coding and in vivo, often used at the beginning stages of analysis for coding close to the data, to pattern coding and focused coding, used as themes develop. Emerson et al. (2011) discussed several types of memos used to elaborate on patterns observed in the data. For example, analytic memos describe insights about the data; code memos define the meanings of analytical codes; and theoretical memos link concepts together into themes. In addition, memos provide a record of the researcher's thinking as the analysis proceeds, strengthening study confirmability by providing an audit trail (Doherty, 2015).

Phenomenological approach to qualitative analysis. The methods and organization of a qualitative study are informed by the approach used for the study design (Creswell, 2013). The phenomenological approach, one of five approaches described by Creswell (2013), was chosen for the current study. The main feature of a phenomenological study is emphasis on a concept to be explored (Polkinghorne, 1989). The researcher collects data from a group of individuals who have experience with the concept, usually through interviews. Data are systematically analyzed by collecting individual units of data into broader categories to develop a coherent description of

the essence of the concept. Anderson and Spencer (2002) used a phenomenological approach in their study of 58 AIDS patients to understand the participants' cognitive representation of their condition. The researchers analyzed participants' interview data for significant statements, formulated meanings from the statements and clustered meanings into themes to construct a description of the essence of the phenomenon. As another example, Lohse (2015) used an interpretive phenomenological approach to analyze interview data to determine the validity of the Satter Eating Competence Inventory developed for low-income persons with persons not classified as low-income. Interview responses were analyzed for congruence with researchers' intended meaning of survey items. The current study focused on analyzing interview responses to determine whether students' understanding of physical activity survey items was congruent with reference definitions determined by researchers.

Content analysis. Content analysis is a flexible, systematic method for analyzing qualitative data such as interview data or quantitative data (Schreier, 2012). Researchers use content analysis to draw inferences from data to the context of its use (Marsh & White, 2006). When applied to either type of data, content analysis may use a data-driven approach to guide the researcher through examining the data to identify concepts that aggregate into patterns to characterize a phenomenon, a concept-driven approach guided by existing theory or a blended approach combining data-driven and concept-driven approaches (Schreier, 2012). Komine (2015) used content analysis with a data-driven approach to assess face validity of the cooking experience, cooking attitude and cooking self-efficacy portions of the *Cooking with Kids – Colorado* survey. Qualitative interview data was examined for emerging themes to develop an operational definition of cooking which was then used to determine comprehension of survey items.

Qualitative analysis with word clouds. Word clouds can be used to examine verbal qualitative data for emerging themes (Saldaña, 2013). In the current study, physical activities mentioned during interviews were compiled into a word cloud to provide a visual aid for analysis. Word clouds, or tag clouds, are a visual representation of the frequency of word occurrence in a segment of text. The more often a word occurs in the text, the larger the font size of the word in a word cloud. Word clouds have the capacity to give a general sense of the text at a glance (Rivadeneira, Gruen, Muller, & Millen, 2007). The popularity of word clouds has spawned several websites allowing users to create word clouds from text ("TagCrowd: make your own tag cloud from any text," n.d., "Tagline Generator - Timeline-based Tag Clouds," n.d., "Tagxedo - Word Cloud with Styles," n.d., "Wordle - Beautiful Word Clouds," n.d.).

Because word clouds are visually compelling, they can be an effective tool for providing an initial view of the data. McNaught and Lam (2010) discuss the usefulness of word clouds as an adjunct tool in content analysis for researchers to have a "fast and visually rich way to have some basic understanding of the data" (p.630). For example, Kitchens (2014) used word clouds as an informal indicator of students' progress by comparing word clouds of student essays written at the beginning of a course with essays written at the end. Cidell (2016) examined regional differences reflected in word clouds for public opinion on green buildings as a methodology for exploratory qualitative data analysis. Nang et al. (2015) used word clouds to show word frequencies and to compare observations drawn from word clouds with findings from other qualitative analyses of the data. Other uses of word clouds include complementing qualitative analysis of satisfaction surveys for a training program (Bletzer, 2015), and tracing the shift in article topics over 3 decades of journal publications (Ahearn, 2014). Saldaña (2013)

suggested using word clouds “after first cycle” as a way to transition to the next level of qualitative analysis.

Physical Activity Instruments

Researchers have developed a variety of self-report instruments to measure physical activity (Cale, 1994). Cale (1994) reviewed eight physical activity self-report instruments used with children, varying in modes of administration, information provided, and response burden. Mode of administration referred to the manner in which the question elicited information about physical activity. For example, in one instrument, participants viewed posters depicting children engaged in activities of various intensity levels. Participants chose the poster most representative of their usual physical activity. In other instruments, participants selected the activities in which they commonly engage from a verbal list of physical activities. Lists included from 10 to 20 specific physical activities or categories of physical activities. In some instruments, participants also reported duration of physical activities. Information provided by instruments varied with mode of administration and included activity performed in the most recent day or week, typical activity, duration of activity, and frequency of activity. Response burdens ranged from low, e.g. for single question instruments, to high for seven day recall instruments. Researchers use instruments such as these to assess intervention effectiveness (Battista, Nigg, Chang, Yamashita, & Chung, 2005; Harmon et al., 2014; C. S. S. Iversen, Nigg, & Titchenal, 2011; Sallis et al., 1997) and describe physical activity level in a sample (Godin, Jobin, & Bouillon, 1986).

Leisure Time Exercise Questionnaire. An instrument used in assessing intervention effectiveness is Godin and Shephard’s (1985) Leisure Time Exercise Questionnaire (LTEQ). The LTEQ is a simple-to-administer instrument with the goal of classifying participants by activity

level. In the original version, adult participants reported the number of times per week they participated in each of strenuous, moderate, and mild levels of activity for more than 15 minutes during their free time. Brief definitions were included in addition to example activities. Participants also reported how frequently they engaged in regular physical activity, with choices of often, sometimes, or never/rarely. The LTEQ was assessed for concurrent validity and test-retest reliability, the degree to which an instrument provides similar scores under similar conditions, and shown to be a valid measure of physical activity in adults (Godin et al., 1986).

Godin and Shephard's (1985) LTEQ was also used with children. Sallis, Buono, Roby, Micale, and Nelson (1993) included the LTEQ in a study assessing the validity of three self-report instruments with children in fifth, eighth, and eleventh grades. Thirty-six fifth graders, thirty-six eighth graders and 30 eleventh graders participated in the study, which examined test-retest reliability and construct validity of an interviewer-administered seven-day recall instrument, LTEQ, and a single question activity-rating instrument. Researchers validated the interviewer-assisted instrument with heart rate data, and then correlated the three instruments with each other. LTEQ demonstrated acceptable construct validity and test-retest reliability in all grades and correlated well with the interviewer-assisted instrument.

Transtheoretical Model. In addition to measuring the amount and type of physical activity, researchers have also investigated how physical activity level is related to stage of change in physical activity behavior. The stage of change model (Prochaska & Velicer, 1997) described five stages through which individuals move as they make behavior change decisions: precontemplation, contemplation, preparation, action, and maintenance. Individuals in precontemplation stage are not planning to make a change in the next six months. In contemplation stage, individuals are planning to make a change in the next six months.

Individuals in preparation stage are planning to make a change in the next month. Individuals in action stage have made a change within the last six months. Individuals reach maintenance stage when they have continued the change for six months. The model included measures for self-efficacy in coping strategies and decisional balance of the benefits and costs of changing to describe movement through the stages. In addition, the theory described processes of change that individuals use as they move through the stages including, for example, consciousness or awareness raising, dramatic relief such as role-playing or personal testimonies, self-reevaluation, counterconditioning to learn substitute behaviors, and stimulus control to restructure their environment to support desired behaviors. Individuals use different processes during different stages of change. Interventions for both children and adults for various health behaviors, including physical activity, have incorporated stage of change theory.

Researchers have successfully used instruments including a stage of change item to measure intervention-mediated stage of change with children. For example, Ham, Sung, Lee, Choi and Im (2016) studied the effects of an exercise intervention for 8 to 13 year-old students in Korea designed using stage of change principles. Researchers used a self-report to assess student stage of change for physical activity. The self-report consisted of a single item with five response choices. Each choice described physical activity behavior in terms of one of the stages of change. For example, for precontemplation the response was, “I am not performing regular exercise currently and I will not start exercise within the next 6 months.” (Ham et al., 2016, p. 118).

In addition, Haas and Nigg (2009) studied construct validity of self-report of stage of change for physical activity with self-report of vigorous, moderate, light, and sedentary behavior with fourth through sixth graders. Students indicated stage of change for regular physical

activity by selecting one of five answer choices. LTEQ was used to measure vigorous, moderate and light activity. Sedentary behavior was measured by self-report of hours of TV viewing or videogame playing per day. Researchers found that students in maintenance reported significantly more vigorous activity than students in other stages, with a similar, but non-significant result for moderate activity. The study extended construct validity of the stage of change for physical activity self-report item for vigorous and moderate activity to children (Haas & Nigg, 2009).

Using self-report instruments with children. Advantages of self-reports are cost-effectiveness and ease of administration, making them a practical mechanism for evaluating physical activity programs. However, limitations include error related to the clarity of terminology and human cognitive processes. When self-report instruments are used with children, impediments related to clarity of terminology and human cognitive processes are more apparent than when using self-reports with adults (Cale, 1994). In middle childhood (ages 7-12) children's memory capacity and speed are still developing, requiring care to avoid complex questions and response choices (de Leeuw, 2011). Language and reading skills are also still developing at this age, requiring clear wording (de Leeuw, 2011). In addition, children this age are more prone to demand characteristics and are more susceptible to suggestion than adults are (de Leeuw, 2011). In early middle childhood (ages 7–9), children may have difficulty recalling specific days or times of physical activity or estimating duration of physical activity (Belton & Mac Donncha, 2010). Preadolescent (9-12) children think concretely, resulting in exaggerating the importance of short activity intervals (Welk, Corbin, & Dale, 2000). In addition, children have different physical activity patterns from adults (Welk et al., 2000). Children are naturally active because their developing nervous systems need stimulation from bodily movement. The

mature nervous systems of adults are able to receive stimulation from cerebral activities such as reading. Results of an observational study showed that children move with short bouts of high intensity energy expenditure interspersed with longer periods of rest, contrasting with adults' uniform physical activity patterns (Welk et al., 2000). Children are naturally inquisitive and eager to try new activities (Welk et al., 2000). These considerations demonstrate the importance of assessing face validity of physical activity self-reports with children, using children similar in age to the children to which the instrument will be administered.

Fuel for Fun

The current study evaluated an instrument used to assess change in physical activity from a school-based intervention, *Fuel for Fun.* This program for fourth grade children promotes a healthful lifestyle through active recess and hands-on cooking experiences (Cunningham-Sabo et al., 2016). Additional components connect classroom experiences to the school cafeteria and encourage involvement of parents. *Cooking with Kids – Colorado* is the cooking experience component (Cunningham-Sabo et al., 2016; Cunningham-Sabo & Lohse, 2013, 2014; Lukas & Cunningham-Sabo, 2011). *Cooking with Kids – Colorado* involves fourth grade children in classroom-based fruit and vegetable tasting and cooking experiences. The program has a 15-year history in the Southwestern United States and was initially developed for a predominantly low-income Hispanic population.

Sports, Play, and Active Recreation for Kids Active Recess is the active recess component (Sallis et al., 1997). The after school physical activity program, Sports, Play, and Active Recreation for Kids (SPARK), began in 1989 as a solution to the growing problem of reduced physical activity in children (Mckenzie, Sallis, & Rosengard, 2009). The program was initially developed for fourth graders and includes physical activity and self-management skills

components (Sallis et al., 1997). The physical activity component consisted of activity units emphasizing cardiovascular endurance and development of motor skills, for example, kicking, throwing and catching (Iversen, Nigg, & Titchenal, 2011). The self-management component included instruction in goal setting, problem solving and self-monitoring with the goal of extending physical activity beyond the school day. The SPARK program was commercialized in 2002, enabling program availability at a national level (Mckenzie et al., 2009).

Fuel for Fun was implemented in eight elementary schools in the Fort Collins and Loveland, Colorado (CO) area (Cunningham-Sabo et al., 2016). To assess program outcomes, trained, University personnel administered a 60-item survey to the children using a paper-pencil format in the classroom. The survey comprised a cooking section, an eating competence section, and a physical activity section. The cooking section, which was shown to be reliable (Lohse et al., 2011) and to have face validity (Komine, 2015), included three cooking experience questions each answered as affirmative or negative. Additionally fruit and vegetable preference was measured with 18 items (11 vegetable, 7 fruit) on a 5-point visual analog scale. Self-efficacy for serving and preparing fruits and vegetables was assessed with 8 items on a 5-point Likert scale. Responses to 6 statements, also on a 5-point Likert scale, demonstrated attitudes toward cooking, fruits and vegetables. Eating competence was measured with the Satter Eating Competence Inventory (ecSI 2.0); this validated instrument included 16 items with response options from never (0) to always (4) so that possible scores ranged from 0 to 64 with higher numbers indicating greater eating competence (Lohse, 2015).

Physical activity components of the *Fuel for Fun* intervention were assessed with 9 items adapted from the *Fun 5* survey. *Fun 5* was a Hawaii-based after school program for fourth through sixth graders with goals similar to those of *Fuel for Fun* (Nigg et al., 2012). *Fun 5*

incorporated SPARK Active Recess and used an instrument combining LTEQ with a question on the stage of change for physical activity (Haas & Nigg, 2009) for assessment during the pilot phase (Battista, Nigg, Chang, Yamashita, & Chung, 2005) and after program dissemination (Iversen et al., 2011).

The physical activity section of the *Fuel for Fun* survey consisted of nine questions regarding participant frequency of engagement in strenuous, moderate, and mild physical activity as well as sedentary behaviors such as watching television, plus a stage of change question and a seasonal activity levels question. Physical activity questions on strenuous, moderate, mild activity were modeled after the LTEQ (Godin et al., 1986; Godin & Shephard, 1985; Sallis, Condon, et al., 1993) with slight modifications.

The goal of the current study was to assess the face validity of the *Fuel for Fun* physical activity items with cognitive interviews with a sample of mostly white, middle-income fourth graders representative of the sample used in the *Fuel for Fun* intervention (Cunningham-Sabo et al., 2016). The research question was does the *Fuel for Fun* physical activity survey have face validity with a sample of mostly white, middle-income fourth graders?

References

Ahearn, L. M. (2014). Detecting research patterns and paratextual features in AE word clouds, keywords, and titles. *American Ethnologist*, *41*(1), 17–30. doi:10.1111/amet.12056

Anderson, E. H., & Spencer, M. H. (2002). Cognitive representations of AIDS: A phenomenological study. *Qualitative Health Research*, *12*(10), 1338–1352. doi:10.1177/1049732302238747

Battista, J., Nigg, C. R., Chang, J. A., Yamashita, M., & Chung, R. (2005). Elementary after school programs: An opportunity to promote physical activity for children. *Californian Journal of Health Promotion*, *3*(4), 108–118.

Belton, S., & Mac Donncha, C. (2010). Reliability and validity of a new physical activity self-report measure for younger children. *Measurement in Physical Education and Exercise Science*, *14*(1), 15–28. doi:10.1080/10913670903454994

Bisogni, C., Jastran, M., Seligson, M., & Thompson, A. (2012). How people interpret healthy eating: Contributions of qualitative research. *Journal of Nutrition Education and Behavior*, *44*(4), 282–301. doi:10.1016/j.jneb.2011.11.009

Bletzer, K. V. (2015). Visualizing the qualitative: making sense of written comments from an evaluative satisfaction survey. *Journal of Educational Evaluation for Health Professions*, *12*(12), 1–8. doi:10.3352/jeehp.2015.12.12 Open

Cale, L. (1994). Self-report measures of children's physical activity: Recommendations for future development and a new alternative measure. *Health Education Journal, 53*, 439–453.

Cidell, J. (2016). Content clouds as exploratory qualitative data analysis, *42*(4), 514–523.

Creswell, J. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). London: SAGE Publications, Inc.

Cunningham-Sabo, L., & Lohse, B. (2013). Cooking with Kids positively affects fourth graders' vegetable preferences and attitudes and self-efficacy for food and cooking. *Childhood Obesity*, *9*(6), 549–556. doi:10.1089/chi.2013.0076

Cunningham-Sabo, L., & Lohse, B. (2014). Impact of a school-based cooking curriculum for fourth-grade students on attitudes and behaviors is influenced by gender and prior cooking experience. *Journal of Nutrition Education and Behavior*, *46*(2), 110–120. doi:10.1016/j.jneb.2013.09.007

Cunningham-Sabo, L., Lohse, B., Smith, S., Browning, R., Strutz, E., Nigg, C. R., … Ruder, E. (2016). Fuel for Fun: a cluster-randomized controlled study of cooking skills, eating behaviors, and physical activity of 4th graders and their families. *BMC Public Health*, *16*(1), 444–460. doi:10.1186/s12889-016-3118-6

de Leeuw, E. (2011). *Improving data quality when surveying children and adolescents: Cognitive and social development and its role in questionnaire construction and pretesting*. Naantali, Finland.

de Leeuw, E., Borgers, N., & Smits, A. (2004). Pretesting questionnaires for children and adolescents. In *Methods for testing and evaluating survey questionnaires* (pp. 409–429). doi:10.1002/0471654728.ch20

Doherty, M. E. (2015). Qualitative analysis of the American College of Nurse-Midwives student reports, 2005 to 2014. *Journal of Midwifery and Women's Health*, *60*(6), 762–768. doi:10.1111/jmwh.12349

Eli, K., Howell, K., Fisher, P. A., & Nowicka, P. (2014). "Those comments last forever": Parents and grandparents of preschoolers recount how they became aware of their own body weights as children. *PLoS ONE*, *9*(11). doi:10.1371/journal.pone.0111974

Emerson, R. M., Fretz, R. I., & Shaw, L. L. (2011). *Writing ethnographic fieldnotes* (2nd ed.). Chicago: The University of Chicago Press.

Godin, G., Jobin, J., & Bouillon, J. (1986). Assessment of leisure time exercise behavior by self-report: A concurrent validity study. *Canadian Journal of Public Health, 77*(5), 359–362.

Godin, G., & Shephard, R. J. (1985). A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Sciences, 10*(3), 141–146.

Haas, S., & Nigg, C. R. (2009). Construct validation of the stages of change with strenuous, moderate, and mild physical activity and sedentary behaviour among children. *Journal of Science and Medicine in Sport, 12*(5), 586–591. doi:10.1016/j.jsams.2008.11.001

Ham, O. K., Sung, K. M., Lee, B. G., Choi, H. W., & Im, E. O. (2016). Transtheoretical model based exercise counseling combined with music skipping rope exercise on childhood obesity. *Asian Nursing Research, 10*(2), 116–122. doi:10.1016/j.anr.2016.03.003

Harmon, B. E., Nigg, C. R., Long, C., Amato, K., Anwar, M.-U., Kutchman, E., … Hill, J. O. (2014). What matters when children play: Influence of social cognitive theory and perceived environment on levels of physical activity among elementary-aged youth. *Psychology of Sport and Exercise, 15*(3), 272–279. doi:10.1016/j.psychsport.2014.02.001

Iversen, C. S. S., Nigg, C. R., & Titchenal, C. A. (2011). The impact of an elementary after-school nutrition and physical activity program on children's fruit and vegetable intake, physical activity, and body mass index: Fun 5. *Hawaii Medical Journal, 70*(7 Suppl 1), 37–41.

