VALIDATION AND RELIABILITY-TESTING OF A BREAKFAST-EATING SURVEY INSTRUMENT

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BY

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ABSTRACT

The short-term consequences of breakfast omissior entail physiological, psychological and cognitive alterations in some children. Errors in school achievement tests and attention-maintenance tasks increase over the morning hours if breakfast is omitted. Physiological manifestations of fasting include lowered blood glucose levels and a decrease in work capacity.

Behavioural decrements in the child who skips breakfast are similar to those of the "hungry" child: irritability, listlessness and social isolation are often present. The sociology of hunger suggests that breakfast-skipping and other negative environmental factors which impact on the child may ultimately result in school failure.

Methods of obtaining accurate information of fooc intake in the young elementary school child have usually incorporated the parent (mother) as a surrogate respordent, despite evidence showing that children are accurate reporters of their own intake in terms of types of foods eaten, but not necessarily quantities of food consumed.

This study examined the validity and reliabilty of a "breakfast-eating questionnaire" assessed on a convenience sample of elementary school children enrolled in grades 1, 2 and 3 in the Halifax-Dartmouth area. The questionnaire made use of symbols to avoid problems associated with limited reading ability present in this age group. The validated

instrument will be used to obtain information about breakfast habits from children in grades 1, 2 and 3, residing in Nova Scotia.

Key words: breakfast, children; questionnaire, reliability, validity; cognition; recall

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INTRODUCTION AND STATEMENT OF PURPOSE

In 1988 the Nova Scotia Nutrition Council published a report entitled "How Do the Poor Afford to Eat?" which documented that social assistance food rates in Nova Scotia were insufficient to provide adequate food for children of families living at or below the poverty line.

The omission of breakfast in the elementary school child is much more of a concern than in the adult population. Adults generally have the freedom to consume food when they feel it is appropriate; young children are dependent on their parents or guardians for meals. A lack of food in the household at breakfast time is proposed to be the primary reason for young children skipping breakfast. Lifestyle factors of "choice" do not normally enter into the decision of breakfast intake for this young age group.

The physiological consequences of hunger, defined as breakfast-skipping, are more pronounced in the young child than in the adult. Ketosis occurs at a more rapid rate in children given their high metabolic rate necessary for growth. Negative influences on work capacity and cognition have been attributed to hunger in children. The child who skips breakfast is suffering from an approximate 15-hour fast; results of intelligence testing have shown that such a fast can detrimentally affect school achievement through test scores, as well as negatively influence the child's social interaction with peers and teachers.

Pollitt and his co-workers (1981, 1983) traced low blood glucose levels in response to breakfast omission as a possible cause of increasing numbers of errors in late morning school achievement of children. A source of protein in the morning meal was found to help maintain blood glucose levels to near normal levels.

The impact of hunger is multi-factorial: researchers find it difficult to attribute cognitive deficits to hunger alone, when other factors such as the education of parents, home environment, and general health of the family all impact on the child's intelligence.

Children in grades 1, 2, and 3 are considered to be semi-literate by educational standards. Learning to read is known to progress in stages (Chall, 1979); grade 3 students are generally much more skilled at reading than are grade 1's.

A method of food intake recall was developed by Trevor Wesson, a medical student at Dalhousie University. Wesson developed a breakfast-eating questionnaire which incorporates symbols and words, and elicits information about the breakfast-eating habits of respondents (Appendix A).

The purpose of this study is to validate and test the reliability of a breakfast habits questionnaire designed for use on a young elementary school population.

The validation of the breakfast-eating instrument received Ethics Committee approval through the Izaak Walton Killam Hospital for Children. Parental consent was obtained for each participant (see Appendix D). Procedures were incorporated into the study design to test for face validity, content validity, criterion validity, and the reliability of children's responses.

Success at defining the validity and reliability of the breakfast-eating questionnaire will allow province-wide use of the form, and ultimately, provide information on the breakfast-eating habits in the elementary school population.

BACKGROUND INFORMATION

To gain a better understanding of the purpose behind the development of the breakfast-eating questionnaire, the reader is provided with a review of literature dealing with the detrimental effects of hunger on the child. In particular, the negative effects of hunger on learning and motor performance are reviewed, as well as the sociology of hunger and the state of feeding programs as they exist in Canada today.

The Sociology of Hunger

Hunger has been defined as the complex, unpleasant, and compelling sensation an individual feels when deprived of food (Bruch, 1969, Read, 1973, Pollitt, 1981). The hungry child demonstrates symptoms of apathy, disinterest and irritability when confronted with challenging tasks. Feelings of isolation are increased by the way that the child's teachers, parents and peers respond negatively to the hungry child's behaviour.

Even short-term food shortages, such as a skipped breakfast, have been shown to negatively affect a child's attention span (Pollitt, 1981, 1983). Kallen (1971) states that being hungry leads to a decreased sense of self-worth, further stigmatizing the child in his own eyes and in those of his teachers. Thus, he fails to learn for social and psychological rather than for biological or neurological reasons.

Shah and his colleagues (1987) point out that nutritional adequacy is known to be directly related to the level of family income and the amount of money spent on food. Nutrient deficiencies are both more common and more severe among low income populations. Nutrients which have been shown to be affected by level of income, identified by the Nutrition Canada National Survey, include calcium, riboflavin, vitamin C, folic acid, vitamin A, iron, vitamin B6, magnesium, and vitamin B12 (Health and Welfare, 1973; 1981). Families with low incomes spend more money on fats and oils, soft drinks, desserts, and less on fruits, vegetables, fish, poultry, meat, and milk and milk products than families with more income (Mathieson and Robichor-Hunt, 1983). Low income families also spend more money on grain products, bread, beans and eggs. The diets of lower income families tend to be higher in fat intake, a condition which predisposes to cardiovascular disease in later life.

Cameron and Bidgood (1988) and Emerson (1967) suggest that parental dietary habits influence those of their children. Employment, educational status of parents, and family disorganization have also been found to influence the breakfast consumption patterns and nutritional status of children (Hertzler, 1979).

Physiological and Cognitive Effects of Hunger

Short-term hunger is often a result of meal-skipping, particularly breakfast-skipping. Studies have evaluated the

physical effects of meal-skipping. Improved motor performance ha· been associated with eating breakfast. Tuttle and his colleagues (1969), in one of a series of investigations entitled "the Iowa Breakfast Studies", alternated periods of eating cereal and milk for breakfast and no breakfast for 17 weeks in boys aged 12 to 14 years. The boys' total daily nutrient intake was kept constant. It was found that by both individual and group means, maximum work rate and maximum work output, as measured by a bicycle ergometer, were lower when breakfast was omitted.

In 1969, Arvedson and colleagues evaluated the performance of 27 Swedish children aged 11 to 17 years who received isocaloric breakfasts with or without protein (Arvedson, et al., 1969). They found no difference in work performance, arithmetic scores, or subjective reports of hunger or tiredness between standard breakfasts high in either calories or protein. These authors did find, however, that breakfast intakes of less than 400 kilocalories had a negative impact on work performance.