Kitchens, M. B. (2014). Word clouds: An informal assessment of student learning. *College Teaching, 62*, 113–114. doi:10.1080/87567555.2013.807216

Komine, T. (2015). *"What does cooking mean to kids?" Using cognitive interviews to assess the*

face validity of an existing survey with a new audience in the Fuel for Fun program. Colorado State University, Fort Collins, CO.

Lohse, B. (2015). The Satter Eating Competence Inventory for low-income persons is a valid measure of eating competence for persons of higher socioeconomic position. *Appetite, 87*, 223–228. doi:10.1016/j.appet.2014.12.228

Lohse, B., Cunningham-Sabo, L., Walters, L. M., & Stacey, J. E. (2011). Valid and reliable measures of cognitive behaviors toward fruits and vegetables for children aged 9 to 11 years. *Journal of Nutrition Education and Behavior, 43*(1), 42–49. doi:10.1016/j.jneb.2009.12.006

Lukas, C. V., & Cunningham-Sabo, L. (2011). Qualitative investigation of the Cooking with Kids program: Focus group interviews with fourth-grade students, teachers, and food educators. *Journal of Nutrition Education and Behavior, 43*(6), 517–524. doi:10.1016/j.jneb.2011.05.009

Marcus, B. H., Rakowski, W., & Rossi, J. S. (1992). Assessing motivational readiness and decision making for exercise. *Health Psychology, 11*(4), 257–261. doi:10.1037/0278-6133.11.4.257

Marsh, E. E., & White, M. D. (2006). Content analysis: A flexible methodology. *Library Trends, 55*(1), 22–45. doi:10.1353/lib.2006.0053

Mckenzie, T. L., Sallis, J. F., & Rosengard, P. (2009). Beyond the Stucco tower: Design, development, and dissemination of the SPARK physical education programs. *Quest, 61*(1), 114–127. doi:10.1080/00336297.2009.10483606

McNaught, C., & Lam, P. (2010). Using wordle as a supplementary research tool. *Qualitative Report, 15*(3), 630–643.

Nang, C. R. N., Monahan, F., Diehl, C. G. B., & French, D. (2015). A qualitative content analysis of global health engagements in peacekeeping and Stability Operations Lessons Learned and Information Management System. *Military Medicine*, *180*(April), 409–419. doi:10.7205/MILMED-D-14-00387

Nigg, C. R., Geller, K., Adams, P., Hamada, M., Hwang, P., & Chung, R. (2012). Successful dissemination of Fun 5 -- A physical activity and nutrition program for children. *Translational Behavioral Medicine*, *2*(3), 276–85. doi:10.1007/s13142-012-0120-0

Nunnally, J., & Bernstein, I. (1978). Validity. In *Psychometric theory* (2nd ed., pp. 86–113). New York, NY: McGraw-Hill.

Polkinghorne, D. E. (1989). Phenomenological research methods. In R. S. Valle & S. Halling (Eds.), *Existential -phenomenological alternatives in psychology* (pp. 41–60). New York, NY: Plenum Press.

Prochaska, J. O., & Velicer, W. F. (1997). The transtheoretical model of health behavior change. *American Journal of Health Promotion*, *12*(1), 38–48. doi:10.4278/0890-1171-12.1.38

Rivadeneira, A. W., Gruen, D. M., Muller, M. J., & Millen, D. R. (2007). Getting our head in the clouds: Toward evaluation studies of tagclouds. *25th SIGCHI Conference on Human Factors in Computing Systems, CHI 2007*, 995–998. doi:10.1145/1240624.1240775

Saldaña, J. (2013). *The coding manual for qualitative researchers* (2nd ed.). London: SAGE Publications, Inc.

Sallis, J. F., Buono, M., Roby, J., Micale, F., & Nelson, J. (1993). Seven-day recall and other physcial activity self-reports in children and adolescents. *Medicine and Science in Sports and Exercise*.

Sallis, J. F., Condon, S. A., Goggin, K. J., Roby, J. J., Kolody, B., & Alcaraz, J. E. (1993). The

development of self-administered physical activity surveys for 4th grade students. *Research Quarterly for Exercise and Sport*, *64*(1), 25–31.

Sallis, J. F., McKenzie, T., Alcaraz, J., Kolody, B., Faucete, N., & Hovell, M. (1997). The effects of a 2-year physical education program (SPARK) on physical activity and fitness in elementary school students. *American Journal of Public Health*, *87*(8), 1328–1334.

Schreier, M. (2012). *Qualitative content analysis in practice*. London: Sage Publications Ltd.

Shan, L. C., Panagiotopoulos, P., Regan, Á., De Brún, A., Barnett, J., Wall, P., & McConnon, Á. (2015). Interactive communication with the public: Qualitative exploration of the use of social media by food and health organizations. *Journal of Nutrition Education and Behavior*, *47*(1), 104–108. doi:10.1016/j.jneb.2014.09.004

Shephard, R. J. (2003). Limits to the measurement of habitual physical activity by questionnaires. *British Journal of Sports Medicine*, *37*(3), 197–206; discussion 206.

TagCrowd: make your own tag cloud from any text. (n.d.). Retrieved February 22, 2016, from http://tagcrowd.com/

Tagline Generator - Timeline-based Tag Clouds. (n.d.). Retrieved February 22, 2016, from http://chir.ag/projects/tagline/

Tagxedo - Word Cloud with Styles. (n.d.). Retrieved February 22, 2016, from http://www.tagxedo.com/

Wallen, V., Cunningham-Sabo, L., Auld, G., & Romaniello, C. (2011). Validation of a group-administered pictorial dietary recall with 9- to 11-year-old children. *Journal of Nutrition Education and Behavior*, *43*(1), 50–54. doi:10.1016/j.jneb.2009.12.008

Welk, G. J., Corbin, C. B., & Dale, D. (2000). Measurement issues in the assessment of physical activity in children. *Research Quarterly for Exercise and Sport*, *71*(sup2), 59–73.

doi:10.1080/02701367.2000.11082788

Willis, G. B. (2005). *Cognitive interviewing: a tool for improving questionnaire design*. Sage Publications.

Wordle - Beautiful Word Clouds. (n.d.). Retrieved February 22, 2016, from http://www.wordle.net/

Chapter 2. Interviews Define Face Validity of Physical Activity Survey Items with Fourth Graders

Physical activity is an important component of a child's daily routine. In a study of preadolescent children, Marta, Marinho, and Marques (2012) found that physical activity was positively related to physical fitness levels and negatively related to body fat. From their meta-analysis, Ahn and Fedewa (2011) concluded that physical activity had a positive effect on children's mental health. Physical activity is also positively correlated with executive cognitive function, important for academic success (Davis & Cooper, 2011; Riggs, Chou, Spruijt-Metz, & Pentz, 2010). Snelling et al. (2015) demonstrated a trend in higher math proficiency scores as physical education time increased.

National guidelines recommend that children obtain at least 60 minutes of physical activity each day consisting of moderate to vigorous aerobic exercise and muscle-strengthening and bone-strengthening activities (US Department of Health and Human Services, 2008). However, a majority of children fail to meet national recommendations. A study of physical activity measured by accelerometer showed that the percentage of children meeting public health recommendations for physical activity was 42% for 6 to 11 year olds and that boys were more active than girls through adolescence (Troiano et al., 2008).

Concern over the increasing gap in children's physical activity has motivated study of school-based or after school physical activity programs, which use self-report surveys in addition to other measures such as pedometers, accelerometers or observation, to evaluate program effectiveness. For example, Gutin, Riggs, Ferguson, and Owens (1999) developed an after school physical activity program for obese children designed to maximize individual participation with engaging games and used a seven-day recall instrument as a measure. In a

study of a school-based enhanced physical education intervention for sixth-graders, Shore, Sachs, DuCette, and Libonati (2014) used pedometer step-counts to assess program effectiveness. Donnelly et al. (2009) conducted a three-year longitudinal study, titled Physical Activity Across the Curriculum, of in-class lessons incorporating physical activity into academic material and using direct observation of physical activity as a measure. Sallis et al. (Sallis et al., 1997) used a one-day physical activity self-report combined with accelerometer and observational data to assess the effects of a school-based physical education program.

A self-report frequently used with adults and children to measure physical activity is the Leisure-Time Exercise Questionnaire (LTEQ) (Godin & Shephard, 1985). Respondents report duration and frequency of strenuous, moderate, and mild activities. Test-retest reliability and construct validity of LTEQ was examined in 5th, 8th and 11th graders (Sallis, Buono, et al., 1993). Harmon et al. (2014) used LTEQ to study the relationship between physical activity levels and enjoyment, self-efficacy and support in 9 to 12 year old children.

Researchers also use self-report to assess stage of change for physical activity, based on the Transtheoretical Model (Prochaska & Velicer, 1997). In the model, five stages of change describe an individual's progression through adoption of physical activity behavior: pre-contemplation, contemplation, preparation, action and maintenance. The self-report consists of a single item with response options corresponding to each stage. Haas and Nigg (2009) studied construct validity of the stage of change for physical activity item with LTEQ in fourth through sixth graders. Battista, Nigg, Chang, Yamashita, and Chung (2005) used an instrument combining LTEQ with an item on stage of change for physical activity as a baseline measure for *Fun-5*, an after school physical activity program for fourth through sixth graders in Hawaii.

Fuel for Fun (Cunningham-Sabo et al., 2016) is a Colorado-based program similar to *Fun-5,* which includes nutrition and physical activity components and uses a 60-item self-report. Assessment of the nutrition component, *Cooking with Kids – Colorado* (Cunningham-Sabo et al., 2016), includes items on cooking experience (CE), attitude (AT) towards cooking with fruits and vegetables, and self-efficacy (SE) of cooking with fruits and vegetables.

Validation of self-report instruments informs researchers about appropriate application and interpretation of results. Face validity describes how well an instrument appears to measure what researchers intend the instrument to measure (Nunnally & Bernstein, 1978) and is determined by judgement of the audience to which the instrument is administered. Cognitive interviews appraise face validity of instruments by investigating how intended recipients understand the content (Willis, 2005). Think-aloud techniques induce the participant to express thoughts regarding the answer to a question. Verbal probing techniques elicit details about specific questions. Cognitive interviews have been used successfully with children in the development, revision, and validation of instruments (de Leeuw et al., 2004; Iversen et al., 2010; Lohse et al., 2011; Wallen et al., 2011).

Content analysis is a flexible, systematic method for analyzing quantitative or qualitative data, including data from cognitive interviews (Schreier, 2012). Content analysis uses categories to organize the data. Content analysis may be used inductively, when little theory exists about the phenomenon, or deductively, allowing theory to guide the development of categories. For example, content analysis was applied to child interview data to determine face validity of CE, AT and SE portions of the *Fuel for Fun* survey (Komine, 2015).

Although test-retest reliability, concurrent validity, and construct validity were examined for LTEQ in adults (Godin et al., 1986; Godin & Shephard, 1985) and children (Sallis, Buono, et

al., 1993) and construct validity of LTEQ with stage of change for physical activity was studied in children (Haas & Nigg, 2009), no studies exist examining face validity of these items in 4th grade students. The goal of the current study was to assess face validity of the *Fuel for Fun* physical activity items with a sample of mostly white fourth graders in the Rochester, New York area who are similar to students participating in the *Fuel for Fun* program in CO (Cunningham-Sabo et al., 2016).

Method

Participants

A targeted convenience sample of participants was recruited from 4th grades of schools and youth programs in low and middle-income areas as determined by percent participation in free school lunch programs. Principals or special-program directors of targeted schools were contacted by email or phone and given information about this study. School personnel in volunteering schools sent home or emailed flyers to parents with information on how to participate. A seven-tabbed version of the flyer was posted in libraries and other venues frequented by the target population. Ninety tabbed flyers and 1254 individual flyers (paper and electronic) were distributed.

Parents consented through an online survey hosted on the Qualtrics platform (Qualtrics.com, Provo, UT). One participating school requested a printed version of the consent form for parents who did not have convenient access to internet. Consenting parents provided demographic information and contact information through an email triggered by submitting the consent. Parents receiving the printed consent form entered the demographic information, signed the form and returned the form to the school. Parents scheduled interviews at convenient times and locations. For interviews held at a participating school, school staff scheduled interviews convenient to the school schedule. Students provided assent at the beginning of the interview. The study was approved by the Colorado State University and Rochester Institute of Technology Institutional Review Boards for the protection of human subjects.

Participants (N=24; 50% girls; 92% white; 12% Hispanic; 8% Asian) were from nine schools including 3 urban and 6 suburban schools and ranged in age from 8 to 10 years (M=9.7, SD=.43). One consented student could not fit an interview into the schedule during the study

period. Four students were from low-income schools, defined as schools with greater than 50% participation in free lunch programs. Interviews were conducted over a 13-week period in the spring with students in 4th grade at the time of the interview. Interview locations included public libraries or participating schools. One interview was conducted after the end of the school year with a student who had just completed 3rd grade.

Materials

Students completed *Fuel for Fun* (Cunningham-Sabo et al., 2016) survey items on CE (Cunningham-Sabo & Lohse, 2013) (3 yes/no items), SE (8 five-point Likert scale items), AT (6 five-point Likert scale items), and the physical activity (9 items, Figure 1), and eating competence (Krall & Lohse, 2011) (16 five-point Likert scale items) sections. The physical activity section included items adapted from LTEQ (Godin & Shephard, 1985) on description and frequency of strenuous, moderate, and mild activity, (Q1-Q6), an item on sedentary behavior (Q7) (Haas & Nigg, 2009), a stage of change item (Q8) (Battista et al., 2005; Haas & Nigg, 2009), and a seasonal activity item (Q9) comparing current and summer physical activity levels.

Insert Figure 1 here.

An interview protocol following recommendations in Shafer and Lohse (Shafer & Lohse, 2005) was developed to guide the interviewer through discussion of the survey items. The protocol included an interview guide with interview questions to probe for understanding of terms used in the survey and clarity of survey items, for example, “What do you think the word ‘strenuous’ means?” (see Table 1), as well as space for notes about non-verbal cues and overall impressions and interview details such as participant ID, interview time, survey completion time and location. To maintain a reasonable length for interviews, the sample was divided into two groups (labeled A and B) with each group responding to interview questions for 8 of the 12

physical activity survey items (3 description items plus 9 response items). Both groups completed all survey items by paper and pencil, and answered interview questions about survey items including one CE (Cunningham-Sabo & Lohse, 2013) item, the description and frequency of strenuous activity, the stage of change item, and two eating competence (Krall & Lohse, 2011) items. In addition, Group A answered interview questions about the description and frequency of moderate activity and the seasonal activity item. Group B answered interview questions about the description and frequency of mild activity and the sedentary behavior item. A variation of the interview guide was created for each group. The interview data on CE and eating competence were used elsewhere.

Insert Table 1 here.

Experts reviewed recordings of practice interviews and informed revision of the interview guides. A pilot interview with a 4th grader resulted in additional revisions. Following Blair, Conrad, Castellano Ackermann, and Claxton's (2006) suggestion to apply informed revisions, the guide was changed twice during data collection. The first revision occurred after eight interviews revealed that the wording of two interview questions was confusing. For example, the interview question, "Tell me about something you think can be completed in 60 minutes. How does this compare with 30 minutes?" was changed to "How is 30 minutes different from 60 minutes?" The second revision, after the ninth interview, included adding a request for examples of strenuous, moderate, or mild activity to gain insight on understanding of the item descriptions.

Procedure

A trained, novice interviewer conducted interviews in English. The interviewer welcomed the student, explained the purpose of the project and read aloud the child assent. After

the signing the assent, the student completed survey items silently and independently, followed by the audio-recorded cognitive interview portion. A second researcher was present as note taker during three interviews as interviewer practice. Standard cognitive interview techniques included a practice question to introduce the process, scripted interview questions, and conditional probes triggered by participant responses (Beatty & Willis, 2007). At completion of the cognitive interview, the participant received a $15 gift card. After the 23rd interview, transcripts were reviewed and it was determined relatively few new insights were uncovered (Beatty & Willis, 2007).

Data Analysis

Qualitative content analysis with mixed concept-driven and data-driven approach (Schreier, 2012) was used to analyze the interview transcripts. Memoing occurred throughout the analysis process to capture insights and reflections. The transcripts were coded for comprehension and physical activity thematic content. The coding frame consisted of dimensions with mutually exclusive subcategories. A single data-driven dimension contained physical activity examples. The other, concept-driven, dimensions were derived from the interview guide. Dimensions described aspects of interview responses such as how the answer was chosen or the meaning of a term. For example, during conversation of the item on seasonal activity, the interviewer asked, “How did you choose your answer?” The response, “Well there's no school so we don’t have to sit around all day and we can play games in a park or something.” (C04) was coded with the *used strategy* subcategory in the *How Chose* dimension.

Two latent dimensions described the response congruence with reference definitions. To assign codes in these dimensions, reference definitions for meanings of terms and survey items were established. The first latent dimension, *Interview Question Response Congruence*,

described congruence of interview question responses and included mutually exclusive categories of *congruent, incongruent,* and *unsure*. For example, during conversation of the item on summer activity, the interviewer asked, "What did you think about when you read the word *active*?" The response, "Like when you are up on the move or something" (C04) was coded *congruent* since the response conformed to the reference definition. The second latent dimension, *Survey Item Response Congruence* described congruence of survey item responses and included mutually exclusive categories of *congruent, incongruent, unsure, transitioned to congruent,* and *still incongruent*. The answer, "More active in the summer" (C04) from the same conversation was coded *congruent* because the answer reflected interview question responses. The categories, *transitioned to congruent,* and *still incongruent* were used when the survey item response changed during discussion of the item.

The coding frame was assessed for stability using an intra-coder check as an alternative to an inter-coder check, by recoding a portion of the material after 11 days and modifying the coding frame to address weaknesses, following Schreier's (2012) method. After the main coding was completed, another intra-coder check was carried out and discrepancies were resolved by a second coder.

Adapting the description of validity performance criteria from Woolley et al. (2006), each response to a survey item was assigned a value according to the highest performance level attained, determined by the code from the dimensions *Interview Question Response Congruence* and *Survey Item Response Congruence*. Level 1 indicated understanding of the concept described in the response matched reference definitions. Level 2 signified coherence, i.e., a strategy appropriate to the concept of the item was used in determining a response. Level 3 signified a congruent response, i.e. the coherent strategy matched the item response chosen. The

previous example conversation on the summer activity item was assigned level 3 since responses to interview questions indicated understanding of the concept, a coherent strategy for determining item response, and item response congruent with the coherent strategy. Level 2.5 signified transitioned to congruence, i.e., the student initially provided an incongruent response, but changed to a congruent response, either at the start of, during, or at end of discussion of the item. Level 0 indicated an important aspect of the item was not understood. Levels were hierarchical, i.e. higher levels subsumed lower levels.

Adapting Woolley et al.'s (Woolley et al., 2006) rater confidence assessment method, rater confidence was assessed by assigning level 0 for coding units with the congruence code "unsure" and level 1 for coding units coded with any other congruence code for the dimension *Survey Item Response Congruence*. The ratio of total number of coding units of level 1 to the total number of coding units was the resulting rater confidence.

Descriptive statistics of survey responses were calculated to characterize the sample using SPSS, version 23 for Windows (SPSS, Inc. Chicago, IL, 2015). Total scores for the SE and AT portions of the survey were computed by summing the score for each item in the respective sections. Minutes per week for each of strenuous, moderate and mild activity were computed by multiplying days per week by minutes per day. Metabolic Equivalent Task (MET) (US Department of Health and Human Services, 2008) minutes per week were computed by summing 9 times strenuous minutes per week, 5 times moderate minutes per week, and 3 times mild minutes per week. Moderate and vigorous physical activity (MVPA) minutes per week were computed by summing strenuous minutes per week and moderate minutes per week. Means and standard deviations for total SE, total AT, MET minutes per week and MVPA minutes

per week were calculated and compared across gender and interview group using Mann-Whitney U tests. Statistical significance was set at $p < 0.05$.

Results

Twenty-four students were interviewed. The recorded portion of the interview was approximately one-half hour (M = 29 min, SD = 4 min). Sessions lasted approximately 45 minutes.

Qualitative Results

Qualitative results are presented as overall observations, followed by general observations on the description and frequency of strenuous, moderate, and mild activity items (adapted from LTEQ) items and finally, item-specific comments. Rater confidence in assigning congruence codes in the latent dimension, *Survey Item Response Congruence,* was 87.5% computed as a percentage of units of coding not coded as *unsure* to total units of coding in these dimensions

Overall observations. Overall, 87.5% to 100% said they understood the items. Sixty-seven percent to 100% provided coherent explanations for answer choices according to the performance levels described above. Fifty percent to 92% provided responses congruent with coherent explanations. The rates of congruent and coherent responses for each item are shown in Table 2. Hours of sedentary behavior and seasonal activity items had the highest rates of coherence and congruence.

Insert Table 2 here.

The concept of time was sufficiently developed to enable comprehension of the survey items. Ninety-six percent (of 24) provided congruent responses to interview questions on the difference between 30 minutes and 60 minutes, 83% (of 12) provided congruent responses for

the length of a school day, and 78% (of 24) provided congruent responses for the difference between 30 days and 6 months. Most had little difficulty reading items and following survey format.

Comprehension issues were categorized as vocabulary, time concepts, reading problems, format, and response confidence issues. Specific issues are discussed for each survey item below. Issues with vocabulary and time concepts were indicated when understanding of terms was incongruent with reference definitions. Reading problems were indicated when the student had difficulty reading the survey items aloud, including hesitation, mispronunciation, stumbling, or omitting words. Format issues were indicated when students had problems following the flow of items in the survey due to positioning of text. Issues in response confidence related to how confident students were in their responses to interview questions or survey items, indicated by tone of voice or hesitation, as well as instances where students said the item was confusing or difficult to interpret.

Comprehension of description and frequency of strenuous, moderate, and mild activity section. Twenty-three said the example activities helped them understand the items. Some explained that the example activities or definitions in parentheses were helpful because they participated in some of the activities (C02, C07, C17, C21) or gave other reasons. Sample quotes explaining the helpfulness of the examples are shown in Table 3.

Insert Table 3 here.

Most understood the items on days per week and minutes per day. However, one was not sure if days per week meant during a certain season: "…I'm not sure… Well I was like sort of wondering if it meant like how many days a week do you do this in the summer or in the winter or like what season" (C03). One overlooked the item on minutes per day when she was silently

filling out the survey, but provided a congruent response during discussion of the item. One was not sure how to respond to the days per week and minutes per day items for moderate activity because she was comparing it with strenuous activity:

> I thought that since, I did less on moderate than strenuous for days a week since I put 4 and 3 days here and since I did 20 and 10 here, well let's pretend the 10 isn't there, since I did 20 then I thought I could do 10 since 3 is one less than 4 and 10 is one less than 20, is 10 less than 20. So, I thought that, that would be the best estimate that I could take (C19).

Issues identified in description and frequency of strenuous, moderate, and mild activity section. Two issues related to format were identified in the section on strenuous, moderate and mild activities. Two students did not see the descriptions for moderate and mild, which are to the left of the frequency items, and consequently thought items 3, 4, 5, and 6 were repetitions of items 1 and 2. Participant C18 remarked, "Again, like this [is the] same as number 1 and 2." Participant C12 said, "5 and 25. I just told you it was the same, 1 and 2 are the same for 3 and 4 and 5 and 6." In addition, six students included school-based activities such as physical education class or walking to classes or recess, contrary to the instructions at the top of the page to exclude school activity.

> **Strenuous activity.**
>
> **(It makes my heart beat quickly, and makes me sweat.)** Examples are: running, jogging, fast bicycling, aerobic dance, rollerblading, paddling, fast swimming, soccer, basketball, football, martial arts.

Although students had reading and comprehension issues with some words, 23 (of 24) said the examples helped them understand the description. *Strenuous* and *aerobic* presented the most

problems. Only two gave congruent responses for *strenuous*. None gave a congruent response for *aerobic*. Other terms with incongruent meanings included *martial arts* and *sweat*. Two mispronounced *martial arts* as *material arts*. Later in the conversation, one said *material arts* meant art such as painting: ". . . me and my mom do like arts. We draw pictures with paint brushes and paint and water and paper" (C08). Two misread *sweat* as *sweet*. One said *sweet* meant powerful. Another said it meant a better personality: "[sweet (sweat)] I think it means in the sentence, I think it means that it makes my personality um, better because I'm getting like fresh air, getting my heart beating" (C18). Words from the examples that presented minor reading problems included *bicycling*, *basketball* (first read as *baseball*), and *paddling* (read as *peddling* by one student).

Moderate activity.

(It doesn't make me tired, and makes me sweat just a little.) Examples are: fast walking, slow bicycling, easy swimming, weight lifting, baseball, softball, tennis, volleyball, hula.

All (of 12) said they understood this description. Fifty percent provided congruent responses for days per week and 58.3% provided congruent responses for minutes per day. Two did not follow the horizontal format, causing their responses to be incongruent. Two provided congruent responses for the term *moderate*. Reading problems for moderate description included reading *sweat* as *sweet*, reading *baseball* as *basketball*, not recognizing *hula*, reading *weight lifting* as *heavy lifting*, and reading *bicycling* as *bicycle*. One said the word *moderate* was confusing. Another said the item about moderate activity was ". . . a little tough to understand [because she did not do many of the examples listed], but I got the main idea of it" (C03).

Mild activity.

(It makes me use little effort, and doesn't make me sweat.) Examples are: easy walking, bowling, fishing, golf, yoga.

All (12) said they understood this description. Seventy-five percent provided congruent responses for days per week and 58.3% provided congruent responses for minutes per day. Four gave congruent responses for *mild*. Three included school activity in their explanation, causing their responses to be incongruent. Other issues with these items included not reading the description in parentheses and not immediately understanding the meaning of *easy walking*. One did not read aloud the description in parentheses for mild activity description, explaining, "Well at first when I didn't read the sentence in parentheses I thought it meant like fast, like you're doing something very fast and very extreme" (C16). Another said the item about mild activity was a little hard to understand because of confusion about the term *easy walking*:

> I would say that it might take me a little more thinking to realize what easy walking meant. I would like to change that to just regular walking because others are very a bit complicated because I would consider easy walking as like one step at a time every minute (C09).

Sedentary behavior.

How many hours a day do you spend watching television, playing video games and using Internet (not for homework)?

All (12) said they understood this item. Seventy-five percent provided congruent responses. Most gave congruent responses for the length of a school day, although a few were not confident when responding. However, one underestimated the length of a school day, saying it was 3 or 4 hours and another overestimated, saying it was 9 or 12 hours. One distinguished

between how long the school day felt and how long it actually was: "It depends what we are doing. If it's a normal day I think it's about eight, I usually feel like eight hours. When we are doing something really fun it feels like five hours" (C21). Most were confident in responding to this item. However, one was unsure how to respond because he wanted to give a response that was in between two answer choices.

Stage of change.

This question is about regular physical activity. Regular physical activity is:

-Activity that happens for 30 minutes at a time (or more) in a day.

-It must be 5 days (or more) in a week.

-It should be enough to make your heart beat faster and/or make you breathe harder…like walking briskly, biking, swimming, paddling, and aerobics classes.

8. Do you do regular physical activity, as it is described above? Please put an "X" in the box to mark your answer.

□ No, and I do not intend to in the next 6 months.

□ No, but I intend to in the next 6 months.

□ No, but I intend to in the next 30 days.

□ Yes, I have been, but for less than 6 months.

□ Yes, I have been for more than 6 months.

Twenty-one (of 24) said they understood this item. This item presented a variety of difficulties. However, 82% (of 24) provided coherent responses and 62% (of 24) provided congruent responses to the survey item. Half gave congruent responses for the meaning of *intend*, though one was not confident in her response. Students stumbled over several words, most commonly *breathe*, *aerobics*, and *intend*, and occasionally *physical* (read as *pacifical* by

one student), *paddling*, *regular*, and *briskly*. Students also jumbled word order or inserted words, especially when reading the response options. Two were not confident when describing the difference between 30 days and 6 months in the earlier version of the interview question, which consisted of two parts: "What is something that lasts 30 days? . . . What is something that lasts 6 months?" Eight described confusing parts about the item. Students said the answer choices were confusing, primarily the word *intend* and the reference to 6 months.

However, students also explained processes they used to understand the item. For example, one explained how he read the item multiple times to understand it: "Like at first, the first time I read it was confusing. The second time I read it, it was kind of a little better but then the last time I read it I figured out what it was asking me" (C05). Another said, "It was a little hard because like that less 6 months like I had to think about it a little bit" (C15). A third responded, "Pretty well, the only thing that I did not catch on until yes is that the no, no, no and but, but, I, I and I do not intend, intend, intend to, I kept saying that over and over I got my head is like okay the next two are going to say that again" (C11).

Seasonal activity.

Now think back to the summer. Compared to NOW, were you… (Please put an X in the box to mark your answer.)

- □ more active in the summer?
- □ as active (same) as in the summer?
- □ less active in the summer?

Eleven (of 12) said they understood this item. All provided congruent responses to the item. In addition, 82% gave congruent responses for *active*. A few misread the word *active* as *activity*. One child stumbled over the words *were you* and read, ". . . compared to now *when you*

were, where you please put an X in the box . . .” (C18). Only two said it was “a little hard” to think back to the summer stating it was a long time ago. The student interviewed after completion of the school year admitted confusion when asked to think *back* to summer since it was currently summer at the time of the interview. The others said it was easy to think back to summer.

Physical activity examples. Eighty percent of physical activity examples provided during discussion of strenuous, moderate, or mild activity items, were congruent with the respective physical activity level. However, a few suggested an activity listed for one level as an example activity for a different level. For example, two suggested as a strenuous activity softball, which is an example for moderate activity. Baseball, tennis, and volleyball were similarly cross-suggested as strenuous activities. Three suggested running or jogging, which are strenuous physical activity examples, as examples for moderate activity. One suggested jogging as an example for mild activity. Three suggested jumping rope as an example of mild physical activity.

Students frequently mentioned participating in several of the activities listed in the survey items such as *baseball*, *running*, *basketball*, *soccer*, *jogging*, *walking*, and *volleyball*. Students identified with these activities and found them helpful in understanding the survey items. Students also extrapolated from the given examples and provided examples not listed in the survey items, such as *badminton*, *cricket*, and *Lacrosse*, indicating they understood the concepts described in the survey items. Students also mentioned typical childhood activities such as *climbing trees*, *swinging*, *skateboarding*, *kickball*, *jumping*, and *[doing] cartwheels* and childhood games such as *hide-and-seek* and *capture-the-flag*. Creative examples included “I pretend I am actually hunting” and “twisting your brother’s arm” both provided by C12.

Quantitative Results

Reported minutes per week of strenuous physical activity (*M*=172, *SD*=110) were greater than reported minutes per week for either moderate (*M*=155, *SD*=122) or mild (*M*=124, *SD*=138) physical activity. Mean hours of reported sedentary behavior per day was 2.46 (*SD*=2.2). Distribution of stage of change for physical activity is shown in Table 4. The largest percentage was in maintenance stage ("Yes, I have been for more than 6 months"). None were in contemplation stage ("No, but I intend to in the next 6 months"). Compared with activity level at the time of the interview, a majority (*n*=16, 66.7%) were more active in the summer, 25% (*n*=6) were as active in the summer, and 8% (*n*=2) were less active in the summer.

Insert Table 4 here.

Three students did not make food with their family (2 boys, 1 girl) and one did not respond to this item. Sixteen did not make food with friends and four (all boys) did not cook. SE, AT and physical activity scores are shown in Table 5. AT was significantly different between boys and girls, with girls having more positive attitudes toward cooking. Differences between interview groups A and B for SE, AT, strenuous min/week, moderate min/week, mild min/week, MET, or MVPA were not significant.

Insert Table 5 here.

Discussion

Cognitive interviews and qualitative content analysis suggest that *Fuel for Fun* physical activity survey items have face validity in a sample of mostly white middle-income 4th graders. The current study contributed a systematic approach to the analysis of cognitive interview data, a deficit in the literature (Fowler, Lloyd, Cosenza, & Wilson, 2014). Cognitive interviews are useful for understanding the level of comprehension and uncovering issues with surveys (Blair et

al., 2006; Willis, Royston, & Bercini, 1991). By using content analysis methods (Schreier, 2012) and a hierarchical scheme for assigning validity performance levels (Woolley et al., 2006), the current study provided transparency for the procedure used to assess comprehension and identify issues.

Although the current study uncovered issues with survey items, the literature is not clear on the rate of interpretation error that is acceptable (Bowen, 2008). Rates of coherent explanations for answer choices ranged from 66% to 100% and rates of congruent responses ranged from 62% to 92%. These rates align with comprehension rates in a study using similar methods by Koskey, Karabenick, Woolley, Bonney, and Dever (2010), supporting face validity in the current study. Students did not provide congruent meanings for *strenuous, moderate* and *mild*, but identified with the physical activity examples given in the item description and provided coherent explanations for their answer choice, important information for evaluating validity (Bowen, 2008). The stage of change item was longer than the other items and provided some cognitive challenges, but was within the cognitive ability of most students in the sample.

Each student was interviewed on 8 of the 12 items, a strategy used in other cognitive interview studies (Bowen, 2008; Irwin, Varni, Yeatts, & DeWalt, 2009; Koskey et al., 2010) to keep the interview at a reasonable length and avoid student fatigue, but resulted in 4 items with less data than the other items. The 4 items with less data included items that were expected to have few issues and items with repeating concepts, e.g. moderate description and frequency items paralleled strenuous items. Despite collecting less data on these items, issues for moderate and mild activity were uncovered and, as expected, the sedentary behavior and seasonal activity items were well understood and had few issues.

The current study used a sample size of 24, similar to sample sizes of cognitive interview studies investigating survey item validity (Banna, Buchthal, & Tauyan, 2015; Iversen et al., 2010; Komine, 2015; Koskey et al., 2010; Krall & Lohse, 2010). Guidance on adequate sample size for studies of this type is not established in the literature (Beatty & Willis, 2007). Studies of this type are intended to uncover problems with the instrument rather than to draw generalizable conclusions (Beatty & Willis, 2007). The current study included students from multiple locations with some demographic variety, as recommended by Beatty and Willis (2007).

Overall, survey results from the current study followed patterns of results of previous studies using these items or slight variations of these items. Reported minutes per week of strenuous, moderate and mild activity followed a similar pattern to the results of Harmon et al. (2014), who used Godin and Shephard's (1985) LTEQ in a study of 393 fourth and fifth graders with slight wording differences, i.e. *vigorous* instead of *strenuous* and *not exhausting* instead of *doesn't make you tired*. Harmon et al. (2014) found the greatest amount of time was spent in vigorous physical activity (224 minutes per week) and the least in mild physical activity (147 minutes per week). The pattern is similar in the current study with 172 and 124 minutes per week for strenuous and mild activity, respectively. In both studies, the greatest amount of time was spent in strenuous (vigorous) activity and the least in mild, though the values in the current study are lower, possibly due to small sample size. Battista et al. (2005) used a variation of LTEQ with 533 fourth through sixth graders. The item wording resulted in activity frequencies as days per week. Thus, the results are not directly comparable with the current study. However, Battista et al. (2005) also found highest values (3.89 days per week) for strenuous activity and lowest values (3.12 days per week) for mild activity.

Results for proportion in each stage of change were similar to Haas and Nigg's (2009) in that a minority were in either precontemplation, contemplation or preparation stages. However, in this sample a majority (66%) were in maintenance stage while Haas and Nigg's results showed about 35% in action and about 40% in maintenance. Haas and Nigg (2009) used slightly different wording, with regular physical activity defined as *30 minutes per day 4 days per week* compared with *30 minutes per day 5 days per week* for the current study and *plan* instead of *intend*. In addition, Haas and Nigg's (2009) sample was larger, 773 divided between two samples, and included older children, i.e. 5th and 6th graders. Battista et al. (2005) found a similar pattern, using the same wording as Haas and Nigg (2009), with less than 10% in each of precontemplation, contemplation and preparation and 30% to 40% in each of action and maintenance. One reason for the larger percentage of maintenance in this sample may be due to self-selection, i.e. students who were interested in physical activity (or cooking) may have been more willing to participate than students not interested in physical activity (or cooking), since the recruitment flyer indicated that the interview would be about physical activity and cooking.

Hours of sedentary behavior (2.46 hours per day) were lower than results in Battista et al. (2005), who found students played video games or watched television for 3.71 hours per day. Demand characteristics may have biased this sample, since the survey was completed during the interview session, as opposed to in a classroom, where anonymity might be expected to reduce this effect.

Results for CE followed a similar pattern to Komine's (2015) results: more students reported making food with their families and cooking than making food with their friends. Cooking AT was significantly different between boys and girls, with girls reporting a more positive attitude than boys, similar to Komine's (2015) results and baseline results of

Cunningham-Sabo and Lohse (2013, 2014). SE was not significantly different between boys and girls, similar to the results of Cunningham-Sabo and Lohse (2013), but unlike the results of Komine (2015) and the intervention group of Cunningham-Sabo and Lohse (2014). Differences may be due to the small sample sizes of the current study and Komine's (2015) study.

A strength of this study is that interview groups were similar because survey scores did not significantly differ between groups. Another strength was that the same researcher designed the interview guide, conducted interviews, created the coding frame and analyzed the data, resulting in a high degree of familiarity with the data and allowing the coding frame to capture the intent of the interviews (Cooper, Harrell, & Perry, 2016). In addition, memoing throughout the coding frame development, pilot testing, and main coding processes added transparency and confirmability to the process (Doherty, 2015; Schreier, 2012). Rater confidence obtained in the current study was 87%, exceeding Woolley et al.'s (2006) threshold, set at 75% for similar methods. Lack of confidence in coding could result from insufficient probing due to the interviewer being a novice or high cognitive demands of the item on the student, resulting in difficulty giving a coherent explanation for a response (Woolley, Bowen, & Bowen, 2004).

A limitation is possible omission of data from missed opportunities for probing because of using a novice interviewer. However, several issues were uncovered and the data contained enough information to provide adequate rater confidence. Another limitation is the survey administration procedure used in the current study contrasts with the procedure used during *Fuel for Fun* program evaluation in which research personnel read aloud the instructions and all items (Cunningham-Sabo et al., 2016). In the current study the student was asked to read aloud the items to assess reading comprehension and detect problematic words (de Leeuw et al., 2004; M. Iversen et al., 2010; Komine, 2015; Woolley et al., 2006). The current study may have

overestimated comprehension issues compared to standard administration procedures for students whose aural comprehension is greater than reading comprehension. A threat to validity is that children usually participate in sports and physical activity in bouts or short bursts of activity, possibly complicating the ability to accurately estimate the amount of time spent in physical activity (Shephard, 2003; Welk et al., 2000). The results of the current study are not generalizable because a convenience sample was used.