Other researchers have investigated the importance of breakfast-eating on learning and school achievement. After more than a decade of research in this area, Pollitt, Gersovitz, and Gargiulo (1978) concluded that breakfast did, in fact, improve children's school performance relative to fasting or breakfast omission. Their research showed that missing breakfast had a short-term negative effect on

children's emotional behaviour and arithmetic and reading ability. Pollitt and his associates (1981; 1983) later reported on two studies which documented breakfast-skipping as having adverse effects on children's late morning problem-solving performance under experimental conditions. Decreased blood glucose level was found to be the best predictor of poor test performance in children.

Conners and Blouin (1983) studied whether the behavioural effects associated with breakfast-skipping were altered over the course of the morning. These investigators assessed the cognitive performance of children aged 9 to 11 years at three different times during the morning by feeding breakfast to some and withholding it from others. While both groups made errors in responses to testing, differences in performance between breakfast-eaters and breakfast-skippers were statistically significant for each of the three periods tested; the fasted children made more errors as the morning progressed compared to children who had eaten breakfast.

Studies have been conducted on the impact of nutritional supplements on children suffering from undernutrition. Authors are in disagreement about the lasting effect of early malnutrition on later intelligence and growth parameters. It appears that the length and severity of fasting, as well as the timing and quality of nutritional rehabilitation have variable effects on outcome.

Evans and colleagues (1980) supplemented the diets of infants from undernourished South African families and found that several years later these children had higher IQ scores than their unsupplemented siblings.

Meyers and colleagues' (1989) study on the association of nutrition and learning found a statistically significant relationship between students having a proper breakfast and their scores on standardized achievement tests.

The evidence strongly suggests that hunger and poor nutritional intake in childhood is associated with adverse effects in terms of cognitive learning, performance of motor tasks and total nutritional status. Hunger in the child has been linked to dietary habits which may lead to the development of risk factors for cardiovascular disease such as obesity, hypercholesterolemia, non-insulin dependent diabetes and hypertension in adulthood.

Studies of Meal-Skipping in Canadian Children

Few studies have addressed meal-skipping specifically in children. The Health Attitudes and Behaviours Survey (1984-85) of 9-, 12-,and 15-year-olds, found that the percentage of students who "rarely" eat breakfast increased sharply from Grade 4 to Grade 10; while three-quarters ate breakfast "most of the time" in grade 4, less than two-thirds did so by grade 10 (King, et al., 1985).

The Nutrition Canada survey from 1970-1972 reported that 22% of Canadian children were not eating breakfast

(Health and Welfare, 1972). When over 4000 Canadians were asked, in the Health Promotion Survey, what they ate for breakfast, 11% said a beverage only and another 4% said no food or drink at all (Health and Welfare, 1988).

Child Feeding Programs in Canada

The Canadian Education Association (CEA) published a report from the results of questionnaires completed by school boards across Canada. Schools were asked to outline any feeding programs, nutrition policies or problems identified in these areas (CEA, 1989). Responses from school boards indicated that a variety of snack or meal programs do exist, but most serve a small population, or are informally organized. Unlike other countries where universal feeding programs exist in the schools, such programs do not exist in Canada, their failure owing primarily to the differing jurisdiction issues of health and education.

DEVELOPMENT AND PILOT-TESTING OF QUESTIONNAIRE

The question of going to school without breakfast as a marker of hunger and poverty in children first arose when the news media reported that a Dartmouth school teacher had asked her class of low income children how many had consumed breakfast that morning; almost half of the class responded that they had not had anything to eat. Several months later the Nova Scotia Nutrition Council (1988) published a report which pointed out inadequacies in funding for social

assistance recipients with respect to family food allowances. The Council had as its mandate the identification of poverty in children within the province. The goal of the report was to make the Nova Scotia government and the public aware of the inadequacies of Social Assistance funding for food.

As one approach to evaluating the problem of hunger in elementary school children, it was decided that the extent of breakfast-skipping must first be assessed. In order to accomplish this goal, a tool had to be developed for testing breakfast-eating in young elementary school children. It was also necessary to incorporate a method of administration of the tool which would be suitable for the age group to be studied. A literature search and key informant mail survey were conducted but no such tool was found. Therefore, an instrument had to be developed from "scratch": it had to be simple, quickly executed, short and "fun" in view of the population to which it was directed. Since children of this age group have limited reading ability, the inclusion of pictures, or symbols, as well as words, was deemed necessary to aid comprehension.

The breakfast-eating questionnaire, (presented in Appendix A), was designed as a survey tool to assess breakfast-skipping and inadequate breakfast intake in young elementary school children. It asked children: 1) whether or not they had had anything to eat or drink before coming to

school that morning; 2) what they ate (or usually eat) before coming to school that morning; and 3) who prepared their food.

The breakfast-eating questionnaire was pilot-tested on a group of 44 children (n=23 boys, n=21 girls) recruited from day camps or day care centres in Halifax (Peter Green Hall, Dalhousie Life Sciences Centre, St. Francis-Gorsebrook School Day Camp, Le Marchant-St. Thomas School Day Camp, and George Dixon Memorial Recreational Centre). Subjects ranged in age from pre-primary to entry-level grade 4's. All written consent was received from parents of children who participated in the study.

Day care or day camp leaders were trained to administer the questionnaire to subjects because it was felt that a person familiar to the subjects would receive more cooperation from the children than a stranger. All responses to the breakfast-eating questionnaire were obtained in the early morning.

At the time of pilot-testing the questionnaire, the second question, "Who prepared breakfast this morning?" incorporated the answers MOM, DAD or ME. This question was later revised to include only the responses ME or OTHER, and was put as question 3.

Results

Results of pilot-testing indicated that 95.7% of males and 95.2% of females reported having consumed breakfast on

the day in question (Wesson, 1989).

Approximately 20% of children in pilot-testing responded that they had consumed four food groups at breakfast, 38.6% ate from 3 of the 4 food groups. Thirty-four percent of respondents consumed only 2 of the 4 food groups, indicating an inadequate breakfast.

Originally, the questions themselves appeared on the page; this was thought to cause some confusion and unnecessary words were removed from the questionnaire.

"Circlers", defined as those subjects who circled greater than seven food choices for breakfast, were found to be made up of the group of pre-primary respondents. It was believed that these children were too young to complete the questionnaire according to the instructions given.

In the final assessment of pilot results, Wesson indicated that the breakfast-eating questionnaire was a reasonable test to determine breakfast-skipping and breakfast inadequacy in young elementary school children. The use of more than one administrator was not recommended, as it appeared that instructions for questionnaire completion differed from one administrator to another, despite attempts at providing a script.