Conclusions and Recommendations

Results suggest that *Fuel for Fun* physical activity survey items have face validity in a sample of mostly white middle-income 4th graders in the Rochester, New York area. These results add to prior results on test-retest reliability, construct validity and concurrent validity of these items. These items are a useful tool for assessing physical activity levels in students as young as 4th grade. Minor format and wording changes could be considered prior to future use to address issues identified and retesting. For example, changing the format of the section on description and frequency of strenuous, moderate, and mild activity from horizontal and vertical to a simple vertical format is suggested, placing the physical activity level descriptions across the full width of the page followed by the frequency items. In addition, connecting the definition of regular physical activity with the stage of change item by placing the numeral 8 at the beginning of the definition may reduce the possibility of overlooking the definition before responding to the item. Suggested word changes include replacing *strenuous* with *hard*, *moderate* with *medium*, *mild* with *easy* and *intend* with *plan*. Finally, including context-appropriate physical activity examples may increase the ability of respondents to identify with the level of physical activity.

References

Ahn, S., & Fedewa, A. L. (2011). A Meta-analysis of the relationship between children's physical activity and mental health. *Journal of Pediatric Psychology*, *36*(4), 1–13. doi:10.1093/jpepsy/jsq107

Banna, J. C., Buchthal, O. V, & Tauyan, S. (2015). Assessing face validity of a food behavior checklist for limited-resource Filipinos. *Hawaii Journal of Medicine and Public Health*, *74*(10), 334–340.

Battista, J., Nigg, C. R., Chang, J. A., Yamashita, M., & Chung, R. (2005). Elementary after school programs: An opportunity to promote physical activity for children. *Californian Journal of Health Promotion*, *3*(4), 108–118.

Beatty, P. C., & Willis, G. B. (2007). Research synthesis: The practice of cognitive interviewing. *Public Opinion Quarterly*, *71*(2), 287–311.

Blair, J., Conrad, F., Castellano Ackermann, A., & Claxton, G. (2006). The Effect of sample size on cognitive interview findings. *Proceedings of the American Statistical Association, Section on Survey Research Methods*, (January 2006), 4041–4046.

Bowen, N. K. (2008). Cognitive testing and the validity of child-report data from the elementary school success profile. *Social Work Research*, *32*(1), 18–29. doi:10.1093/swr/32.1.18

Cooper, M., Harrell, M. B., & Perry, C. L. (2016). A qualitative approach to understanding real-world electronic cigarette use: Implications for measurement and regulation. *Preventing Chronic Disease*, *13*, 150502. doi:10.5888/pcd13.150502

Cunningham-Sabo, L., & Lohse, B. (2013). Cooking with Kids positively affects fourth graders' vegetable preferences and attitudes and self-efficacy for food and cooking. *Childhood Obesity*, *9*(6), 549–556. doi:10.1089/chi.2013.0076

Cunningham-Sabo, L., & Lohse, B. (2014). Impact of a school-based cooking curriculum for fourth-grade students on attitudes and behaviors is influenced by gender and prior cooking experience. *Journal of Nutrition Education and Behavior*, *46*(2), 110–120. doi:10.1016/j.jneb.2013.09.007

Cunningham-Sabo, L., Lohse, B., Smith, S., Browning, R., Strutz, E., Nigg, C. R., … Ruder, E. (2016). Fuel for Fun: a cluster-randomized controlled study of cooking skills, eating behaviors, and physical activity of 4th graders and their families. *BMC Public Health*, *16*(1), 444–460. doi:10.1186/s12889-016-3118-6

Davis, C. L., & Cooper, S. (2011). Fitness, fatness, cognition, behavior, and academic achievement among overweight children: do cross-sectional associations correspond to exercise trial outcomes? *Preventive Medicine*, *52 Suppl 1*, S65-9. doi:10.1016/j.ypmed.2011.01.020

de Leeuw, E., Borgers, N., & Smits, A. (2004). Pretesting questionnaires for children and adolescents. In *Methods for testing and evaluating survey questionnaires* (pp. 409–429). doi:10.1002/0471654728.ch20

Doherty, M. E. (2015). Qualitative analysis of the American College of Nurse-Midwives student reports, 2005 to 2014. *Journal of Midwifery and Women's Health*, *60*(6), 762–768. doi:10.1111/jmwh.12349

Donnelly, J. E., Greene, J. L., Gibson, C. A., Smith, B. K., Washburn, R. A., Sullivan, D. K., … Williams, S. L. (2009). Physical Activity Across the Curriculum (PAAC): A randomized controlled trial to promote physical activity and diminish overweight and obesity in elementary school children. *Preventive Medicine*, *49*(4), 336–41. doi:10.1016/j.ypmed.2009.07.022

Fowler, F. J., Lloyd, S. J., Cosenza, C. A., & Wilson, I. B. (2014). Coding cognitive interviews: An approach to enhancing the value of cognitive testing for survey question evaluation. *Field Methods, 28*(1), 3–20. doi:10.1177/1525822X14549921

Godin, G., Jobin, J., & Bouillon, J. (1986). Assessment of leisure time exercise behavior by self-report: A concurrent validity study. *Canadian Journal of Public Health, 77*(5), 359–362.

Godin, G., & Shephard, R. J. (1985). A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Sciences, 10*(3), 141–146.

Gutin, B., Riggs, S., Ferguson, M., & Owens, S. (1999). Description and process evaluation of a physical training program for obese children. *Research Quarterly for Exercise and Sport, 70*(1), 65–69.

Haas, S., & Nigg, C. R. (2009). Construct validation of the stages of change with strenuous, moderate, and mild physical activity and sedentary behaviour among children. *Journal of Science and Medicine in Sport, 12*(5), 586–591. doi:10.1016/j.jsams.2008.11.001

Harmon, B. E., Nigg, C. R., Long, C., Amato, K., Anwar, M.-U., Kutchman, E., … Hill, J. O. (2014). What matters when children play: Influence of social cognitive theory and perceived environment on levels of physical activity among elementary-aged youth. *Psychology of Sport and Exercise, 15*(3), 272–279. doi:10.1016/j.psychsport.2014.02.001

Irwin, D. E., Varni, J. W., Yeatts, K., & DeWalt, D. A. (2009). Cognitive interviewing methodology in the development of a pediatric item bank: a patient reported outcomes measurement information system (PROMIS) study. *Health and Quality of Life Outcomes, 7*(1), 3. doi:10.1186/1477-7525-7-3

Iversen, M., Lee, B., Connell, P., Andersen, J., Anderson, A. F., & Kocher, M. S. (2010). Validity and comprehensibility of the International Knee Documentation Committee Subjective

Knee Evaluation form in Children. *Scandinavian Journal of Medicine and Science in Sports, 20*(1), 87–95. doi:10.1111/j.1600-0838.2009.00917.x

Komine, T. (2015). *"What does cooking mean to kids?" Using cognitive interviews to assess the face validity of an existing survey with a new audience in the Fuel for Fun program*. Colorado State University, Fort Collins, CO.

Koskey, K. L. K., Karabenick, S. A., Woolley, M. E., Bonney, C. R., & Dever, B. V. (2010). Cognitive validity of students' self-reports of classroom mastery goal structure: What students are thinking and why it matters. *Contemporary Educational Psychology*, *35*(4), 254–263. doi:10.1016/j.cedpsych.2010.05.004

Krall, J. S., & Lohse, B. (2010). Cognitive testing with female nutrition and education assistance program participants informs validity of the satter eating competence inventory. *Journal of Nutrition Education and Behavior, 42*(4), 277–283. doi:10.1016/j.jneb.2009.08.003

Krall, J. S., & Lohse, B. (2011). Validation of a measure of the Satter eating competence model with low-income females. *The International Journal of Behavioral Nutrition and Physical Activity*, *8*, 26–36. doi:10.1186/1479-5868-8-26

Lohse, B., Cunningham-Sabo, L., Walters, L. M., & Stacey, J. E. (2011). Valid and reliable measures of cognitive behaviors toward fruits and vegetables for children aged 9 to 11 years. *Journal of Nutrition Education and Behavior*, *43*(1), 42–49. doi:10.1016/j.jneb.2009.12.006

Marta, C., Marinho, D. a, & Marques, M. C. (2012). Physical fitness in prepubescent children: an update. *Journal of Physical Education & Sport*, *12*(4), 445–457. doi:10.7752/jpes.2012.04066

Nunnally, J., & Bernstein, I. (1978). Validity. In *Psychometric theory* (2nd ed., pp. 86–113). New

York, NY: McGraw-Hill.

Prochaska, J. O., & Velicer, W. F. (1997). The transtheoretical model of health behavior change. *American Journal of Health Promotion, 12*(1), 38–48. doi:10.4278/0890-1171-12.1.38

Riggs, N. R., Chou, C.-P., Spruijt-Metz, D., & Pentz, M. A. (2010). Executive cognitive function as a correlate and predictor of child food intake and physical activity. *Child Neuropsychology : A Journal on Normal and Abnormal Development in Childhood and Adolescence, 16*(3), 279–292. doi:10.1080/09297041003601488

Sallis, J. F., Buono, M., Roby, J., Micale, F., & Nelson, J. (1993). Seven-day recall and other physcial activity self-reports in children and adolescents. *Medicine and Science in Sports and Exercise*.

Sallis, J. F., McKenzie, T., Alcaraz, J., Kolody, B., Faucete, N., & Hovell, M. (1997). The effects of a 2-year physical education program (SPARK) on physical activity and fitness in elementary school students. *American Journal of Public Health, 87*(8), 1328–1334.

Schreier, M. (2012). *Qualitative content analysis in practice*. London: Sage Publications Ltd.

Shafer, K., & Lohse, B. (2005). *How to conduct a cognitive interview - A nutrition education example*.

Shephard, R. J. (2003). Limits to the measurement of habitual physical activity by questionnaires. *British Journal of Sports Medicine, 37*(3), 197–206; discussion 206.

Shore, S. M., Sachs, M. L., DuCette, J. P., & Libonati, J. R. (2014). Step-count promotion through a school-based intervention. *Clinical Nursing Research, 23*(4), 402–420. doi:10.1177/1054773813485240

Snelling, A. M., Belson, S. I., Watts, E., George, S., Van Dyke, H., Malloy, E., & Kalicki, M. (2015). Translating school health research to policy. School outcomes related to the health

environment and changes in mathematics achievement. *Appetite*, *93*, 91–95. doi:10.1016/j.appet.2015.06.001

Troiano, R. P., Berrigan, D., Dodd, K. W., Sse, L. C. M., Tilert, T., & Mcdowell, M. (2008). Physical activity in the United States measured by accelerometer. *Medicine and Science in Sports and Exercise*, *40*(1), 181–188. doi:10.1249/mss.0b013e31815a51b3

US Department of Health and Human Services. (2008). *2008 Physical activity guidelines for Americans*. Washington D.C.: U.S. Government Printing Office.

Wallen, V., Cunningham-Sabo, L., Auld, G., & Romaniello, C. (2011). Validation of a group-administered pictorial dietary recall with 9- to 11-year-old children. *Journal of Nutrition Education and Behavior*, *43*(1), 50–54. doi:10.1016/j.jneb.2009.12.008

Welk, G. J., Corbin, C. B., & Dale, D. (2000). Measurement issues in the assessment of physical activity in children. *Research Quarterly for Exercise and Sport*, *71*(sup2), 59–73. doi:10.1080/02701367.2000.11082788

Willis, G. B. (2005). *Cognitive interviewing: a tool for improving questionnaire design*. Sage Publications.

Willis, G. B., Royston, P., & Bercini, D. (1991). The use of verbal report methods in the development and testing of survey questionnaires. *Applied Cognitive Psychology*, *5*(3), 251–267. doi:10.1002/acp.2350050307

Woolley, M. E., Bowen, G. L., & Bowen, N. K. (2004). Cognitive Pretesting and the Developmental Validity of Child Self-Report Instruments: Theory and Applications. *Research on Social Work Practice*, *14*(3), 191–200. doi:10.1177/1049731503257882

Woolley, M. E., Bowen, G. L., & Bowen, N. K. (2006). The Development and Evaluation of Procedures to Assess Child Self-Report Item Validity Educational and Psychological

Measurement. *Educational and Psychological Measurement, 66*, 687–700. doi:10.1177/0013164405282467

Chapter 3. Additional Details for Method, Results and Discussion

Method

Primary method is in Chapter 2. This section provides additional details relevant to the data analysis. Construction and evaluation of the coding frame used for content analysis and use of Atlas.ti tools are presented. Data collection forms are shown in Appendices A through G.

Data Analysis

Qualitative content analysis was used to analyze the transcripts with a mixed concept-driven and data-driven approach (Schreier, 2012). Academic Transcription Services (https://www.academic-transcription-services.com/) transcribed the interviews verbatim and a student intern verified the transcriptions. The transcribed interview data were coded for comprehension and physical activity thematic content using a qualitative content analysis approach, a descriptive method that focuses on consistency (Schreier, 2012, p. 41).

The coding frame. Following methods described in Schreier (2012), a coding frame consisting of dimensions with mutually exclusive subcategories was constructed (for definitions of terms, see Appendix H). Most of the coding frame was concept-driven, using the cognitive interview guide as a source for generating discrete dimensions (Schreier, 2012, p. 87). Dimensions were either manifest, describing the data item and requiring little or no interpretation; or latent, requiring interpretation to arrive at a meaning for the data. For example, the dimension *Term*, identifying responses to interview questions about the meaning of particular terms, e.g. strenuous, was a manifest dimension. The dimension *Interview Question Response Congruence*, evaluating congruence with the reference definition of the term, was latent. One dimension, *Physical Activity Example*, which identified examples of physical activity mentioned, was data-driven, i.e. the subcategories were generated from the data. Codes for dimension

subcategories were applied to units of coding, i.e., segments of the interview transcript data. Generally, the response to an interview question was a unit of coding. However, for some dimensions, the unit of coding was a word or phrase, e.g. the unit of coding for the *Physical Activity Example* dimension. Coding methods included magnitude coding, simultaneous coding, and descriptive coding (Saldaña, 2013). Each unit of coding was assigned a single code from one or more appropriate dimensions.

Two dimensions contained subcategories to evaluate for congruence with reference definitions. The dimension, *Interview Question Response Congruence* evaluated congruence of responses with interview questions for survey items. The dimension, *Survey Item Response Congruence* evaluated congruence of responses with survey items. To assign codes in these dimensions, reference definitions for meanings of terms and survey items were established (see Appendix I).

As outlined in Schreier (2012), after the coding frame was developed, a pilot coding of five randomly chosen interview transcripts was conducted using the coding frame. The same transcripts were recoded after 11 days. The results of the two codings were compared for differences to identify shortcomings in the coding frame such as ambiguous code definitions or missing categories. After the coding frame was revised to remedy shortcomings, the main coding was carried out, assigning codes to all units of coding in the transcripts. To evaluate consistency in the main coding, a second coding of five randomly chosen transcripts was carried out 10 days after the main coding was completed. Discrepancies between the two codings were examined and a final code was assigned following guidelines in Schreier (Schreier, 2012). A second coder evaluated seven units of coding with differences that were difficult to resolve. The second coder's result was used as the final code for these units of coding.

Rater confidence was assessed adapting Woolley et al.'s (Woolley et al., 2006) method. Coding units from the latent dimension *Survey Item Response Congruence* were used in the computation. Coding units with the congruence code *unsure* were designated level 0. Coding units with any other congruence code were designated level 1. Rater confidence was computed as percent coding units at level 1 compared to total coding units. Since little interpretation was required for the manifest dimensions, they were not included in the analysis to avoid inflating results.

Analysis. Atlas.ti analysis tools including the code-co-occurrence tool, query tool and codes-primary documents table were used to interpret the coded data. Analytic memos were written describing the analysis query and the specific steps using Atlas.ti analysis tools to answer the query, including the findings from the query (Friese, 2014, p. 169). These memos were used as a basis for writing results.

Results

Additional details of results presented in Chapter 2 are provided here. This section includes information on rater confidence calculation, participant and school characteristics, comprehension of definitions for strenuous, moderate and mild activity, and additional details on physical activity examples mentioned.

The number of coding units for each level for each item are shown in Table 6. Rater confidence was 87.5%. The total number of coding units in this dimension was 144. Each response to each item received one code from the *Survey Item Response Congruence* dimension.

Insert Table 6 here.

Twenty-four students participated. Participant characteristics are shown in Table 7. Participants were mostly white (92%). Interviews were conducted from April 8, 2016 through

July 7, 2016 with students in 4th grade at the time of the interview. The last interview (July 7, 2016) was conducted after the end of the school year with a student who had just completed 3rd grade. Twenty interviews were conducted at public libraries in meeting rooms. Two interviews were conducted in quiet open areas of a public library. During all library interviews, parents remained in the library. Two interviews were conducted in a meeting room at a participating school.

Insert Table 7 here.

Students attended nine schools geographically distributed as shown in Figure 2. Six schools were classified as suburb and three as city according to National Center for Educational Statistics ("The Condition of Education - Glossary," n.d.). School characteristics are shown in Table 8. Schools were diverse in terms of free school lunch eligibility and racial composition. Free school lunch eligibility ranged from 17.5% to 75.2%. Three schools had greater than 50% free school lunch eligibility. Schools' racial composition varied with African-American students comprising from 1.2% to 72.9% of the population, Hispanic 2.6% to 36%, and white 4.9% to 95.6%. Six schools were predominantly white. In comparison, the CO intervention school districts (Cunningham-Sabo et al., 2016) had a lower proportion of African-American (only 1%), but proportions of Hispanic (18% to 20%) and white (74% to 75%) students were within the ranges of the schools in the current study.

Insert Figure 2 here.

Insert Table 8 here.

Qualitative Results. A flow diagram (Figure 3) shows how vocabulary issues, format issues and the physical activity examples influenced the comprehension of strenuous, moderate and mild activity definitions. Eighty-three percent did not define strenuous, moderate or mild

congruent with the reference definition. However, all reported the physical activity examples helped them understand the meaning of the item (one student was not asked the interview question on example helpfulness). Two students did not follow the horizontal and vertical format, with the result that they did not understand that some items were referring to different levels of activity, i.e. moderate or mild, as compared with strenuous.

Insert Figure 3 here.

Example responses to the interview question, "How well did you understand the item?" asked during discussion of the stage of change item are shown in Table 9. Students described confusing aspects of the item and explained processes they used to understand the item.

Insert Table 9 here.

Physical activity examples. The physical activities mentioned during the discussion of the survey items are included in the word cloud shown in Figure 4. The word cloud illustrates the variety with which students described their physical activity. Note that the relative font size of the words is not an exact representation of the relative frequency of the words, although words of a larger font size occurred more frequently than words of a smaller font size. Activities mentioned using different word forms were combined. For example, bicycling was combined with biking.

Insert Figure 4 here.

Students also provided creative examples of activities, shown in Table 10, and not included in the word cloud since they were each mentioned once. The most frequently mentioned activities were running, walking, and swimming. Soccer and basketball were frequently mentioned sports. Activities were mentioned that were not included in the survey examples, for example Lacrosse, kickball, scootering, and jumping rope, though students used

the term jump roping. The examples illustrated students identified with the activities, participated in them and could provide additional examples.

Insert Table 10 here.

Discussion

This section includes additional details of the discussion in Chapter 2. Details on Leisure-Time Exercise Questionnaire (LTEQ) (Godin & Shephard, 1985) instruments, additional sample size and error rate considerations and future directions are presented.

Comparison with Other Leisure-Time Exercise Questionnaire Instruments

The wording used in the description and frequency of strenuous, moderate, and mild activity items in the current study differed slightly from other instruments using LTEQ. Several adaptations of the LTEQ exist in the literature. In Godin and Shephard's (1985) original version, the respondent reported the average number of times per week he or she participated in strenuous, moderate, and mild exercise for more than 15 minutes during free time. Brief definitions and examples were included for each level of exercise. The variation used by Battista et al. (2005) and Haas and Nigg (2009) changed the original *15 minutes during free time* to *30 minutes during free time* and some of the examples, e.g. *hula* instead of *folk dancing* for moderate exercise. The variation used by Harmon et al. (2014) was most similar to the version used in the current study. Harmon et al. (2014) asked students to specify the number of days per week and minutes per day they engaged in each of the activity levels and substituted *vigorous* for *strenuous.* Researchers did not specify whether students were given choices, as in the current study, or simply wrote a number, similar to the original version. Each of these versions results in minutes per week of activity. However, the versions differ in cognitive demands placed on the respondent. Children in middle childhood (7-12) are still developing cognitive processing speed

and memory capacity, think concretely, and need clear definitions (de Leeuw, 2011). The original version required the respondent to think retrospectively over the past week and count how many times he engaged in each type of activity. Harmon et al.'s (2014) version, in which the respondent is specifically asked for days per week and minutes per day is more concrete and therefore may require less cognitive processing for children. Providing specific numbers for days and minutes, as in the current study, addressed the need for clear definitions.

Sample Size Considerations

General agreement about adequate sample size for cognitive interview studies investigating survey item validity has not been reached (Beatty & Willis, 2007). Sample size for the current study was 24. Researchers have based conclusions on as few as five interviews per item. For example, Haas and Nigg (2009) piloted their survey on LTEQ and stage of change for physical activity on 5 students in grades 4 through 6 for comprehension before using the instrument in their study. In another study involving children, Iversen et al. (2010) conducted cognitive interviews with 30 ten to eighteen year olds to assess how children interpreted an instrument consisting of 10 items relating to knee conditions. The instrument was used routinely with adults to evaluate rehabilitation efforts and had been validated with adults. Researchers identified problems in the areas of language comprehension, item and response format, and response mapping, concluding that the study did not support face validity of the survey with children and provided suggestions for revision.

Koskey, Karabenick, Woolley, Bonney, and Dever (2010) assessed the cognitive validity of a student self-report of a classroom learning environment instrument using cognitive interviews. The instrument consisted of 5 questions, each question answered in the context of classroom goals and teacher goals, for a total of 10 items. Researchers interviewed a sample of

19 third and fourth graders and a sample of 25 sixth and eighth graders, reporting separate results for each sample. Researchers concluded interview results showed some support for cognitive validity of two items across the contexts.

In a study involving adults, Banna, Buchthal, and Tauyan (2015) used an iterative approach to establish face validity with Filipino adults of a food behavior checklist translated into their native language. The instrument consisted of 5 items with photographs as visual aids. Researchers conducted cognitive interviews, revising the instrument to incorporate suggestions after each interview. Interviewing stopped when no new suggestions were heard, after 20 interviews. This approach was similar to the approach, recommended by Beatty and Willis (2007), of conducting rounds of 5 to 15 cognitive interviews, revising between rounds.

These studies involved samples sizes from 5 to 30, using methods similar to the current study. Although continuation of interviewing is likely to continue to produce new insights, (Blair et al., 2006), constraints of time or cost often limit the ability to continue interviewing. Beatty and Willis (2007) suggest category saturation (Strauss & Corbin, 1990) (as cited in Beatty & Willis, 2007), i.e. concluding data collection when relatively few new insights are found, as a guide. An iterative approach similar to Banna et al.'s (2015) is an efficient method for revising instruments, addressing problems as interviews proceed. However, the purpose of the current study was to evaluate an instrument already in use. A sample of 24 was sufficient to evaluate comprehension, identify issues and make recommendations for revisions (M. Iversen et al., 2010).

Error Rate Considerations

The literature does not show consensus of what an acceptable error rate is when assessing for face validity (Bowen, 2008). For example, Iverson et al. (2010) studied children's

comprehension of the knee condition evaluation form and reported that children exhibited issues in four categories including language comprehension, item format, response format, and response mapping. Percentages of children exhibiting issues in each of these categories for each item ranged up to 73%. Based on high rates of issues in comprehension, instrument face validity could not be affirmed. In contrast, Koskey et al. (2010) reported on student comprehension of the 5-item classroom learning environment instrument. Data supported the cognitive validity of two items whose percentages of understanding ranged from 53% to 100%. However, validity of the other three items with lower percentages of understanding, ranging from 32% to 77%, was not supported. In the current study percentages providing coherent explanations for answer choices ranged from 67% to 100%. Percentage providing congruent responses ranged from 50% to 92%. These rates align with comprehension rates defined by earlier studies, supporting face validity in this sample.

Future Directions

Although the study supported face validity in this sample, several issues were uncovered that support survey revisions. Suggestions for improvement based on these issues included word changes and format changes. Ideally, these changes can be made and tested with rounds of cognitive interviews, revising between rounds, as suggested by Beatty and Willis (2007).

Suggestions for revising the cognitive interview questions that emerged during data analysis include:

- Instead of asking the meaning of *strenuous*, ask the meaning of *strenuous activity*. Strenuous is more abstract than strenuous activity and the definition of strenuous activity is given in the item in parentheses. Use the same approach for moderate and mild.

- Ask how is *strenuous activity* different from *moderate activity*? How is *mild activity* different from *strenuous activity*?
- When discussing sedentary behavior, ask students when they use technology. In the current study, many students spontaneously volunteered this information.
- When discussing the stage of change item, ask about how regularly they do the activity. In the current study, some students spontaneously volunteered that information.
- Include a note in the protocol to check that all items have been answered before starting the cognitive interview.

Reflections

Working on this project has shown me how having a valid survey to evaluate health-promoting interventions contributes to helping children be healthier. I learned how important survey development and validation are and how much work is involved in assessing a survey for validity. I learned how to recruit participants, prepare for and conduct interviews, analyze qualitative data and write up a research study.

One of the most challenging tasks of the project was recruiting participants. When I first started contacting schools and organizations, I was unsure of what to say and how to introduce the project. With practice, I became more comfortable with the process and made use of my qualities of persistence and follow-up. Finally, the persistence paid off and I remember the excitement I felt every time I received a consent email.

Although I practiced interviewing with six or seven friends and family members, I felt nervous during my first few interviews. I enjoyed talking with the children, but I especially wanted to be an effective “conduit” of information, an important quality of a cognitive

interviewer that I learned during cognitive interview training. I had to restrain my normal habits of interacting with children, which consisted of verbal and non-verbal encouragement and reassurance. At first, it was very difficult not to say *ok*, but instead *thank you* to remain neutral. After the first couple of interviews, I started to relax and was more comfortable with the situation. After a few more interviews, I felt I reached a greater level of competence when I observed a student's mispronunciation of *sweat* as *sweet* and used an unscripted probe to ask what he thought that word meant. I was able to notice when a student was nervous and consequently spent a little more time in warm up conversation. I was able to recognize when a student needed reassurance that there are no right or wrong answers and provide a reminder. Working with a second interviewer on several interviews helped me see where I could improve as an interviewer. Almost all of the students seemed happy to talk with me once they realized it was not a test and that I was really and truly interested in their opinion. One very friendly girl had a big smile for me when her parent brought her and I asked why she had such a big smile and she said, "because I'm talking to you!" Some students were direct and answered my questions without much elaboration. Some students paused to think carefully after each interview question I asked. Some students were fidgety at the end of the interview. Each student provided helpful information.

I learned from raising two daughters that children can say and do unexpected things. I expected to be surprised. As I conducted the interviews, I was surprised that two children mispronounced *sweat* as *sweet* and each had a different idea of what it meant. I was surprised that one child thought *martial arts* was *material arts* and thought it meant painting and drawing. I was surprised that two children did not recognize the horizontal and vertical layout for the description and frequency of strenuous, moderate, and mild activity items. However, I was not

surprised that students did not know what strenuous or aerobic meant. I was not surprised that students found the physical activity examples helpful.

Learning about qualitative analysis has broadened my understanding of data analysis and is a complement to my background of software development. This was my first experience analyzing qualitative data. The Qualitative Methods course at University of Rochester provided important groundwork. I was introduced to theories of analysis and practiced skills of taking field notes, transcribing, coding, memoing, and data analysis. Schreier's (2012) explanation of content analysis was very helpful because it provided structure and described the content analysis process in detail, including many examples. In addition to using content analysis for this project, I used thematic analysis for an independent study. Both are foundational methods in qualitative analysis. Using these two methods allowed me to contrast and compare aspects of each.

Another helpful resource was Friese's (2014) book on Atlas.ti, which described how to analyze qualitative data with tools in Atlas.ti. I felt comfortable with Atlas.ti because its structure was similar to integrated development environments used in software development. Using Atlas.ti allowed me to apply codes faster and use tools such as the codes-cooccurancy table to facilitate my analysis.

Woolley, Bowen, and Bowen's (2006) paper, which explained a process for arriving at a validity determination using hierarchical criteria, was another helpful resource. I gave much thought to what criteria would need to be satisfied and at what level to make a conclusion about validity. Woolley et al.'s (2006) paper provided guidance.

Reviewing my thesis proposal, which I wrote in spring, in preparation to write the introduction to my thesis highlighted my growth in writing ability. I learned to write more

concisely through working with my advisor on a manuscript. Writing weekly reflection papers for Developmental Psychology class, I became more comfortable with APA 6 style, practiced summarizing papers for different levels of detail, and learned the importance of smooth transitions. I have more to learn about writing well for this field, but I see the progress I have made since starting this project.

Working on this project has fulfilled several of my goals for personal growth. I wanted to experience working with qualitative data. I wanted to experience collecting data. I wanted to experience writing a thesis. These experiences will enable me to have a bigger impact with whatever type of work I will do in the future.

References

Banna, J. C., Buchthal, O. V, & Tauyan, S. (2015). Assessing face validity of a food behavior checklist for limited-resource Filipinos. *Hawaii Journal of Medicine and Public Health*, *74*(10), 334–340.

Battista, J., Nigg, C. R., Chang, J. A., Yamashita, M., & Chung, R. (2005). Elementary after school programs: An opportunity to promote physical activity for children. *Californian Journal of Health Promotion*, *3*(4), 108–118.

Beatty, P. C., & Willis, G. B. (2007). Research synthesis: The practice of cognitive interviewing. *Public Opinion Quarterly*, *71*(2), 287–311.

Blair, J., Conrad, F., Castellano Ackermann, A., & Claxton, G. (2006). The Effect of sample size on cognitive interview findings. *Proceedings of the American Statistical Association, Section on Survey Research Methods*, (January 2006), 4041–4046.

Bowen, N. K. (2008). Cognitive testing and the validity of child-report data from the elementary school success profile. *Social Work Research*, *32*(1), 18–29. doi:10.1093/swr/32.1.18

Cunningham-Sabo, L., Lohse, B., Smith, S., Browning, R., Strutz, E., Nigg, C. R., … Ruder, E. (2016). Fuel for Fun: a cluster-randomized controlled study of cooking skills, eating behaviors, and physical activity of 4th graders and their families. *BMC Public Health*, *16*(1), 444–460. doi:10.1186/s12889-016-3118-6

de Leeuw, E. (2011). *Improving data quality when surveying children and adolescents: Cognitive and social development and its role in questionnaire construction and pretesting*. Naantali, Finland.

Friese, S. (2014). *Qualitative data analysis with ATLAS.ti* (2nd ed.). London: Sage Publications

Ltd.

Godin, G., & Shephard, R. J. (1985). A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Sciences*, *10*(3), 141–146.

Haas, S., & Nigg, C. R. (2009). Construct validation of the stages of change with strenuous, moderate, and mild physical activity and sedentary behaviour among children. *Journal of Science and Medicine in Sport*, *12*(5), 586–591. doi:10.1016/j.jsams.2008.11.001

Harmon, B. E., Nigg, C. R., Long, C., Amato, K., Anwar, M.-U., Kutchman, E., … Hill, J. O. (2014). What matters when children play: Influence of social cognitive theory and perceived environment on levels of physical activity among elementary-aged youth. *Psychology of Sport and Exercise*, *15*(3), 272–279. doi:10.1016/j.psychsport.2014.02.001

Iversen, M., Lee, B., Connell, P., Andersen, J., Anderson, A. F., & Kocher, M. S. (2010). Validity and comprehensibility of the International Knee Documentation Committee Subjective Knee Evaluation form in Children. *Scandinavian Journal of Medicine and Science in Sports*, *20*(1), 87–95. doi:10.1111/j.1600-0838.2009.00917.x

Koskey, K. L. K., Karabenick, S. A., Woolley, M. E., Bonney, C. R., & Dever, B. V. (2010). Cognitive validity of students' self-reports of classroom mastery goal structure: What students are thinking and why it matters. *Contemporary Educational Psychology*, *35*(4), 254–263. doi:10.1016/j.cedpsych.2010.05.004

Saldaña, J. (2013). *The coding manual for qualitative researchers* (2nd ed.). London: SAGE Publications, Inc.

Schreier, M. (2012). *Qualitative content analysis in practice*. London: Sage Publications Ltd.

Strauss, A., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage.

The Condition of Education - Glossary. (n.d.). Retrieved December 17, 2016, from http://nces.ed.gov/programs/coe/glossary.asp#poverty

Woolley, M. E., Bowen, G. L., & Bowen, N. K. (2006). The Development and Evaluation of Procedures to Assess Child Self-Report Item Validity Educational and Psychological Measurement. *Educational and Psychological Measurement, 66*, 687–700. doi:10.1177/0013164405282467

This section is about physical activity. Please fill in the circle for the number of days in a week and how many minutes each day that best describes how much activity you do when you're NOT in school.

Strenuous activity (It makes my heart beat quickly, and makes me sweat.)

Examples are: running, jogging, fast bicycling, aerobic dance, rollerblading, paddling, fast swimming, soccer, basketball, football, martial arts.

1. **How many days a week do you do this?**

⓪ ① ② ③ ④ ⑤ ⑥ ⑦

2. **How many minutes each day?**

⓪ ⑩ ⑳ ㉚ ㊵ ㊿ ⑥⓪+

Moderate activity (It doesn't make me tired, and makes me sweat just a little.)

Examples are: fast walking, slow bicycling, easy swimming, weight lifting, baseball, softball, tennis, volleyball, hula.

3. **How many days a week do you do this?**

⓪ ① ② ③ ④ ⑤ ⑥ ⑦

4. **How many minutes each day?**

⓪ ⑩ ⑳ ㉚ ㊵ ㊿ ⑥⓪+

Mild activity (It makes me use little effort, and doesn't make me sweat.)

Examples are: easy walking, bowling, fishing, golf, yoga.

5. **How many days a week do you do this?**

⓪ ① ② ③ ④ ⑤ ⑥ ⑦

6. **How many minutes each day?**

⓪ ⑩ ⑳ ㉚ ㊵ ㊿ ⑥⓪+

7. **How many hours a day do you spend watching television, playing video games and using Internet (not for homework)?**

⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩+

This question is about regular physical activity. Regular physical activity is:

-Activity that happens for 30 minutes at a time (or more) in a day.
-It must be 5 days (or more) in a week.
-It should be enough to make your heart beat faster and/or make you breathe harder…like walking briskly, biking, swimming, paddling, and aerobics classes.

8. **Do you do regular physical activity, as it is described above? Please put an "X" in the box to mark your answer.**
   - ❑ No, and I do not intend to in the next 6 months.
   - ❑ No, but I intend to in the next 6 months.
   - ❑ No, but I intend to in the next 30 days.
   - ❑ Yes, I have been, but for less than 6 months.
   - ❑ Yes, I have been for more than 6 months.

9. **Now think back to the summer. Compared to NOW, were you… (Please put an X in the box to mark your answer.)**
   - ❑ more active in the summer?
   - ❑ as active (same) as in the summer?
   - ❑ less active in the summer?

Figure 1. Physical activity items of the *Fuel for Fun* survey.

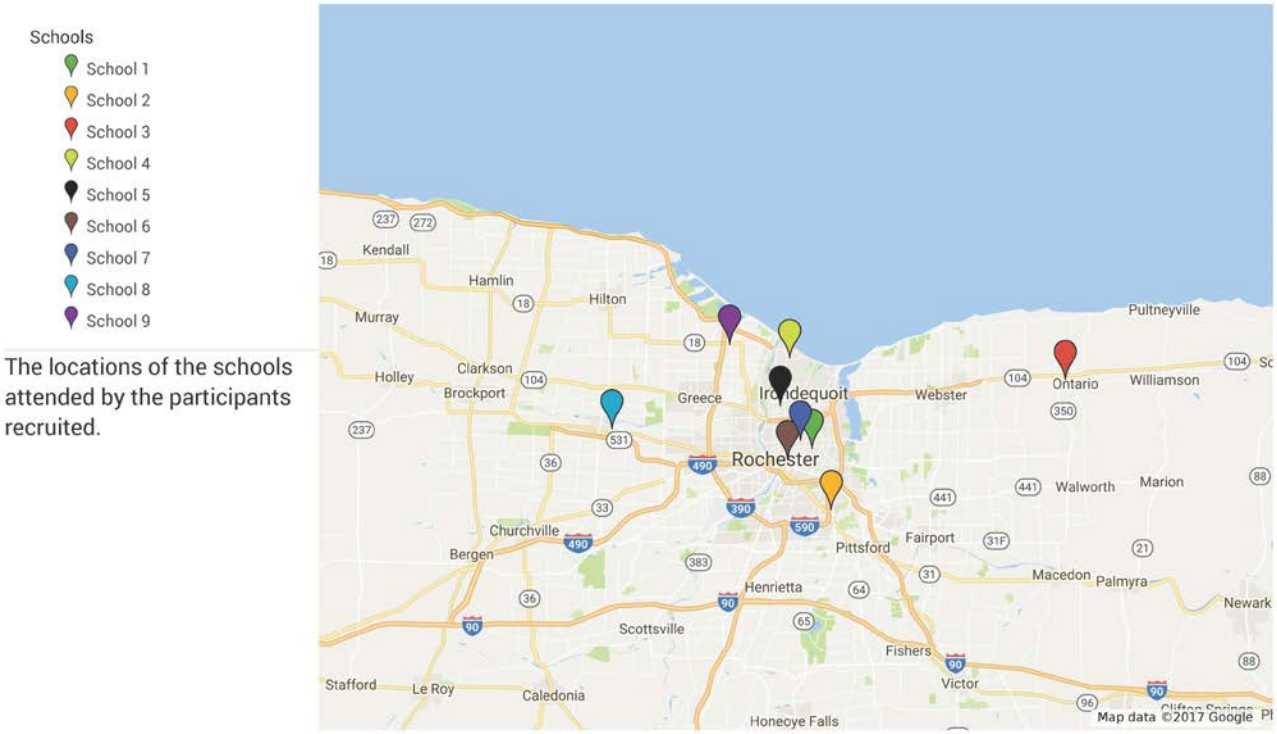

*Figure 2.*Geographic distribution of schools attended by participants.