Since pilot-testing appeared to be relatively successful in terms of the administration of the questionnaire, and subsequent understanding by the respondents, the next step in the research process was to

determine the validity and reliability of the breakfast-eating questionnaire. The purpose of validity-testing of the questionnaire would not be to determine prevalence of breakfast-skipping, but rather to assess the usefulness and reliability of the questionnaire itself on the population to which it was directed. Once validated, the questionnaire could then be used across the province to assess the prevalence of breakfast omission.

OBJECTIVES

The objectives of this study are:

1. To determine the validity and reliability of a breakfast-eating questionnaire which is to be used in a provincial "breakfast-habits survey" of children enrolled in grades 1, 2 and 3.

This objective will be achieved through a variety of tasks, to be performed on the appropriate population. Specific activities required to meet this objective include:

a) determining the face validity (reasonableness) of the questionnaire; establishing criteria against which face validity can be measured;

b) establishing criterion validity of the questionnaire upon which children's responses to the breakfast-eating questionnaire may be assessed against a standard measure for for measure of breakfast adequacy;

c) ensuring the content validity of the questionnaire by assessing the representativeness of children's usual breakfast consumption;

d) measuring children's ability to recall food intake;

e) assessing children's ability to complete the questionnaire under a variety of circumstances and within a limited time frame, e.g., having two observers administer the questionnaire;

f) recommending specific changes to the questionnaire on the basis of problems identified by validity and reliability testing.

2. To assess the administrative procedures of the questionnaire and make recommendations for the up-coming provincial survey.

Supportive Literature for Validity- and Reliability-Testing

The approach to validation of the breakfast-eating questionnaire, is based upon:

1) the development and pilot-testing results of the questionnaire;

2) the purpose and objectives of the validation study;

3) knowledge of the adequacy of breakfast based on the Recommended Nutrient Intakes for Canadians (RNI's), and Canada's Food Guide;

4) the reading ability of young elementary school children; and,

5) an understanding of the concepts of validity and reliability.

Children in grades 1, 2 and 3, aged 5- to 8- years, constitute the population of interest in this study. This group was chosen because very few studies to date have employed such young children in their investigations of nutritional health of the population.

The breakfast-eating questionnaire is a tool designed to elicit information regarding the breakfast-eating habits of young elementary school children. The determination of breakfast-skipping, as a marker for hunger, and the assessment of breakfast inadequacy, are to be revealed in children's responses to the questionnaire. Reliability and validity of the survey instrument are necessary for accurate

retrieval of information about the population of interest.

The following review of literature provides a foundation upon which the establishment of criteria of breakfast adequacy, and an understanding of the questionnaire, may be tested.

NUTRIENT ADEQUACY

Recommended Nutrient Intake

The Recommended Nutrient Intakes (RNI's) for Canadians are the reference standards against which the population can determine its adequacy of food intake (Health and Welfare, 1983). Estimated requirements are established for all nutrients, including energy, and refer to levels of intake required to maintain health in already healthy individuals.

These established "requirements" are not all exact, clinically proven requirements, but may be extrapolated from animal studies, or, in the case of children, from estimated adult requirements. As such, the Canadian RNI's incorporate a margin of safety (Health and Welfare, 1983). The RNI's exceed the actual requirements of almost all individuals within a group of similar characteristics (age, sex, body size, physical activity, and type of diet). Except for the case of energy, the RNI is set at +2 standard deviations from the average level of requirement, because increased risk to health is associated with inadequate intakes.

"Risk" as a probability statement, is taken to mean the

chance that a given level of intake is inadequate to meet the actual requirements of an individual (Health and Welfare, 1983). A safe range of intake is associated with a very low probability of either inadequacy or excess of a nutrient for the individual.

For young children, the average requirements for nutrients are usually broken down into more concise age groups than for adults, thereby accounting for the variation in needs for the growth spurts.

The RNI's are described as requirements to be consumed on a daily basis (Health and Welfare, 1983). Since the RNI's have been set sufficiently high to cover the requirements of almost all individuals, they tend to exceed the actual requirements of almost all. Therefore, if an individual intake of a nutrient is below the RNI, this does not necessarily mean that the individual is inadequately nourished. The further the intake falls below the RNI, the greater is the probability that the person may be undernourished.

Breakfast offers a major contribution in meeting the daily RNI's, particularly in the case of the child (Daum, et al., 1950, 1955; Steele, et al., 1952; Arvedson, et al., 1969; Morgan, et al.,1981; Evans, et al., 1980; Pollitt, et al., 1981; Dickie and Bender, 1982). However, the questionnaire under evaluation is concerned only with the adequacy of protein and energy in the breakfast meal, and

not with other nutrients, specifically vitamins or minerals.

Canada's Food Guide

Canada's Food Guide (Health and Welfare, 1982) is another reference standard (Appendix B) which serves to convert nutrient intake into a more comprehensible form of desired food intake. It is a nutrition education tool designed to assist Canadians in choosing foods that will meet their recommended nutrient intakes on a daily basis.

Canada's Food Guide classifies foods into four food groups according to their nutrient composition, the nutrient needs of Canadians, and the food consumption patterns common in Canadian society.

The food groups include: milk and milk products; meat, fish, poultry and alternates; breads and cereals; and fruits and vegetables. Together these four food groups provide the more than fifty nutrients essential for growth and good health.

To ensure sufficient nutrients at all stages of the lifecycle, Canada's Food Guide makes separate recommendations for children, adolescents, pregnant and lactating women, and other adults.

Canada's Food Guide notes the importance of consuming an adequate breakfast: "children do better in school and are livelier in their play if they have had a "sensible" breakfast" (defined as consumption of at least three food groups) (Health and Welfare, 1982, p.44).

In early 1990, Canada's Guidelines for Healthy Eating and Recommended Strategies for Implementation were published by Health and Welfare (1990). These guidelines are recommended for implementation by the healthy public over 2 years of age.

Canada's Food Guide is currently being revised to be based on a total diet approach, to serve as a tool for lowering the risk of nutrient deficiencies, and also for promoting a diet that reduces the risk of chronic disease (Health and Welfare, 1990).

Nutritional Adequacy of the Diets of Children in Nova Scotia

There has not been a national study of food intake or nutritional status since the Nutrition Canada Survey (Health and Welfare, 1973) of 1970 to 1972.

The Nutrition Canada National Survey (1973) was implemented to assess the nutritional status of the Canadian population according to region, population type, income, and season. Each participant in the survey received a two hour examination that included clinical and anthropometric examinations and dietary interview.

Of particular concern in the Nutrition Canada Survey, were the nutritional problems characteristic of children, aged 5 to 9 years, residing in the Atlantic region. On a provincial level, at the time of the Nutrition Canada Survey (Health and Welfare, 1975), children in Nova Scotia

appeared to have reasonable nutritional health, although intakes of folate, and possibly iron, were low. On a national level, children were found to be experiencing low intakes of iron, calcium, vitamin D, vitamin C, vitamin A, iodine and in some cases, protein.

Adequacy of Breakfast Intake

The breakfast eating habits of the population have been investigated by researchers in an effort to determine the adequacy of intake.