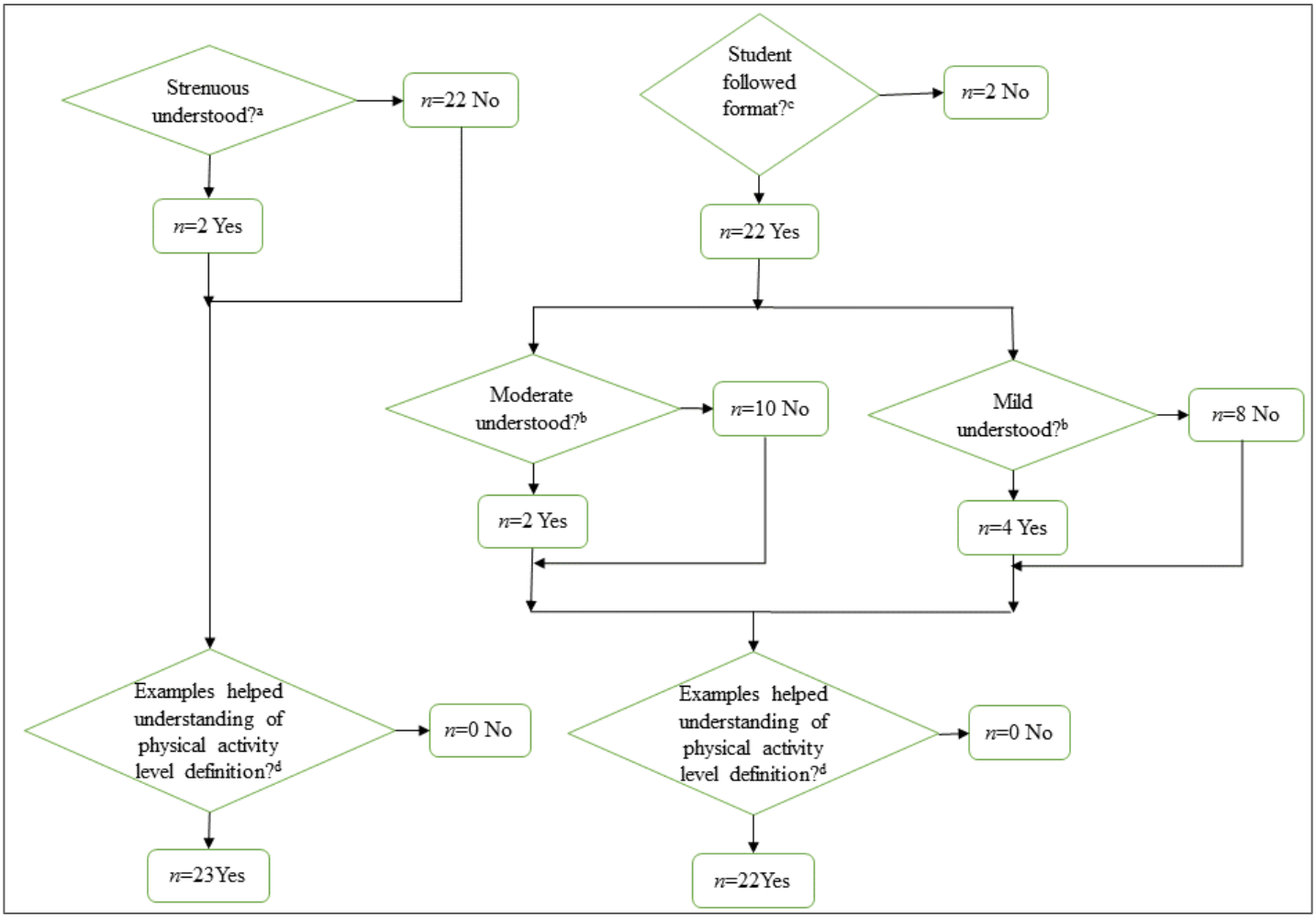

Figure 3. Flow of understanding for strenuous, moderate or mild descriptions. Understanding was based on a response congruent with reference definition. [a]All were asked the meaning of strenuous. [b]Twelve each were asked the meaning of moderate and mild. [c]Students were required to follow a horizontal and vertical format. [d]Students (23 out of 24) were also asked if the example physical activities provided with the item help them understand the item.

Figure 4. Word cloud of physical activities mentioned during discussion of survey items. Students mentioned words shown in larger font sizes more frequently than words shown in smaller font sizes.

Table 1

Sample questions asked during interview to determine understanding of terms used in survey and clarity of survey items

Survey Item	Group[a]	Specific Interview Questions	General Interview Questions
Strenuous activity	A, B	What do you think the word 'strenuous' means? What do you think the word 'aerobic' means?	How helpful were the examples? What other examples can you think of that I could include in this list?
Item 1	A, B	What activity or activities were you thinking of when you chose your answer? What days of the week do you do this activity (these activities)?	How did you figure out the number to choose for your answer?
Item 2	A, B	How is 30 minutes different from 60 minutes?	What did you think about as you chose your answer?
Moderate activity	A	What do you think the word "moderate" means?	What did you think about when you read this item? What other examples can you think of that I could include in this list?
Item 3	A	What activity or activities were you thinking of when you chose your answer? What days of the week do you do this activity (these activities)?	How do you figure out the number of days a week you do an activity?
Item 4	A	You mentioned (activity or activities) before. For how long do you do these activities?	What did you think about as you chose your answer?
Mild activity	B	What do you think the word "moderate" means?	What did you think about when you read this item? What other examples can you think of that I could include in this list?

Item 5	B	What activity or activities were you thinking of when you chose your answer? What days of the week do you do this activity (these activities)?	How do you figure out the number of days a week you do an activity?
Item 6	B	You mentioned (activity or activities) before. For how long do you do these activities?	What did you think about as you chose your answer?
Item 7	B	How many hours do you think there are in a school day?	How did you figure out the number to choose for your answer?
Item 8	A, B	What do you think the word “intend” means? Tell me about a regular physical activity that you do. How is 30 days different from 6 months?	How did you choose your answer?
Item 9	A	What did you think about when you read the word, “active?” When we asked you to think back to the summer, how easy or hard was that for you? Tell me about activities you do in the summer. Tell me about activities you do this time of year.	How did you choose your answer?

Note. The interviewer also asked, “How well did you understand this item?” for each item. [a]The sample was divided into two groups (labeled A and B) to maintain a reasonable length for interviews. Each group responded to interview questions for 8 of the 12 physical activity survey items (3 description items plus 9 response items).

Table 2

Percent coherent explanations for answer choices and answer choices congruent with explanation.

Item	Coherent (%)[a]	Congruent (%)[b]
n=24		
Strenuous days per week	83	63
Strenuous minutes per day	79	67
Stage of change	83	63
n=12		
Moderate days per week	67	50
Moderate minutes per day	67	58
Mild days per week	83	75
Mild minutes per day	83	58
Hours of sedentary behavior per week	100	75
Seasonal activity	100	92

Note. [a]student explanation for answer choice was appropriate for the concept of the item (performance level 2). [b]student answer choice matched coherent explanation for answer choice (performance level 3).

Table 3

Sample responses to the interview question, "How helpful were the examples?"

Participant ID	Quotation
C03	"They were very helpful because strenuous was sort of like a word that wasn't in my vocabulary."
C05	"Helpful enough to help me understand what the question was asking."
C06	"They were helpful because they showed me what the activities were."
C10	"Very helpful 'cause it's like hard to imagine what that would look like or what that would be. So, when they gave me the examples it was like, Oh I know what they mean. It really helped me with question."
C14	"They were really helpful because it helped me understand strenuous, the word strenuous better."
C19	"They were helpful because at first I wasn't very sure if strenuous meant strength in one activity. This kinda, this like in parentheses, it helped too, but I think the running and the jogging and all the examples help me a lot, too."

Note. All who were asked (*n*=23) the interview question, "How helpful were the examples?" responded that the examples helped them understand the description. These quotations provide insight to why students found the examples helpful.

Table 4

Reported stage of change for physical activity

Stage	% (n=24)
No, and I do not intend to in the next 6 months. (precontemplation)	4
No, but I intend to in the next 6 months. (contemplation)	0
No, but I intend to in the next 30 days. (preparation)	8
Yes, I have been, but for less than 6 months. (action)	21
Yes, I have been for more than 6 months. (maintenance)	67

Table 5

Cooking self-efficacy, cooking attitude, and physical activity scores by gender

Score[1]	Total (*n*=24)		Boys (*n*=12)		Girls (*n*=12)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Cooking Self-efficacy[a]	35.4	3.2	35.5	3.5	35.2	3.1
Cooking Attitude[b]*	26.5	3.1	25.8	13.4	27.9	1.9
Strenuous minutes per week	172.7	110.2	161.4	120.4	180.0	109.0
Moderate minutes per week	155.4[e]	121.5	147.7[f]	119.2	162.5	128.4
Mild minutes per week	124.4	137.6	134.1	148.9	121.7	137.2
MET[c] minutes per week	2700[e]	1411	2593[f]	1447	2798	1435
MVPA[d] minutes per week	326[e]	181	309[f]	180	342	188

Note. [1] Significance notations indicate statistical difference when comparing groups using Mann Whitney U. *$p < .01$. [a]Five response options were provided for this scale. Possible scores ranged from 8 to 40. Higher scores indicated a greater self-efficacy. [b]Five response options were provided for this scale. Possible scores ranged from 6 to 30. Higher scores indicated a more positive attitude. [c]MET indicates metabolic equivalent task, computed by (9*strenuous days per week * strenuous minutes per day) + (5*moderate days per week * moderate minutes per day) + (3*mild days per week * mild minutes per day). [d]MVPA indicates moderate and vigorous physical activity computed by summing moderate minutes per week and strenuous minutes per week. [e]*n* = 23 due to one missing response for moderate minutes per week. [f]*n* = 11 due to one missing response for moderate minutes per week.

Table 6

Rater confidence assigning codes in the latent dimension, Survey Item Response Congruence

Item	Unsure of coding assignment	Confident in coding assignment
n = 24		
Strenuous days per week	3	21
Strenuous minutes per day	4	20
Stage of change	2	22
n = 12		
Moderate days per week	3	9
Moderate minutes per day	2	10
Mild days per week	1	11
Mild minutes per day	1	11
Hours of sedentary behavior per week	2	10
Seasonal activity	0	12
Total	18	126

Note. Total number of coding units in this dimension was 144.

Table 7

Participant characteristics

Characteristic	Total (n=24)
Gender (%)	
Boys	12 (50)
Girls	12 (50)
Age, y (mean ± SD)	9.7 ± .43
Race/Ethnicity (%)[a]	
White/Non-Hispanic	22 (92)
White/Hispanic or Latino	3 (12)
Asian	2 (8)
School (%)	
1 (City)	1 (4)
2 (Suburb)	1 (4)
3 (Suburb)	6 (25)
4 (Suburb)	6 (25)
5 (Suburb)	4 (17)
6 (City)	1 (4)
7 (City)	2 (8)
8 (Suburb)	2 (8)
9 (Suburb)	1 (4)

Note. [a] Not all participants specified race/ethnicity and some participants specified two races/ethnicities.

Table 8

Free-lunch eligibility and demographic characteristics of schools attended by students

School ID	Students from school (*n*)	Free lunch eligible (%)	Reduced price lunch eligible (%)	American Indian/ Alaska Native (%)	Asian or Asian/ Pacific Islander (%)	African-American (%)	Hispanic (%)	White (%)	2 or more races (%)
1	1	69.9	0.8	0.1	0.5	58.5	36.0	4.9	0.1
2	1	NA	NA	0.4	5.8	4.7	2.8	71.3	9.3
3	6	23.1	8.5	0.0	0.3	1.2	2.6	95.6	0.3
4	6	NA	NA	0.0	2.4	7.9	8.7	77.0	4.0
5	4	21.0	6.2	0.2	1.9	14.1	11.5	69.7	2.6
6	1	52.6	2.6	0.4	2.6	72.9	10.5	13.2	0.1
7	2	75.2	1.0	0.0	0.6	66.0	27.0	6.2	0.3
8	2	22.8	8.8	0.2	2.9	2.1	7.2	84.2	3.5
9	1	17.5	6.9	0.2	2.0	6.7	6.0	81.8	3.4

Note. NA indicates information from this school was not available.

Table 9

Example responses to the interview question, "How well did you understand the item?" for the stage of change item.

Participant ID	Quotation
C05	"Like what it was trying to ask you to do. . . .Like less, the more the next more than six months, less than six months the next 30 days, the next 6 months."
C11	"Pretty well, the only thing that I did not catch on until yes is that the no, no, no and but, but, I, I and I do not intend, intend, intend to, I kept saying that over and over I got my head is like okay the next two are going to say that again."
C15	"It was a little hard because like that less 6 months like I had to think about it a little bit."
C17	"For a second, I don't know why I thought this but the words I have been for more than 6 months, I felt that like it was something you can join like some club that I didn't know about and I got confused because I was like what if I haven't been doing this for six months?"
C18	"Pretty well because there's a lot of question, answers, like no but I intend to do it for the next 6 months and just multiple questions as in like me I do intend to do for the next 30 day or next 3 months or I have been and I did for the last 6 months or more than 6 months."
C19	"At first I put yes I have been about for less than 6 months, because I was a little confused on this question. Since I thought that it meant for, at first, I thought that it meant for like the past 6 months. But then I realized that I think it's talking about your whole life. So, I said yes I have been for more than 6 months since I have been for more than 6 months in my whole life."
C23	"I thought that the yes is going to be at the top but then the no one is going to be at the bottom but yes is at the bottom and the no is at the top. And I don't get what it makes do you regular physical activity as it is described above, please put an X in the box to mark your answer."
C24	"Well I don't really know what that word intend meant."

Note. Student responses illustrate aspects of the item they found confusing, for example, the wording of the answer choices or the word *intend.* Responses also illustrate strategies students used to understand the item, such as thinking about the item, or repeating the words.

Table 10

Creative examples of physical activities provided by students during discussion of plysical activity survey items.

Student	Activity
C03	“capture the kick ball”
C04	“training on a medium level”
C10	“dribble the ball like slowly”
C10	“weed and plant things”
C11	“going up and down the slides”
C12	“twisting your brothers arm”
C12	“fly my drone”
C12	“I pretend I am actually hunting”
C12	“play with my nerf gun”
C12	“shape shifting”

Appendix A

Flyer to be Sent Home to Parents

Are you the Parent of a 4th Grader?

Can we interview your 4th grader to find out what physical activity and cooking mean to him/her?

- **Interviews are less than 30 minutes**
- **Face-to-face interviews will be audio recorded**
- **Responses are strictly confidential**

Each student will receive a $15 grocery store gift card upon interview completion

Interested in Participating?

Go to http://tiny.cc/ROC4thGrader

Questions? Please contact Betty Wayman

edw1181@rit.edu or (585)-732-4307

R·I·T

W·S·H·N Wegmans School of Health and Nutrition

needs NUTRITION EDUCATION ENGINEERING & DESIGNS

Appendix B

Flyer with Tabs to be Posted

Are you the Parent of a 4th Grader?

Can we interview your 4th grader to find out what physical activity and cooking mean to him/her?

- **Interviews are less than 30 minutes**
- **Face-to-face interviews will be audio recorded**
- **Responses are strictly confidential**

Each student will receive a $15 grocery store gift card upon interview completion

Interested in Participating?

Go to http://tiny.cc/ROC4thGrader

R·I·T

W·S·H·N Wegmans School of Health and Nutrition

needs NUTRITION EDUCATION ENGINEERING & DESIGNS

4th Grader Interviews
Go to http://tiny.cc/ROC4thGrader
Questions? Contact Betty Wayman
edw1181@rit.edu or (585)-732-4307

Appendix C

Printed Version of Qualtrics Survey

This is the right place to learn more about the project with your 4th grade child.

Are you the parent of a 4th grade child?

_____ Yes
_____ No

Consent

Thank you for your interest in this study. Before we get started we need you to read more about the study and then indicate that you understand what the study is about and that you agree to have your child participate.

You may ask about the study at any time by contacting one of the following: Dr. Barbara Lohse, Professor of Health Sciences, Rochester Institute of Technology, 814-880-9977 (balihst@rit.edu); Dr. Leslie Cunningham-Sabo, Associate Professor, Colorado State University, 970-491-6791 (leslie.cunningham-sabo@colostate.edu); Betty Wayman, Graduate Student, Department of Psychology, Rochester Institute of Technology, 585-732-4307 (edw1181@rit.edu).

What is this study about?

We will be giving your 4th grade child a survey to complete that has questions related to physical activity and cooking. Then, we will do a face-to-face interview with your child to find out why they chose their answers and what they think about the question. The interview length will depend on what your child wants, but will never be longer than 30 minutes. We will not do any part of this study if your child doesn't want to participate.

What will my child be asked to do in this interview?

We will ask questions about the survey (such as what exercise and cooking means to them, what made them choose their answer). We will be audio-recording the interview to help us be sure that no important information is missed. At no time will your child's name be included in the recording or the data that we analyze. Your child's participation in this research is voluntary; he/she may refuse to participate, and if he/she does decide to participate, he/she may choose to withdraw consent and stop at any time without penalty.

Are there any benefits to me or my child if he/she participants in this study?

There are no direct benefits to you or your child associated with this research, we hope to gain more knowledge about what exercise and cooking mean to 4th grade children, and how they interpret specific questions in our survey, which is currently being used a larger research project called Fuel for Fun. Your child will receive a $15 gift card to a grocery store/food market.

Are there any risks to me or my child if he/she participates in this study?

There will be no costs to you or your child for taking part in this study. There are no known risks associated with participation in this research. It is not possible to identify all potential risks in research procedures, but the researchers have taken reasonable safeguards to minimize any known and potential, but unknown, risks.

Will my child's information be kept private?

The interview will be recorded. Each participant will be assigned a number that will then serve as an identifier. Participants will only be known by their assigned number to the research team. Once the study is complete, audio files and original transcripts (with identifiers) will be deleted/destroyed.

Are there any costs or payments for my child participating in the study?

There will be no costs to you or your child for taking part in this study. Your child will receive a $15 gift card to a grocery store/food market.

Who can I talk to if I have questions?

If you have any questions regarding this research, contact one of the following: Dr. Barbara Lohse, Professor of Health Sciences, Rochester Institute of Technology, 814-880-9977 (balishst@rit.edu); Dr. Leslie Cunningham-Sabo, Associate Professor, Colorado State University, 970-491-6791 (leslie.cunningham-sabo@colostate.edu); Betty Wayman, Graduate Student, Department of Psychology, Rochester Institute of Technology, 585-732-4307 (edw1181@rit.edu). If you have any questions about your rights as a volunteer in this research, contact the Colorado State University IRB representative, Evelyn Swiss, evelyn.swiss@colostate.edu; 970-491-1381).

What does my signature on this consent form mean?

You understand the information given to you in this form. You have been able to ask the interviewer questions and state any concerns. The interviewer has responded to your questions and concerns. You believe you understand the purpose of this research study and the potential benefits and risks that are involved.

Check one of the following choices below:

_____ I agree that my child may participate in the study. I am 18 years of age or older.

_____ I don't want my child to participate in the study.

Full (first and last) name of your 4th grader.

Your First Name

Indicate the school or after school program (such as the Y) your child attends.

Please provide your contact information below in case we need to contact you.

Phone Number (enter XXX-XXX-XXXX format)

Please provide your e-mail. Thank you.

Please indicate your CHILD's gender

_____ Male
_____ Female

What is your CHILD's race/ethnicity (Choose ONE OR MORE GROUPS)

_____ White/Non-Hispanic
_____ White/Hispanic or Latino
_____ Black or African American/Non-Hispanic
_____ Black or African American/Hispanic or Latino
_____ Asian
_____ Native American or Alaska Native
_____ Hawaiian Native or Pacific Islander

What is your child's birthdate? Please use dd/mm/yyyy format. For example, if your child was born on January 2, 2006 you would enter 01/02/2006.

Appendix D

Child Assent Form

Hello!

I am from the Rochester Institute of Technology, also called RIT. I study being active and cooking. My work is about making up questions about cooking and activity that we ask other kids like you. You can help me by letting me ask you what you think about some of the questions. There are no right or wrong answers. I would like you to just say how you feel about the question, and what it means to you.

Agreeing to do this will not hurt you. It won't help you, either. You don't have to do it. If you say "yes" now but later change your mind, you can stop being in the research any time by just telling me.