Martinez (1982) studied the breakfast intake of elementary school children in relation to their socioeconomic status, classified as either low, intermediate or high, based on fathers' total income, occupation and education. Results indicated that from 7% to 10% of children in the intermediate and low socioeconomic groups skipped breakfast 3 to 4 times per week, whereas none of the children in the high socioeconomic group were reported to skip breakfast regularly. Children in the high socioeconomic group tended to eat breakfast cereals (47%) more often than children in the low socioeconomic group (27.6%).

Although the children were generally found to meet their requirements for the RNI's, the mean intakes of iron and thiamine declined with socioeconomic status. Breakfasts provided the highest proportion of all nutrients except

protein and vitamin A, compared with other meals and was thereby classified as the most nutritious meal of the day. Martinez (1982) suggested that part of the reason for breakfast's large contribution to meeting daily nutrient requirements may have been due to cereal consumption, which is usually fortified with iron and eaten with milk.

Sample size appeared to be adequate in this study, suggesting some measure of generalizability of results. The significance of results indicating low nutrient intakes was questionable, however, due to the fact that all children met their RNI's. The reliability of responses to breakfast-skipping is also questionable. Interviewers were not blinded to the socioeconomic status of the child; although interviewers were trained, some prompting may have altered children's responses to questions on breakfast-skipping.

The breakfast eating habits of adolescents have been investigated by a number of researchers. The interest in this group lies in the declining role of parental supervision in meal consumption.

Steele, Clayton and Tucker (1952) conducted a study to investigate the contribution of breakfast to the total daily nutrient consumption of adolescents. Seven-day food records were assessed for each of 316 junior and senior high school students. "Breakfast" was defined as the consumption of any food or drink which contributed energy (calories) and was taken before going to school on school days or immediately

on rising on non-school days. A comparison of dietary adequacy based on the U.S. Recommended Dietary Allowances (RDA's) was made between students who always ate breakfast and those who skipped breakfast at least once a week.

Results indicated that, in general, boys consumed breakfast more regularly than girls and breakfast contributed an average of approximately 20% to the total daily nutrient intake. Students who ate breakfast had a greater chance of meeting the RDA's.

Ohlson and Hart (1965) postulated that the type of breakfast consumed in terms of nutrients, particularly protein and energy, could have either detrimental or beneficial effects on further ad libitum intake throughout the day.

Subjects were assigned to receive two breakfast regimes, differing in their type and amount of protein. Researchers found that subjects who consumed a low protein diet (9 grams of vegetable protein) tended to have a higher intake of sweets and snacks in the remainder of the day. Adolescents who experienced nutrient losses by omitting breakfast rarely made up for those losses by the end of the day.

The contribution of breakfast to the nutritional status of adolescents was also investigated by Skinner and associates (1985). Researchers obtained 24-hour food intakes from 225 adolescents. Breakfast was found to be

omitted by 34% of respondents. Approximately half of breakfast-eaters ate breakfasts they had prepared themselves, while 33% ate breakfasts prepared by their mothers. On a per-1000 calorie basis, breakfasts prepared by adolescents were higher in calcium, thiamine and riboflavin, and tended to be higher in vitamin A than breakfasts prepared for them by their mothers.

These researchers also found both qualitative and quantitative differences in food choices throughout the day between those adolescents who consumed breakfast and those who did not, suggesting that breakfast-eaters tended to make better, more nutritious food choices in general.

This group of studies evaluating the breakfast habits of adolescents indicates that nutrients missed with a skipped breakfast are rarely compensated for by the end of the day. Rather, daily intake tends to consist of a greater proportion of sweets and snacks. Breakfast has been shown to be an effective method of meeting the RDA's. Larger quantities consumed at breakfast improved the chances of meeting the RDA's.

Descriptive analyses of these studies were based on responses to oral interview or written questionnaire completion. As in all interviews related to food intake, the willingness of the subject to cooperate and to answer truthfully to questions is uncertain, particularly those questions directed at the sensitive topic of food intake.

Sample size was reasonable in studies performed on adolescent breakfast intake; however, no randomization was performed prior to subject recruitment.

The role of the breakfast meal in the estimation of nutrient intakes of children was studied by Morgan, Zabik and Leveille (1981). These researchers conducted a cross-sectional study on 657 American children aged 5 to 12 years to look at their breakfast-eating habits and the contribution of nutrients from breakfast for the remainder of the day. Data were analyzed from 7-day food records of middle- to upper-middle class families.

An adequate breakfast was defined as the consumption of one-quarter of the day's requirements for protein and energy at breakfast. It was found that protein intake was met by most children at the breakfast meal. Energy, however, was found to be lower than one-quarter of the day's requirements.

The group of children classified as cereal eaters (presweetened and non-sweetened cereal) had significantly higher intakes at breakfast of all vitamins and minerals, except sodium and zinc, than did non-cereal eaters. This was explained by the fact that almost all cereals are fortified with nutrients and taken with milk, the breakfast provided an excellent source of vitamin D and calcium. Non-cereal eaters had a greater tendency to skip breakfast than did ready-to-eat cereal eaters. The average child,

aged 5 to 12 years, did consume breakfast in this study.

In summary, breakfast appears to contribute the greatest amount of nutrients of all meals consumed in the day. Children who eat breakfast, in particular, those who consume a source of high biological value protein at breakfast, make more nutritious food choices throughout the day. Boys tend to eat more nutritious breakfasts than do girls, due to a larger quantity of foods consumed.

Children of low socioeconomic families tend to skip breakfast more often than do high socioeconomic families; cereal eaters skip breakfast less often than non-cereal eaters.

Results of the above studies appear to be generalizable to the elementary and the teenage population, since sample sizes were sufficient to include a representative sample of the population. A randomized selection of the population, was not conducted, however, nor was randomization to treatment groups in the breakfast regimen study by Ohlson and Hart (1965).

Poor nutritional intake throughout the remainder of the day may not be causally related to breakfast-skipping, or to a low protein or vegetable protein breakfast. For this reason, an "inadequate breakfast" does not necessarily indicate chronic malnutrition.

Responses of high and low socioeconomic status children to questions on breakfast-skipping may have been altered by

what the children thought were socially desirable responses.

Based on the above studies, an adequate breakfast is defined as the consumption of one-quarter of the day's total energy and protein needs, through the intake of a minimum of three out of four food groups from Canada's Food Guide, with one of these food groups being of high biological value protein.

Children's Reading Ability

Certain prerequisites are deemed essential in terms of knowledge, abilities, attitudes and awareness before the child is thought to be prepared to learn to read (i.e., to be in a "pre-reading state"). Within this pre-reading state are found environmental and experiential factors which help to predict reading ability. The concept of reading stages is based on the works of Piaget and his "stages" of cognitive development in the child (Chall, 1979). The "Reading Stages" follow a hierarchical progression and are divided into approximate grades and ages; however, some children may achieve a higher level at a much earlier age. The affective component of reading, the child's attitude toward reading, is a consequence of family, culture and the school which the child attends.

Reading is a problem-solving process in which the child adapts to his environment through a process of assimilation and accommodation. The stages of reading begin with Stage 0 - the Pre-Reading Stage (Chall, 1979). The approximate ages

for this stage are from birth to age 6 years. As in all aspects of this age group, the child undergoes more rapid change and development than in any other stage of growth throughout life. From birth to the beginning of formal education, the child picks up knowledge in the literate environment about the alphabet, words and books. Children at the pre-reading stage also develop visual, visual-motor, and auditory perceptual skills required for tasks in Stage 1 Reading. Children at Stage 0 understand that spoken words may be broken up into distinct parts (syntactic and semantic language), that the parts may be added to other words, that some words sound the same (rhyme and alliteration), and that word parts can be synthesized to form whole words.

Stage 1, the Initial Reading or Decoding Stage takes into account the development of most children in grades 1 and 2, ages 6 and 7 years. The most important task in Stage 1 is learning the set of letters that correspond with parts of spoken words. Children at this stage begin to internalize cognitive knowledge about reading and are able to understand when they make an error. This stage in reading development has been referred to as a "guessing and memory game". The insight gained at the end of this stage is the nature of the spelling system. The child discovers that the spoken word is made up of a finite number of sounds. On the surface, the child's reading ability does

not appear to have progressed; the child is still sounding out words, although "reading" may become more fluent.

Stage 2 of Chall's (1979) Stages of Reading Theory, the Confirmation, Fluency, Ungluing From Print Stage, usually occurs among children in grades 2 and 3, ages 7 to 8 years. Stage 2 is a perfecting of Stage 1 knowledge, whereby children consolidate what they have learned through reading familiar words and stories, increasing in fluency and speed as they do so. Reading is still not done for the purposes of learning; this comes in Stage 3. Common words are emphasized for increased familiarity and fluency, although some new decoding (word recognition) knowledge is gained.

The above theory on Reading Stages illustrates the steps in learning to read. Studies suggest that reading abilities are well ingrained by grade 3 (Juel, 1988).

Breakfast-Eating Questionnaire

The assumption made in the development of the breakfast-eating questionnaire was that the vast majority of grade 1 children had only limited reading ability and that reading ability improved with age and grade level.

Words used on the breakfast-eating questionnaire have been compared to similar words used in the teaching curriculum for health issues, specifically nutrition, in the Nova Scotia teaching curriculum for health in grades 1, 2 and 3. Since the health curriculum is under review, it was difficult to locate texts used in nutrition education.

However, in the grade one reader alone, the words "breakfast, grow, energy, and foods" were present (Richmond and Pound, 1977).

In order to ensure comprehension of the breakfast-eating questionnaire by the least advanced child in terms of reading development, the tool was designed to attach symbols to the words describing breakfast foods. The symbols are not a specific representation of the word. Representative amounts described in the diagrams may also confuse subjects: where the child had eaten less than the amount drawn (one-half cup of milk as opposed to the diagramatic one cup), the child may not respond that they had consumed the item.

Pictorial Distractors

Breznitz (1988) conducted a study whereby the effects of pictorial distractors were assessed in terms of the reading performance of children in grade 1.

When young children were allowed to read at their own pace, this slow reading rate was found to provide more opportunity for distracting stimuli to register and interfere with comprehension. When young students were asked to read at their fastest normal reading rates, their comprehension and reading accuracy tended to improve. Breznitz (1988) reported that this phenomenon may be attributed to the constraints of short-term memory, to the principles underlying word recognition as well as to a reduced distractability.

Breznitz (1988) designed a study to look at the distractive-capabilities of pictures in the readers of first grade students. Pictures that were highly visible but irrelevant to the text were placed in the reader.

Subjects consisted of 44 matched pairs of first graders (mean age, 6.5 years) from two different schools; both were using the same materials for teaching reading and both were at the same point in the curriculum at the time of the study. All subjects in the first group were given the fast-paced reading test; the second group was given the self-paced conditions.

In the distractor condition, line drawings of familiar objects (flower, tree, ice cream cone, etc.) were added to the text. The control group read the text with pictorial distractors at their normal reading rate, the experimental group read the text with pictorial distractors in a fast-paced condition. In order to control reading rates with pictorial distractors, a computer program was developed which controlled the duration of the text presentation on the screen.

Results indicated that the pictorial distractors did not distract the first graders in this study to the point of reduced comprehension. The experimental group, reading at their fastest normal rate could not concentrate on both the text (central task) and the distracting stimuli (incidental task). Subjects in the fast-paced condition could correctly

answer more comprehension items and made less oral reading errors than did their matched controls who read at a self-paced rate. The experimental group also recognized fewer items in a pictorial distractor recognition test than did the control group. Comprehension was not affected by the presence of pictorial stimuli.

Breznitz's (1988) study, however, does not control for the variability in reading abilities of subjects, which may have influenced the results. The sample population was not randomly assigned to treatment groups and tended to be fairly small in number.

Assuming the generalizability of results of this study, however, it may be postulated that the symbols used on the breakfast-eating questionnaire should not serve as a major distraction for subjects. Results also point to the fact that the questionnaire should be administered in as concise a format as possible to allow comprehension by the child, with reduced distractability. It appears that reading proficiency is likely very low in grade 1, but improves by grade 3.

The breakfast-eating questionnaire was designed with children's reading limitations in mind. Symbols were incorporated to aid questionnaire completion for those children with limited reading ability. Thus, in order to successfully complete the questionnaire, the child must be able to recognize the symbols, but need not be capable of

reading, except for the words YES and NO.

Reliability of the 24-Hour Recall

As early as the 1950's, researchers were debating over the validity and reliability of the 24-hour recall as a measurement tool in assessing nutrient intake. Over the past two decades, researchers such as Young, et al., (1952), Balogh, et al., (1971), Linusson, et al., (1974), Madden, et al., (1976), Gersovitz, et al., (1978), Stunkard and Waxman (1981), and Rush and Kristal (1982) have all found the 24-hour recall to be a valid tool for measuring either individual and/or group nutrient intakes in a variety of populations. According to Beal (1967), no method for determining dietary intake is free from errors or limitations.

Children and 24-Hour Recalls

In assessing the breakfast-eating habits of elementary school children, one must first determine the children's capability of responding to questions regarding their dietary intake. Much debate centres around the concept of the child's ability to accurately recall dietary information. Until recently, the child's primary caregiver was generally considered to be the most reliable source of dietary information about the child. However, with children eating a greater number of meals away from home, and with many mothers now in the labour force, it has become increasingly difficult to account for the child's particular

food consumption. Researchers are realizing the child's ability to provide accurate self-reports of meal intake. The following literature review details the results obtained in the assessment of children's capacity to recall intake.