We asked your parent if it is OK that you do this, too. If you want to be in this research, sign your name and write today's date on the lines below.

_____

_____

Child Date

_____

_____

Researcher Date

Appendix E

Portion of Fuel for Fun Survey to be Completed during Interview

Fuel for Fun: Cooking with Kids Student Survey

First name _____ Last name _____

Teacher name _____ School _____

Date _____

I have been told that I can choose to answer the questions in this packet or not. If I choose not to answer any or all questions I won't get in trouble with my teacher or anyone else.

If I sign my first and last name below, it means I plan to answer the questions in this packet. If I don't sign my name, it means I don't want to do this.

_____

(Write your first and last name on this line if you want to answer the questions.)

****

Please put an "X" in the box to mark your answer.

1. Do you make food with your family?
- ☐ Yes
- ☐ No

2. Do you make food with your friends?
- ☐ Yes
- ☐ No

3. Do you cook?
- ☐ Yes
- ☐ No

Please put an "X" in the box to mark your answer.

1. **I can make a snack with fruit.**

❑ YES!	❑ Yes	❑ No	❑ NO!	❑ Not sure

2. **I can make a snack with vegetables.**

❑ YES!	❑ Yes	❑ No	❑ NO!	❑ Not sure

3. **With help, I can use a recipe.**

❑ YES!	❑ Yes	❑ No	❑ NO!	❑ Not sure

4. **I can help my family make a meal.**

❑ YES!	❑ Yes	❑ No	❑ NO!	❑ Not sure

5. **I can make a salad.**

❑ YES!	❑ Yes	❑ No	❑ NO!	❑ Not sure

6. **I can cut up food.**

❑ YES!	❑ Yes	❑ No	❑ NO!	❑ Not sure

7. **I can measure ingredients.**

❑ YES!	❑ Yes	❑ No	❑ NO!	❑ Not sure

8. **I can follow recipe directions.**

❑ YES!	❑ Yes	❑ No	❑ NO!	❑ Not sure

Please put an "X" in the box to mark your answer.

1. **How do you feel about cooking?**
   - ❑ I **really like** to cook.
   - ❑ I **kind of like** to cook.
   - ❑ I **don't like** to cook.
   - ❑ I **really don't like** to cook.
   - ❑ I'm **not sure** if I like to cook.

2. **How do you feel about foods that you have helped cook?**
   - ❑ I **really like** foods that I have helped cook.
   - ❑ I **kind of like** foods that I have helped cook.
   - ❑ I **don't like** foods that I have helped cook.
   - ❑ I **really don't like** foods that I have helped cook.
   - ❑ I'm **not sure** if I like foods that I have helped cook.

3. **How do you feel about measuring ingredients?**
   - ❑ I **really like** to measure ingredients.
   - ❑ I **kind of like** to measure ingredients.
   - ❑ I **don't like** to measure ingredients.
   - ❑ I **really don't like** to measure ingredients.
   - ❑ I'm **not sure** if I like to measure ingredients.

4. **How do you feel about making snacks?**
   - ❑ I **really like** to make snacks.
   - ❑ I **kind of like** to make snacks.
   - ❑ I **don't like** to make snacks.
   - ❑ I **really don't like** to make snacks.
   - ❑ I'm **not sure** if I like to make snacks.

5. **How do you feel about making food with your friends?**
   - ❑ I **really like** to make food with my friends.
   - ❑ I **kind of like** to make food with my friends.
   - ❑ I **don't like** to make food with my friends.
   - ❑ I **really don't like** to make food with my friends.
   - ❑ I'm **not sure** if I like to make food with my friends.

6. **How do you feel about making food with your family?**
   - ❑ I **really like** to make food with my family.
   - ❑ I **kind of like** to make food with my family.
   - ❑ I **don't like** to make food with my family.
   - ❑ I **really don't like** to make food with my family.
   - ❑ I'm **not sure** if I like to make food with my family.

This section is about physical activity. Please fill in the circle for the number of days in a week and how many minutes each day that best describes how much activity you do when you're NOT in school.

Strenuous activity (It makes my heart beat quickly, and makes me sweat.)

Examples are: running, jogging, fast bicycling, aerobic dance, rollerblading, paddling, fast swimming, soccer, basketball, football, martial arts.

1. **How many days a week do you do this?**

⓪ ① ② ③ ④ ⑤ ⑥ ⑦

2. **How many minutes each day?**

⓪ ⑩ ⑳ ㉚ ㊵ ㊿ ⑥⓪+

Moderate activity (It doesn't make me tired, and makes me sweat just a little.)

Examples are: fast walking, slow bicycling, easy swimming, weight lifting, baseball, softball, tennis, volleyball, hula.

3. **How many days a week do you do this?**

⓪ ① ② ③ ④ ⑤ ⑥ ⑦

4. **How many minutes each day?**

⓪ ⑩ ⑳ ㉚ ㊵ ㊿ ⑥⓪+

Mild activity (It makes me use little effort, and doesn't make me sweat.)

Examples are: easy walking, bowling, fishing, golf, yoga.

5. **How many days a week do you do this?**

⓪ ① ② ③ ④ ⑤ ⑥ ⑦

6. **How many minutes each day?**

⓪ ⑩ ⑳ ㉚ ㊵ ㊿ ⑥⓪+

7. **How many hours a day do you spend watching television, playing video games and using Internet (not for homework)?**

⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩+

This question is about regular physical activity. Regular physical activity is:

-Activity that happens for 30 minutes at a time (or more) in a day.
-It must be 5 days (or more) in a week.
-It should be enough to make your heart beat faster and/or make you breathe harder…like walking briskly, biking, swimming, paddling, and aerobics classes.

8. Do you do <u>regular physical activity</u>, as it is described above? <u>Please put an "X" in the box to mark your answer.</u>

- ❑ No, and I <u>do not intend to</u> in the next <u>6 months</u>.
- ❑ No, but I <u>intend to</u> in the next <u>6 months</u>.
- ❑ No, but I <u>intend to</u> in the next <u>30 days</u>.
- ❑ Yes, I have been, but for <u>less than 6 months</u>.
- ❑ Yes, I have been for <u>more than 6 months</u>.

9. Now think back to the summer. Compared to NOW, were you… (<u>Please put an X in the box to mark your answer.)</u>

- ❑ more active in the summer?
- ❑ as active (same) as in the summer?
- ❑ less active in the summer?

10. Below are statements about your eating. Think about each one, then fill in the circle that is the best response for you.

	Always	Often	Sometimes	Rarely	Never
I am relaxed about eating.	O	O	O	O	O
I am comfortable about eating enough.	O	O	O	O	O
I have regular meals.	O	O	O	O	O
I feel it is okay to eat food that I like.	O	O	O	O	O
I experiment with new food and learn to like it.	O	O	O	O	O
If the situation demands, I can "make do" by eating food I don't much care for.	O	O	O	O	O
I eat a wide variety of foods.	O	O	O	O	O
I am comfortable with my enjoyment of food and eating.	O	O	O	O	O
I trust myself to eat enough for me.	O	O	O	O	O
I eat as much as I am hungry for.	O	O	O	O	O
I tune in to food and pay attention to eating.	O	O	O	O	O
I make time to eat.	O	O	O	O	O
I eat until I feel satisfied.	O	O	O	O	O
I enjoy food and eating.	O	O	O	O	O
I consider what is good for me when I eat.	O	O	O	O	O
I plan for feeding myself.	O	O	O	O	O

Student ID# _____ School _____ Date _____ *Version Date 07/09/2014*
Colorado State University, Food Science and Human Nutrition Department, Leslie Cunningham-Sabo

Appendix F

Cognitive Interview Guide for Group A

Cognitive Interview Guide for 4th Grade Students

Assessing Sections of the Fuel for Fun Survey

Group A

Group A

Cognitive Interview Guide for 4th Grade Students Assessing Sections of the Fuel for Fun Survey

Cognitive Interview Checklist

Assemble the following materials (1-2 days prior to conducting the interview):

- ❑ Fuel for Fun survey items for participants
- ❑ Pens, pencils
- ❑ Assent Form
- ❑ Extra note paper
- ❑ Cognitive Interview Guide for interviewer
- ❑ Audio recorder (laptop)
- ❑ Power cord for laptop
- ❑ Recorder backup (phone or other)
- ❑ Gift cards
- ❑ Gift Card Receipts

Make sure the audio recorder is working properly and the batteries are not running low. Bring a backup recorder in case the main device is not working properly. Practice recording before beginning the interview to ensure that the recorder can pick up another person's voice.

Interview Record

To be completed at time of interview

- Participant ID _____
- Interview Date _____
- Interviewer _____
- Location _____
- Interview Start Time _____
- Interview Stop Time _____
- Total Recorded Length _____
- Time to complete interview _____
- Time to complete survey _____

Notes

Cognitive Interview Introduction

"Hi! I'm _____. I'm a student at RIT and **my project is about interviewing kids** like you about being active and cooking. Tell me how **you're doing today**?

Thank you for talking to me today. We'll talk **for about a half hour**. We want to know **what you think** about some questions on a survey that we made for kids like you. I am going to ask you to **complete the survey** and then we'll talk about some of the questions on the survey. There are **no right or wrong answers**. Your answers will really help us answer some questions we have. After we are finished, I will give you a **gift card to thank you** for helping us."

- Give the participant the assent form.

  "This is a **form that means you agree to help us with this project**. I am going to read it out loud and you can read silently along with me."

- Read it out loud (reproduced below) and have them follow along.

"'Hello! I am from the Rochester Institute of Technology, also called RIT. I study being active and cooking. My work is about making up questions about cooking and activity that we ask other kids like you. You can help me by letting me ask you what you think about some of the questions. There are no right or wrong answers. I would like you to just say how you feel about the question, and what it means to you.

Agreeing to do this will not hurt you. It won't help you, either. You don't have to do it. If you say "yes" now but later change your mind, you can stop being in the research any time by just telling me.

We asked your parent if it is OK that you do this, too. If you want to be in this research, sign your name and write today's date on the lines below.' (end) If you don't sign your name that means you don't want to do this. After we get started, if you decide you want to stop answering questions, you can stop at any time by just telling me you want to stop and it's ok. Do you have any questions?"

- Answer any questions. Once the form is signed, continue.

"Thank you. Now I am going to give you some questions to **answer silently** by checking the box that you agree with. After you are done, **I am going to ask you some questions**. I am going to **record what you say on this recorder** so that we can remember everything you said. I might also **write some things down while you are talking, but I am still listening** to you. Remember, there are no right or wrong answers. **Please answer how you think is best**. I am going to **start the recorder** now."

- Give participant predetermined portion of student survey questions.
- Allow participant to complete survey. Ask the participant if they would like you to read the survey aloud or not.
- Start recorder
- Say the participant ID number and date and start time on the recorder.
- Record the interview start time on this Cognitive Interview Guide.

Notes

Survey start time _____

Survey end time _____

What is the seating arrangement of participant and interview?

Is the door closed?

Is the participant's back toward the door or windows?

Are there distractors in the room?

Observations about survey completion

Cognitive Interview Question Guide

Notes

Practice Question

"I'm interested in what you're thinking and feeling. Before we get started, I'm going to ask you some questions to help you get used to talking about your thinking. Tell me about your favorite song or singer.

Additional probes based on response:

- Who do you listen with?
- Tell me what you're thinking/feeling when you listen to this song or singer?
  - If answers with **description**
    - What I'm really interested in is what you're feeling when you listen to this song or singer. Please tell me more about how you're feeling.
    - If answers with **feeling**
    - Thank you – that is the kind of information I'm looking for.

Now we're going to get started with some of the questions from the survey you just filled out. A lot of students like you actually fill out this survey and we want to know what students like you think about these questions. There are no right or wrong answers. What we talk about is strictly between us. I didn't make these survey questions up, so you can tell me whatever you think about them.

Do You Cook?

Notes

Let's go to "do you cook." What did you put for your answer? (or I see you put ( ) for your answer)"

Probing Questions: based on the child's response, we will ask one or more of these follow up questions

- How did you choose your answer?
- If **yes** to "Do you cook:"
    - What is your favorite thing to make when you cook? How do you make it?
    - What types of equipment do you use?
    - What are some other things that you cook? What do you do when you cook these?
  - If **no** to "Do you cook:"
    - When I say "cooking" what comes to your mind?
    - Who cooks in your family?
    - What do they cook?
- We want to make sure that the questions on this survey are clear to students like you who take this survey. You can help us do this by telling me how well you understood the questions. How well did you understand this question?
  - If answered **not well**
  - What part of the question was confusing to you?
  - If answered **well**
  - What are your thoughts about this question?
- Now that we have talked about this question, do you want to change or keep your answer?

Physical Activity Strenuous		
Survey Question	**Probing Questions**	**Notes**
"Let's go to the section on strenuous activity. Please read the item aloud." Strenuous activity (It makes my heart beat quickly, and makes me sweat.) Examples are: running, jogging, fast bicycling, aerobic dance, rollerblading, paddling, fast swimming, soccer, basketball, football, martial arts.	• One of the words you read was '**strenuous**.' What do you think the word 'strenuous' means? • Another word you read was '**aerobic**.' What do you think the word 'aerobic' means? • There were some examples given in the question, like running, fast swimming, soccer. How helpful were the examples? • How well did you understand this item? o If answered **not well** ▪ What part of the item was confusing to you? o If answered **well** ▪ What are your thoughts about this item?	
"Now let's go to question 1, '**How many days a week do you do this?**' What did you put for your answer?"	• How did you figure out the number to choose for your answer? • If answered **more than 0**: o What activity or activities were you thinking of when you chose your answer? ▪ What days of the week do you do this activity (these activities)? • How well did you understand this question? o If answered **not well** ▪ What part of the question was confusing to you? o If answered **well** ▪ What are your thoughts about this question? • Now that we have talked about this question, do you want to change or keep your answer?	

"Let's go to question 2, **'How many minutes each day?** What did you put for your answer?"	• What did you think about as you chose your answer? • If answered **more than 0** and **mentioned an activity** in response to the previous survey question o You mentioned (activity or activities) before. ▪ For how long do you do these activities? • If answered **30** minutes ▪ Tell me about something you think can be completed in **60** minutes. How does this compare with **30** minutes? o If answered **other than 30** minutes ▪ Tell me about something you think can be completed in **30** minutes. How does this compare with [**minutes they answered**]? • How well did you understand this question? o If answered **not well** ▪ What part of the question was confusing to you? o If answered **well** ▪ What are your thoughts about this question? • Now that we have talked about this question, do you want to change or keep your answer?	For "Tell me about something you think can be completed..." Circle minutes choice to remember for next question.

Physical Activity Moderate		
Survey Question	**Probing Questions**	**Notes**
"Let's go to the section on moderate activity. Please read the item aloud." Moderate activity (It doesn't make me tired, and makes me sweat just a little.) Examples are: fast walking, slow bicycling, easy swimming, weight lifting, baseball, softball, tennis, volleyball, hula.	• One of the words you read was 'moderate.' What do you think the word "moderate" means? • What did you think about when you read this item? • How well did you understand the item? o If answered **not well** ▪ What part of the item was confusing to you? o If answered **well** ▪ What are your thoughts about this item?	

"Now let's go to question 3, '**How many days a week do you do this**?' What did you put for your answer?"	• How do you figure out the number of days a week you do an activity? o If answered more than 0: • What activity or activities were you thinking of when you chose your answer? • What days of the week do you do this activity (these activities)? ▪ If answered 0 • Tell me about activities that you think make you sweat just a little. • How well did you understand this question? o If answered **not well** ▪ What part of the question was confusing to you? o If answered **well** ▪ What are your thoughts about this question? • Now that we have talked about this question, do you want to change or keep your answer	
"Let's go to question 4, **'How many minutes each day?** What did you put for your answer?"	• What did you think about as you chose your answer? • Tell me about something you think can be completed in [**30/60**] minutes. • If answered more than 0 and mentioned an activity in response to the previous survey question o You mentioned (activity or activities) before. ▪ For how long do you do these activities? • How well did you understand the question? o If answered **not well** ▪ What part of the question was confusing to you? o If answered **well** ▪ What are your thoughts about this question? Now that we have talked about this question, do you want to change or keep your answer?	Choose minutes to be different from strenuous minutes above.

Regular Physical Activity		
Survey Question	**Probing Questions**	**Notes**

"Please read the description about regular physical activity and question 8 and its answer choices aloud, and then we'll talk about the question."
 	
This question is about regular physical activity. Regular physical activity is:
-Activity that happens for 30 minutes at a time (or more) in a day.
-It must be 5 days (or more) in a week.
-It should be enough to make your heart beat faster and/or make you breath harder…like walking briskly, biking, swimming, paddling, and aerobics classes.
 	
1. Do you do regular physical activity, as it is described above? Please put an "X" in the box to mark your answer.
☐ No, and I do not intend to in the next 6 months.
☐ No, but I intend to in the next 6 months.
☐ No, but I intend to in the next 30 days.
☐ Yes, I have been, but for less than 6 months.
☐ Yes, I have been for more than 6 months.
	• How did you choose your answer?
	• The word 'intend' is used several times in this question. What do you think the word "intend" means?
	• Tell me about a regular physical activity that you do.
	• What is something that lasts 30 days?
	• What is something that lasts 6 months?
	• How well did you understand this question?
	  o If answered **not well**
	  ▪ What part of the question was confusing to you?
	  o If answered **well**
	  ▪ What are your thoughts about this question?
	• Now that we have talked about this question, do you want to change or keep your answer?
		Note whether student reads the description of physical activity preceding the question.

Summer Activity		
Survey Question	**Probing Questions**	**Notes**
"Let's go to question 9. Please read the question and its answer choices aloud, and then we'll talk about the question." 1. Now think back to the summer. Compared to NOW, were you... <u>(Please put an X in the box to mark your answer.)</u> ☐ more active in the summer? ☐ as active (same) as in the summer? ☐ less active in the summer?	• How did you choose your answer? • What did you think about when you read the word, "active?" • When we asked you to think back to the summer, how easy or hard was that for you? • Tell me about activities you do in the summer. • Tell me about activities you do this time of year. • How well did you understand this question? o If answered **not well** ▪ What part of the question was confusing to you? o If answered **well** • What are your thoughts about this question? • Now that we have talked about this question, do you want to change or keep your answer?	

Eating Competence		
Survey Question	**Probing Questions**	**Notes**

"There are 2 questions left to talk about. Now we're going to talk about some of the statements about eating. Please turn to the last page. The first statement is '**I am relaxed about eating**.' What did you put for your answer?"	• How did you choose your answer?
	• These questions let you choose an answer: either always, often, sometimes, rarely or never. Which of these words do you think means that it is done more times than the others.
	• How do you think "rarely" differs from "sometimes?"
	• What did you think of when you read the word "relaxed?"
	• How well did you understand this question?
	  o If answered **not well**
	  ▪ What part of the question was confusing to you?
	  o If answered **well**
	  ▪ What are your thoughts about this question?
	• Now that we have talked about this question, do you want to change or keep your answer?	

"The third from last statement is '**I feel it is okay to eat food that I like**.' What did you put for your answer for this one?"	• How did you choose your answer?
	• What did you think of when you read "food that I like?"
	• Tell me how "sometimes" differs from "often."
	• How well did you understand this question?
	  o If answered **not well**
	  ▪ What part of the question was confusing to you?
	  o If answered **well**
	  ▪ What are your thoughts about this question?
	• What are your thoughts about this statement?
	• Now that we have talked about this question, do you want to change or keep your answer?	

Closing **Notes**

All students will be asked these questions

Of the things we talked about, what stands out in your mind the most?