Meredith and colleagues (1951) were among the first to document a study involving the accuracy of children's (aged 9 to 18 years) ability to recall food intake. Investigators were looking for exact agreement in number, kind and quantity of foods consumed at a cafeteria lunch meal. Recalls were taken by trained interviewers 30 minutes to 2 hours after the lunch meal was consumed.

Complete agreement was noted in only 6 of 94 students (6.4%); children tended to under-report food items as the number of foods consumed increased. The reason for such a low degree of accuracy was thought to be due to the literal translation of recall: foods had to agree exactly in number, kind and quantity. It appears, from the results of this study, that children may be accurate reporters of types of food consumed, but not quantities of intake.

Emmons and Hayes (1973) postulated that in order to accurately recall intake, the child must have an adequately developed sense of time, a good memory, a sufficiently long attention span, and an adequate knowledge of food. The validity of the child's (aged 6 to 12 years) recall was tested comparing recall with a known school lunch intake. Using regression analysis, results indicated that children

were good reporters of their own intake, and that the ability of the child to recall foods eaten improved from grade 1 to grade 4.

Carter, Sharbaugh and Stapell (1981) also studied the 24-hour recall ability of 14 children attending summer camp for children with cystic fibrosis, asthma and insulin-dependent diabetes. After the noon meal on the day following observation by a trained observer, children were interviewed to obtain 24-hour recalls. Prompts and food models were used to assist recall of portion size.

No significant differences were found between recalled and observed intake according to sex or age on regression analysis. However, results of paired t-tests comparing average observed and recalled protein and energy intakes showed significant differences. The authors concluded that children's reports of intake could not be considered to be valid or reliable. It appears that portion size, as a determinant of nutrient assessment (protein and energy) hindered recall ability. The technique of nutrient analyses itself, may have caused some of the discrepancy in recall ability observed in this group.

Baranowski and associates (1986) studied self-reports of children's (grade 3 to 6) food intake through the aid of a written food frequency form containing pictures, which the child was given instruction on how to complete. These same children were observed over the 2-day period in which they

completed the form. Subjects were not asked to spontaneously recall intake over the past 24-hours, but rather, their 2-day record was compared to actual intake.

Results indicated that by using the food record form with pictures and words, the children were able to accurately report frequencies of food consumption. The pictures served as a memory cue for children who disliked or who had difficulty in reading.

Surrogate Responses

Emmons and Hayes (1973) compared mothers' reports of children's (aged 6 to 12 years) food consumption with their child's recall of intake. Results indicated good agreement between mothers' and children's recall of intake in terms of food groups and main dishes, regardless of the child's age. Disagreement occurred in the secondary food items such as gravies, sauces and condiments. Where disagreement between mother's and child's intake did occur, it was debatable whether the mother or the child provided the more accurate recall. Problems with mother's recall were associated with such factors as the mother working away from the home, and the fact that a mother with several children may have had difficulty in remembering what one particular child ate.

Eck, Klesges and Hanson (1989) studied the accuracy of report of child's intake at one meal from the mother's, father's and child's (aged 4 to 9.5 years) viewpoint. Without the family's knowledge, the food consumed by the

child at a cafeteria lunch meal was recorded. The following day the family was asked to recall the child's intake separately, and as a group. No significant differences were noted in consensus nor individual recall of foods consumed.

The studies cited above tested the recall ability of children, the majority of whom were between the ages of 6 and 12 years. No attempt at random selection of subjects was made, although children were stratified by age, sex and grade. Sample size appeared reasonable in most studies reported, except perhaps for the Carter and associates' (1981) study, where only 14 chronically-ill children were tested. This small sample size and the conditions under which the subjects were chosen should be regarded with caution; i.e., chronically-ill children included diabetic and cystic fibrosis subjects, both of whom have a high degree of nutrition intervention and knowledge related to their disease. This expected "better-than-average" knowledge about food intake may, in fact, promote an increased ability to recall food intake, thereby biasing results.

The above studies do not blind the interviewers, except in the case of Meredith and colleagues (1951). Twenty-four hour or meal recalls were performed on a group of children by the same individuals who recorded their intake. Additional prompting, or deliberate non-prompting by the

interviewer, may have influenced recall results. However, all interviewers were trained in the art of obtaining 24-hour recalls to control for most elements of interviewer bias.

In summary, it appears that elementary school students have good recall ability related to types of food consumed, but not to quantities of foods. Elementary school children may be better able to recall intake than a surrogate respondent, such as the child's mother.

Respondent Bias of Children

The above recall studies presume that the characteristics of the interviewer do not influence the dietary reports of the child.

Gussow, Contento, and White (1982) studied elementary and high school students to determine whether subjects intentionally biased their reports of food intake toward "approved foods" when responding to a nutritionist.

Children were asked to complete either a written (high school) or an oral (elementary school) 24-hour recall of types of foods consumed. Quantities of food eaten were not tested, since the objective of the study was not to estimate nutrient intakes.

The "approver-disapprover" variable was implemented by way of using two cover sheets; an informal "approver" cover sheet signed by a television producer supposedly considering what teenagers really like to eat, and a formal

"disapprover" cover sheet, from a supposed university-based nutritionist who was investigating the "poor eating habits of teenagers". Approximately one-half of the class received approver forms and the other half, disapprover forms.

The elementary school children were interviewed either by an adult, introduced as a nutritionist, or by a 9-year old child who was supposedly doing a class project.

The hypothesis tested was that the approver/disapprover factor would affect reporting of approved and disapproved foods to the nutritionist. Therefore, investigators developed an "approved" and a "disapproved" food score.

Results indicated no statistically significant differences in the reported consumption of foods between approver and disapprover groups in either elementary or high school students. The elementary school students reported consuming almost the same mean intake of approved and disapproved foods, (which they had earlier identified in pilot-testing), whether they were responding to a nutritionist (disapprover) or a peer (approver). It appeared, therefore, that children's dietary intake recalls were not influenced by the apparent attitude of the interviewers regarding good and bad food habits.

This experimental study involved elementary (n=30) and high school (n=500) students as subjects. The authors state that approximately one-half of the elementary school class was interviewed by an adult nutritionist, while the other

half was interviewed by a peer. The selection process for treatment was not documented; neither is the reader aware of possible blinding of subjects to the treatment groups. These factors may jeopardize results and threaten the generalizability of this study.

Intra-observer (within one individual) and inter-observer (child interviewer versus adult interviewer) bias may have influenced results in the elementary school children's 24-hour recalls. However, interviewers were trained to obtain the 24-hour recalls, and therefore, bias in this regard should have been minimal.

The sensitivity of the "approver/disapprover" score itself is questionable, in its ability to detect a real difference in children's comprehension of "good" and "bad" responses. Results of the small sample size of children recruited for this study do not support generalizability of results to the elementary school population.

Gussow and colleagues' (1982) study seems to dispel the hypothesis that subjects respond to interviewers' approver/disapprover cues on food recall. At this time it is unknown whether or not children respond differently about their food intake if they fear disapproval. The limited literature thus far suggests that they do not. However, the concept of confidentiality of answers may prove to be an advantage in study design for increased truthfulness of responses to the breakfast-eating questionnaire. Further

work on the influence of these cues, on children in particular, is needed.