Do you feel that you told me what you were really thinking?

Is there anything else you would like to add?

"We are now done with talking about the survey questions. Your answers will help us make sure the survey is clear to students like you who take it."

Provide gift card.

End of Interview

- Record the stop time of the interview on the first page of this guide.
- List any additional notes, comments, or reactions you had about the interview (including non-verbal communication, distractions, and any comments about specific questions).
- Keep information in a secure file. This includes:
    - Cognitive interview guide with notes
    - Cognitive interview recording
    - Signed assent forms
    - Signed gift card receipts

Additional Notes

How well did the participant maintain eye contact?

Other observations – what stands out about this interview?

This document was adapted from **Cognitive Interview Protocol for 4th Grade Students Assessing Sections of the Fuel for Fun Survey**, by Tessa Komine and adapted by Betty Wayman

Appendix G

Cognitive Interview Guide for Group B

Cognitive Interview Guide for 4th Grade Students

Assessing Sections of the Fuel for Fun Survey

Group B

Group B

Cognitive Interview Guide for 4th Grade Students Assessing Sections of the Fuel for Fun Survey

Cognitive Interview Checklist

Assemble the following materials (1-2 days prior to conducting the interview):

- ❑ Fuel for Fun survey items for participants
- ❑ Pens, pencils
- ❑ Assent Form
- ❑ Extra note paper
- ❑ Cognitive Interview Guide for interviewer
- ❑ Audio recorder (laptop)
- ❑ Power cord for laptop
- ❑ Recorder backup (phone or other)
- ❑ Gift cards
- ❑ Gift Card Receipts

Make sure the audio recorder is working properly and the batteries are not running low. Bring a backup recorder in case the main device is not working properly. Practice recording before beginning the interview to ensure that the recorder can pick up another person's voice.

Interview Record

To be completed at time of interview

- Participant ID _____
- Interview Date _____
- Interviewer _____
- Location _____
- Interview Start Time _____
- Interview Stop Time _____
- Total Recorded Length _____
- Time to complete interview _____
- Time to complete survey _____

Notes

Cognitive Interview Introduction

"Hi! I'm _____. I'm a student at RIT and **my project is about interviewing kids** like you about being active and cooking. Tell me how **you're doing today**?

Thank you for talking to me today. We'll talk **for about a half hour**. We want to know **what you think** about some questions on a survey that we made for kids like you. I am going to ask you to **complete the survey** and then we'll talk about some of the questions on the survey. There are **no right or wrong answers**. Your answers will really help us answer some questions we have. After we are finished, I will give you a **gift card to thank you** for helping us."

- Give the participant the assent form.

  "This is a **form that means you agree to help us with this project**. I am going to read it out loud and you can read silently along with me."
- Read it out loud (reproduced below) and have them follow along.

  "'Hello! I am from the Rochester Institute of Technology, also called RIT. I study being active and cooking. My work is about making up questions about cooking and activity that we ask other kids like you. You can help me by letting me ask you what you think about some of the questions. There are no right or wrong answers. I would like you to just say how you feel about the question, and what it means to you.

Agreeing to do this will not hurt you. It won't help you, either. You don't have to do it. If you say "yes" now but later change your mind, you can stop being in the research any time by just telling me.

We asked your parent if it is OK that you do this, too. If you want to be in this research, sign your name and write today's date on the lines below.' (end) If you don't sign your name that means you don't want to do this. After we get started, if you decide you want to stop answering questions, you can stop at any time by just telling me you want to stop and it's ok. Do you have any questions?"

- Answer any questions. Once the form is signed, continue.

"Thank you. Now I am going to give you some questions to **answer silently** by checking the box that you agree with. After you are done, **I am going to ask you some questions**. I am going to **record what you say on this recorder** so that we can remember everything you said. I might also **write some things down while you are talking, but I am still listening** to you. Remember, there are no right or wrong answers. **Please answer how you think is best**. I am going to **start the recorder** now."

- Give participant predetermined portion of student survey questions.
- Allow participant to complete survey. Ask the participant if they would like you to read the survey aloud or not.
- Start recorder
- Say the participant ID number and date and start time on the recorder.

Record the interview start time on this Cognitive Interview Guide.

Notes

Survey start time _____

Survey end time _____

What is the seating arrangement of participant and interview?

Is the door closed?

Is the participant's back toward the door or windows?

Are there distractors in the room?

Observations about survey completion

Cognitive Interview Question Guide

Notes

Practice Question

"I'm interested in what you're thinking and feeling. Before we get started, I'm going to ask you some questions to help you get used to talking about your thinking. Tell me about your favorite song or singer.

Additional probes based on response:

- Who do you listen with?
- Tell me what you're thinking/feeling when you listen to this song or singer?
  - If answers with **description**
    - What I'm really interested in is what you're feeling when you listen to this song or singer. Please tell me more about how you're feeling.
    - If answers with **feeling**
    - Thank you – that is the kind of information I'm looking for.

Now we're going to get started with some of the questions from the survey you just filled out. A lot of students like you actually fill out this survey and we want to know what students like you think about these questions. There are no right or wrong answers. What we talk about is strictly between us. I didn't make these survey questions up, so you can tell me whatever you think about them.

Do You Cook?

Notes

Let's go to "do you cook." What did you put for your answer? (or I see you put ( ) for your answer)"

Probing Questions: based on the child's response, we will ask one or more of these follow up questions

- How did you choose your answer?
- If **yes** to "Do you cook:"
    - What is your favorite thing to make when you cook? How do you make it?
    - What types of equipment do you use?
    - What are some other things that you cook? What do you do when you cook these?
  - If **no** to "Do you cook:"
    - When I say "cooking" what comes to your mind?
    - Who cooks in your family?
    - What do they cook?
- We want to make sure that the questions on this survey are clear to students like you who take this survey. You can help us do this by telling me how well you understood the questions. How well did you understand this question?
  - If answered **not well**
    - What part of the question was confusing to you?
  - If answered **well**
    - What are your thoughts about this question?
- Now that we have talked about this question, do you want to change or keep your answer?

Physical Activity Strenuous		
Survey Question	**Probing Questions**	**Notes**
"Let's go to the section on strenuous activity. Please read the item aloud." Strenuous activity (It makes my heart beat quickly, and makes me sweat.) Examples are: running, jogging, fast bicycling, aerobic dance, rollerblading, paddling, fast swimming, soccer, basketball, football, martial arts.	• One of the words you read was '**strenuous**.' What do you think the word 'strenuous' means? • Another word you read was '**aerobic**.' What do you think the word 'aerobic' means? • There were some examples given in the question, like running, fast swimming, soccer. How helpful were the examples? • How well did you understand this item? o If answered **not well** ▪ What part of the item was confusing to you? o If answered **well** ▪ What are your thoughts about this item?	
"Now let's go to question 1, '**How many days a week do you do this?**' What did you put for your answer?"	• How did you figure out the number to choose for your answer? • If answered **more than 0**: o What activity or activities were you thinking of when you chose your answer? ▪ What days of the week do you do this activity (these activities)? • How well did you understand this question? o If answered **not well** ▪ What part of the question was confusing to you? o If answered **well** ▪ What are your thoughts about this question? • Now that we have talked about this question, do you want to change or keep your answer?	

"Let's go to question 2, **'How many minutes each day?** What did you put for your answer?"	• What did you think about as you chose your answer?
	• If answered **more than 0** and **mentioned an activity** in response to the previous survey question
	  o You mentioned (activity or activities) before.
	  ▪ For how long do you do these activities?
	• If answered **30** minutes
	  ▪ Tell me about something you think can be completed in **60** minutes. How does this compare with **30** minutes?
	  o If answered **other than 30** minutes
	  ▪ Tell me about something you think can be completed in **30** minutes. How does this compare with [**minutes they answered**]?
	• How well did you understand this question?
	  o If answered **not well**
	  ▪ What part of the question was confusing to you?
	  o If answered **well**
	  ▪ What are your thoughts about this question?
	• Now that we have talked about this question, do you want to change or keep your answer?
		For "Tell me about something you think can be completed..." Circle minutes choice to remember for next question.

Physical Activity Mild		
Survey Question	**Probing Questions**	**Notes**

"Let's go to the section on mild activity. Please read the item aloud."
 	
Mild activity (It makes me use little effort, and doesn't make me sweat.) Examples are: easy walking, bowling, fishing, golf, yoga
	• One of the words you read was 'mild.' What do you think the word "mild" means?
	• What did you think about when you read this item?
	• How well did you understand the item?
	  o If answered **not well**
	  ▪ What part of the item was confusing to you?
	  o If answered **well**
	  ▪ What are your thoughts about this item?	

"Now let's go to question 5, '**How many days a week do you do this**?' What did you put for your answer?"	• How do you figure out the number of days a week you do an activity? o If answered more than 0: • What activity or activities were you thinking of when you chose your answer? • What days of the week do you do this activity (these activities)? ▪ If answered 0 • Tell me about activities that you think make you sweat just a little. • How well did you understand this question? o If answered **not well** ▪ What part of the question was confusing to you? o If answered **well** ▪ What are your thoughts about this question? • Now that we have talked about this question, do you want to change or keep your answer	
"Let's go to question 6, **'How many minutes each day?** What did you put for your answer?"	• What did you think about as you chose your answer? • Tell me about something you think can be completed in [**30/60**] minutes. • If answered more than 0 and mentioned an activity in response to the previous survey question o You mentioned (activity or activities) before. ▪ For how long do you do these activities? • How well did you understand the question? • If answered **not well** o What part of the question was confusing to you? o If answered **well** ▪ What are your thoughts about this question? Now that we have talked about this question, do you want to change or keep your answer?	Choose minutes to be different from strenuous choice above.

Sedentary behavior		
Survey Question	**Probing Questions**	**Notes**
"Let's go to question 7. Please read the question about watching television." How many hours a day do you spend watching television, playing video games and using Internet (not for homework)?	• What answer did you put? • How did you figure out the number to choose for your answer? • When you answered (____) were you thinking about watching TV, video games, Internet (not for homework) or more than one of these? • Depending on the previous answer o What TV shows do you watch? What video games do you play? How do you use Internet? • How many hours do you think there are in a school day? • How well did you understand this question? o If answered **not well** ▪ What part of the question was confusing to you? o If answered **well** ▪ What are your thoughts about this question? • Now that we have talked about this question, do you want to change or keep your answer?	

Regular Physical Activity		
Survey Question	**Probing Questions**	**Notes**

"Please read the description about regular physical activity and question 8 and its answer choices aloud, and then we'll talk about the question."
 	
This question is about regular physical activity. Regular physical activity is:
-Activity that happens for 30 minutes at a time (or more) in a day.
-It must be 5 days (or more) in a week.
-It should be enough to make your heart beat faster and/or make you breath harder…like walking briskly, biking, swimming, paddling, and aerobics classes.
 	
2. Do you do regular physical activity, as it is described above? Please put an "X" in the box to mark your answer.
☐ No, and I do not intend to in the next 6 months.
☐ No, but I intend to in the next 6 months.
☐ No, but I intend to in the next 30 days.
☐ Yes, I have been, but for less than 6 months.
☐ Yes, I have been for more than 6 months.
	• How did you choose your answer?
	• The word 'intend' is used several times in this question. What do you think the word "intend" means?
	• Tell me about a regular physical activity that you do.
	• What is something that lasts 30 days?
	• What is something that lasts 6 months?
	• How well did you understand this question?
	  o If answered **not well**
	  ▪ What part of the question was confusing to you?
	  o If answered **well**
	  ▪ What are your thoughts about this question?
	• Now that we have talked about this question, do you want to change or keep your answer?
		Note whether student reads the description of physical activity preceding the question.

Eating Competence		
Survey Question	**Probing Questions**	**Notes**

"There are 2 questions left to talk about. Now we're going to talk about some of the statements about eating. Please turn to the last page. The first statement is '**I am relaxed about eating**.' What did you put for your answer?"	• How did you choose your answer?
	• These questions let you choose an answer: either always, often, sometimes, rarely or never. Which of these words do you think means that it is done more times than the others.
	• How do you think "rarely" differs from "sometimes?"
	• What did you think of when you read the word "relaxed?"
	• How well did you understand this question?
	  o If answered **not well**
	  ▪ What part of the question was confusing to you?
	  o If answered **well**
	  ▪ What are your thoughts about this question?
	• Now that we have talked about this question, do you want to change or keep your answer?	

"The third from last statement is '**I enjoy food and eating.**' What did you put for your answer for this one?"	• How did you choose your answer?
	• What do you think the word "enjoy" means?
	• Tell me about a time you enjoyed eating.
	• Tell me how "sometimes" differs from "often."
	• How well did you understand this question?
	  o If answered **not well**
	  ▪ What part of the question was confusing to you?
	  o If answered **well**
	  ▪ What are your thoughts about this question?
	• What are your thoughts about this statement?
	• Now that we have talked about this question, do you want to change or keep your answer?	

Closing **Notes**

All students will be asked these questions

Of the things we talked about, what stands out in your mind the most?

Do you feel that you told me what you were really thinking?

Is there anything else you would like to add?

"We are now done with talking about the survey questions. Your answers will help us make sure the survey is clear to students like you who take it."

Provide gift card.

End of Interview

- Record the stop time of the interview on the first page of this guide.
- List any additional notes, comments, or reactions you had about the interview (including non-verbal communication, distractions, and any comments about specific questions).
- Keep information in a secure file. This includes:
    - Cognitive interview guide with notes
    - Cognitive interview recording
    - Signed assent forms
    - Signed gift card receipts

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Additional Notes

How well did the participant maintain eye contact?

Other observations – what stands out about this interview?

Appendix H

Definitions of Qualitative Content Analysis Terms

Term	Definition	Example from data
Coding frame	". . . is a way of structuring your material. It consists of main categories [dimensions] specifying relevant aspects and of subcategories for each main category [dimension] specifying relevant meanings concerning this aspect." (Schreier, 2012, p. 61)	
Dimensions	(sometimes called main category) ". . . are the aspects on which you want to focus your analysis." (Schreier, 2012, p. 59) "Each dimension in your coding frame should capture only one aspect of your material." (Schreier, 2012, p.72)	One dimension was *Interview Question Response Congruence*, which denoted the congruence of a response with the reference definition.
Subcategories	". . . specify what is said about the aspects that interest you, i.e. your main categories [dimensions]." (Schreier, 2012, p. 60) Within a dimension, subcategories are mutually exclusive of each other.	The subcategories for the dimension *Interview Question Response Congruence* were *congruent, incongruent, unsure*
Unit of analysis	". . . refers to that unit which you have selected for qualitative content analysis, each unit yielding one text. . . . When conducting interviews, each interview serves as the unit of analysis." (Schreier, 2012, p. 130)	One unit of analysis was one transcribed interview.
Unit of coding	". . . are those parts of the units of analysis that can be interpreted in a meaningful way with respect to your categories and that fit within one subcategory of your coding frame." (Schreier, 2012, p. 131)	One unit of coding was the response to an interview question. For example, an interview question for the survey item, "Now think back to the summer. Compared to NOW, were you… (Please put an X in the box to mark your answer.) □ more active in the summer? □ as active (same) as in the summer? □ less active in the summer?" was, "How did you choose

		your answer?" An example response was, "I choose my answer because I'm more active in the summer than I am like in the fall or winter." (C08)
Code	". . . [is] a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data." (Saldaña, 2013, p. 3)	The subcategories of the coding frame became the codes. For example, the subcategories *congruent*, *incongruent*, *unsure*, of the dimension *Interview Question Response Congruence* became the codes applied to units of coding. In the example for *Unit of Coding*, above, the response received the code *congruent.*

Appendix I

Reference Definitions of for Meanings of Terms and Survey Items

Meaning of Specific Words asked about during the Interview

Term	Reference definition
Strenuous	activity which makes one's heart beat quickly and makes one sweat. Examples are: running, jogging, fast bicycling, aerobic dance, rollerblading, paddling, fast swimming, soccer, basketball, football, martial arts.
Moderate	activity which does not make one tired, and makes one sweat just a little. Examples are: fast walking, slow bicycling, easy swimming, weight lifting, baseball, softball, tennis, volleyball, hula. Medium is acceptable as a definition.
Mild	activity which requires little effort and does not make one sweat. Examples are: easy walking, bowling, fishing, golf, yoga.
Aerobic	of exercise: strengthening the heart and lungs by making them work hard for several minutes or more (from Merriam Webster simple definition of aerobic). It is acceptable if the respondent says making the heart stronger without including working hard for several minutes.
Active	doing things that require physical movement and energy (from Merriam Webster simple definition of active). It is acceptable if the respondent says it means moving without including using energy. It is also acceptable if the respondent gives examples of activity, because the wording of the interview question was "What did you think about when you read the word active?"
Intend	to plan or want to do (something): to have (something) in your mind as a purpose or goal (from Merriam Webster simple definition of intend). It is acceptable if the respondent says thinking about or making plans to do something, but it is not acceptable if the respondent says want to do something. Also accept "going to do something" or “determined to do something” or “mean to do something.”
30 min vs. 60 min	30 is less than 60 (passable meaning); 30 is half of 60 (preferred meaning). In the earlier interviews, the respondent was asked "What is something that lasts 30/60 minutes?" For these, acceptable responses include examples of anything that would take that amount of time.
30 days vs. 6 months	30 days is one month (passable meaning); 30 days is one month and 6 months is 6 times 30 days (preferred meaning). In the earlier interviews, the respondent was asked "What is something that lasts 30 days/6 months?" For these, acceptable responses include examples of anything that would take that amount of time.

Length of school day	this will vary depending on the school. An example is school 3 has a school day beginning at 8:35 and ending at 3:15, for a total of 6 hours 40 min. Preferred answers will range from 6 to 8 hours (school 7 has expanded days). It is passable to give a start time and end time, indicating time awareness.

Meaning of Survey Questions

Survey Item	Meaning
How many days a week do you do this?	number of days in a typical week do you do this kind of activity. No context for time period is given in the survey, i.e. the survey does not say, e.g. "in the past 30 days." Therefore we assume the question is asking about current activity.
How many minutes each day?	number of minutes per day, averaged over the days the activity is done, reported in "How many days a week do you do this?"
How many hours a day do you spend watching television, playing video games and using Internet (not for homework)?	number of hours per day averaged over the days of the week. No context for time period is given in the survey, i.e. the survey does not say "in the past 30 days." Therefore we assume the question is asking about current behavior.

This question is about regular physical activity. Regular physical activity is:

-Activity that happens for 30 minutes at a time (or more) in a day.

-It must be 5 days (or more) in a week.

-It should be enough to make your heart beat faster and/or make you breath harder…like walking briskly, biking, swimming, paddling, and aerobics classes. Do you do regular physical activity, as it is described above? Please put an “X” in the box to mark your answer.

No, and I do not intend to in the next 6 months.	I don't do regular physical activity now and I don't plan to start doing a regular physical activity in the next 6 months.
No, but I intend to in the next 6 months.	I don't do regular physical activity now but I plan to start a regular physical activity in the next 6 months.
No, but I intend to in the next 30	I don't do regular physical activity now but I plan to start a regular physical activity in the

days.	next 30 days.
Yes, I have been, but for less than 6 months.	I do regular physical activity now and I have been doing regular physical activity for less than 6 months.
Yes, I have been for more than 6 months.	I do regular physical activity now and I have been doing regular physical activity for more than 6 months.

Now think back to the summer. Compared to NOW, were you... (Please put an X in the box to mark your answer.)

more active in the summer?	I was more physically active in the summer than I am now.
as active (same) as in the summer?	I was as physically active in the summer as I am now.
less active in the summer?	I was less physically active in the summer than I am now.