In summary, the review of literature attempts to provide the reader with a framework on which the validation of the breakfast-eating instrument can be built. The breakfast-eating habits questionnaire will be used to identify breakfast-eating patterns of children in grades 1, 2 and 3.

PART II METHODS

GENERAL METHODOLOGY

Conceptual Framework for Validity and Reliability Testing

VALIDITY TESTING

Wolfson and associates (1990) define the validity of an instrument as referring to the extent to which it measures what it purports to measure. The validation of a survey instrument is an on-going process; the researcher must constantly consider whether the measuring tool performs the function for which it was intended. As revisions are made, the usefulness of the tool must be reassessed.

This study will test the face validity, criterion validity and content validity of a questionnaire. Each of these concepts will be defined in the context of the breakfast-eating questionnaire (see Appendix C, Figure 1).

Face Validity

Face validity is defined as that function of a survey tool which looks like it measures what it intends to measure.

Face validity was determined for the breakfast-eating questionnaire by testing the subjects' ability to recognize the symbols and words on the form, as well as the generic concept of "fruit". Testing procedures were planned to assess the child's recognition of the questionnaire's symbols. Positive results of these tests will allow the

researcher to reasonably claim that the questionnaire has face validity.

Criterion Validity of Breakfast-Eating Questionnaire

A newly developed measuring instrument should be compared to a GOLD STANDARD, i.e., an instrument for which validity and reliability have already been established, and which measures identical factors as the tool in question (Wolfson, et al., 1990). Correlation coefficients between the components of the newly developed instrument and the Gold Standard are referred to as the indices of validity.

Criterion validity was assessed using four nutritional standards: Chery and Sabry's (1984) commonly consumed portions; Health and Welfare's Recommended Nutrient Intakes for Canadians (1983); Canada's Food Guide (1982); and other researchers' work defining one-fourth the daily energy and protein requirements as necessary for breakfast. Portion sizes on the breakfast-eating questionnaire were taken as those similar to Chery and Sabry's estimated quantities of intake. Breakfast was therefore considered ADEQUATE if it contained THREE OF THE FOUR FOOD GROUPS of Canada's Food Guide, with one of the food groups being of high biological value protein, in order to meet the one-quarter energy and protein requirements for breakfast. It was against these criteria that children's responses to the breakfast-eating questionnaire were assessed.

Content Validity

Content validity refers to the accuracy with which an instrument measures the factors or situations under study (Leedy, 1980, chap.2).

Content validity of the breakfast-eating questionnaire was assessed by comparing "usual" breakfast intakes of a group of Nova Scotia elementary school children with results of the questionnaire. Although the data collected cannot be extrapolated to the entire Nova Scotia population, the degree of inter-subject variability was expected to be small with regard to the consumption of breakfast foods.

RELIABILITY TESTING

The reliability of a tool refers to the extent to which it is capable of producing consistent results when applied to the same individual at varying times, either by the same or by different observers.

Validity refers to the "truthfulness" of the questionnaire; reliability refers to the reproducability of responses to the questionnaire. While a valid instrument must, by design, also entail reliability, a reliable tool is not necessarily valid.

Sometimes it is difficult to separate validity from reliability. A test involving children's recall of actual intake, for example, is a measure of the truthfulness (or validity) of responses; however, it is also a measure of the reliability of response since a time element has been

introduced. The child's ability to recall his/her breakfast does not assess the validity of the breakfast-eating questionnaire, but it may assess the reliability of the instrument to record foods which are recalled by the child. Children's recall of food intake will therefore be considered as a reliability assessment.

RESEARCH METHODOLOGY

This section describes the research methodology and design for validity and reliability-testing of the breakfast-eating questionnaire.

Children enrolled in grades 1, 2 and 3 were chosen because very few studies to date have investigated the responses to food recall of such young children directly. As well, it has been shown that the impact of hunger on such young children would have more dramatic consequences on school success, both in the short- and long-term, than on older children.

The words, foods and symbols chosen for inclusion in the questionnaire were found to be timely and appropriate for use in the subgroup studied on pilot-testing.

Methods have been developed which allow an investigator to assess nutritional status. This study uses a modified "dietary assessment", namely, the recall of one particular meal, to obtain information on the breakfast habits of young elementary school children in Nova Scotia.

Questionnaire

The questionnaire was prepared using MacIntosh computer software, "Hypercard - Art Ideas" software package and "Write Now, 2.0" word processing package available at the Instructional Computing Centre, Dalhousie University. The questionnaire was presented on standard white paper with black ink and was reproduced by photocopying. The form did

not include a title because it was felt that such a heading might influence results of those children who could read.

Some changes in the order of symbols and words were made after initial pilot-testing for validation of the questionnaire, i.e., "enticing" breakfast foods such as pancakes, waffles, bacon, sausages were later distributed throughout the questionnaire; initially they appeared as a group at the beginning of the form. It was anticipated that children might react to these more favourable foods by circling them first, if they thought that their intake of cereal or toast would not show up on the questionnaire. Another early change to the questionnaire was to include the use of symbols of a "boy" and a "girl" when it was discovered that not all children could read those words.

The breakfast-eating questionnaire was designed with children's reading limitations in mind. Symbols were incorporated to aid questionnaire completion for those children with limited reading ability. Thus, in order to successfully complete the questionnaire, the child must be able to recognize the symbols, but need not be capable of reading, except for the words YES and NO.

Sample

A sample of convenience was selected from a variety of sites where children tend to congregate. The public schools were excluded as these sites would have contaminated results of the upcoming breakfast-eating survey and jeopardized

school board approval of testing in the future. Responses to the survey were sought from a variety of socio-economic areas of the city; there was limited success at recruiting low income children, in particular.

The following describes the sites considered for this study. Appendix C, Figure 2 illustrates the sites chosen and the tests performed.

Lunch Programs

The YM/YWCA coordinates lunch programs at various sites across the city where supervision in the school is not provided during the lunch hour. Those children enrolled in the Y-Lunch Programs would otherwise have no supervision during the lunch hour, generally because parents are working. A room in the school or nearby church hall is designated for the Lunch Program and children are transported to these sites by Y-personnel. Supervision is provided by a child care worker employed by the YM/YWCA.

The YM/YWCA also provides "Special Camps" during the March Break, for working parents who wish to enroll their child in an organized activity week.

A low income Hot Lunch Program is provided through the Cornwallis Baptist Church in Halifax and provides subsidized lunches to children in a low-income area. The Cornwallis Hot Lunch Program was identified by the Social Planning Department, City of Halifax as a potential site for data collection on a low-income population.

"Club" Meetings and Sunday Schools were thought to be potential sources of data. Permission was granted to attend a Beaver Club meeting at the Anglican Diocesan Centre and a Sunday School meeting in Dartmouth. As well, a swim meet for children 12 years of age and under, was held at "Dalplex", Dalhousie University's recreation centre. Permission was also given to interview children attending the swim meet, pending parental consent.

The Izaak Walton Killam Hospital for Children's in-patient and out-patient populations were suggested as being potential areas for data collection.

Private schools were also recommended as sites for data collection; subjects of the appropriate grade level would be readily available for questionnaire administration. The principals of two separate schools in the city (Sacred Heart School of Halifax and Armbrae Academy) were contacted and granted permission for the study.

Children

Only English-speaking children were included in the study. Both boys and girls enrolled in grades 1, 2 and 3 were chosen for study in an effort to evaluate gender and grade differences among results. Excluded from the study were children who did not have parental permission, despite fitting the criteria for inclusion. At only one site targeted for low income children was obtaining consent a

major problem. Therefore, the majority of children taking part in this survey were of apparently adequate income.

Sample Size

A sample size of 20 subjects per arm of the study was recommended by a biostatistician in the Department of Community Health and Epidemiology, Dalhousie University, as necessary to provide an appropriate sample for results of validity and reliability testing of the questionnaire.

Time Frame

Data were collected from January, 1990 to March, 1990. Thus, the winter school term of 1990 encompassed the season of data collection.

Rasanan (1979) found seasonal effects of income to be small in Finland, where the availability of food is large. Major seasonal effects in food variety and availability occurs mainly in the summer months in Canada. Since this questionnaire was to be evaluated during school months, it is doubtful whether food availability would change much and therefore was not assessed in validity and reliability testing.

Administration

Administration of the questionnaire was performed in either a group or individual setting with one trained interviewer delivering oral instructions on how to complete the questionnaire. Teachers or supervisors were present for group management, but it was not anticipated that any

intervention would be necessary, other than discipline or behaviour control, from these individuals.

Administration of the breakfast-eating questionnaire took approximately 10 minutes; interviews with children ranged from 2 minutes to 20 minutes, depending on the cooperation of the subjects, the type of testing, and time limitations surrounding the activity.

Reliability-testing was performed in the morning for the test-retest studies (approximately 9:15 a.m. to 11:00 a.m.) and again in the early afternoon (12:30 p.m. to 2:00 p.m.) for comparative purposes. Test-retest studies included differences associated with time effects, word alteration effects and symbol alteration effects. The lunch meal was chosen as the most convenient meal for observation on accuracy of recall since children tended to congregate in a convenient site at lunch time. The recall of usual breakfast intake was scheduled to occur as close to the breakfast meal as possible, given the limitation of school hours, i.e., 9:00 a.m. was the earliest possible time of recall, when students were congregated in class.

It was anticipated that a controlled, quiet environment, with as few external distractors as possible, would provide the greatest yield of responses. A quiet, secluded area of the room was designated for oral interview, where two chairs were set up, one for the interviewer and one for the child. Children were cautioned not to discuss

the interview with their neighbour until all sessions were complete. In cases where only part of a group of children was considered eligible for investigation, those participating were removed from the classroom to avoid interrupting the rest of the class.

For reliability-testing, it was necessary to have children write their first name and grade on the questionnaire so that later matching of responses could occur. Children were assured that their answers would remain confidential and that the investigator was the only person who would see their responses.

In reliability and validity testing, the lunch meal was substituted for breakfast since it was the most convenient period of food intake in which actual consumption could be compared to recalled intake. Ideally, breakfast would have been chosen for investigation, but due to the unavailability of subjects at that time of the day, it was impossible to use breakfast intake as a means of reliability testing.

Interviewer Training

The investigator was trained in questionnaire delivery through discussions with her thesis co-supervisor, and the original developer of the questionnaire. A report on pilot-testing results also provided instruction on how to administer the questionnaire. All interviews were conducted by the investigator to allow consistency of administration. To perform inter-observer reliability testing with the

investigator, two other individuals were trained to administer the questionnaire: a staff dietitian at the IWK Hospital, and a medical student at Dalhousie University. Interviewers were instructed according to the script presented in Appendix A, and were cautioned to avoid prompts other than those suggested in the script. Interviewers were told to abandon the interviewing process at the first sign of anxiety in the child.

Consent

Ethical approval for the study was granted by the Research Committee of the Izaak Walton Killam Hospital for Children, in October, 1989. Individual permissions were given by the institutions involved in data collection: the YMCA and YWCA of Halifax and Darmouth, the Beaver Club and Sunday School, Dalplex, the two private schools: Armbrae Academy and Sacred Heart School of Halifax, and the IWK in- and out-patient areas.

Written parental consent was necessary for the child's participation in the study. The parental consent form is presented in Appendix D.

Figure 3, Appendix C, illustrates the steps taken to achieve parental consent. Parental permission was obtained either directly by the investigator or indirectly by having the supervisors of the respective programs approach parents for consent. Experience from pilot-testing of the questionnaire suggested that it might be difficult to obtain

parental consent in the lower income areas of the city. Therefore, an intermediary person (supervisor of the program), with whom the parents were familiar, was asked to obtain consent. The study was explained to these intermediaries to prepare them for questions by parents regarding the study. A second reason for obtaining parental consent in an indirect manner was that direct consent would imply that parents were present at the time of testing, as in the case of the IWK in-patient population. It was thought that this might influence the children's responses.

Analysis

Statistical assistance was received from two biostatisticians in the Department of Community Health and Epidemiology, Dalhousie University.

Coding of questionnaire responses was performed after all data were collected. Data were entered into a Zenith micro-computer system attached to a mainframe computer at Dalhousie University. Data entry was verified prior to analysis.

Data analysis for descriptive statistics on grade and sex was done with the SAS software (SAS Institute, Inc. 1985).

For face validity testing of symbol recognition, a recognition level of 80% was set for symbol acceptability. This level was set arbitrarily, on the advice of statistical consult, prior to data analysis.

Inferential statistics to determine statistical differences among groups included the t-test, chi-square test, and Fisher's exact test when cell counts of less than 5 were obtained. The tests were calculated using the Epistat statistical package (Tracy L. Gustafson, Epistat 3.0, 1984).

The kappa statistic ($\hat{k}$) was used as a primary measure of reliability-testing of responses and was analyzed by the use of the BMDP statistical package (BMDP, 1988). Cohen's kappa is a measure of reliability that controls for agreement beyond chance (Fleiss, 1981, chap. 13). It is defined as the ratio of differences between observed and expected agreement:

$$\hat{k} = \frac{I_o - I_e}{1 - I_e}$$

where $\hat{k}$ = kappa, a measure of agreement beyond chance
I_o= observed agreement,
I_e= expected agreement

Fleiss' Criteria

According to Fleiss (1981), for the majority of purposes, values greater than 0.75 may be taken to represent excellent agreement beyond chance. Values of kappa below 0.40 may be taken to represent poor agreement beyond chance and values between 0.40 and 0.75 represent agreement beyond chance that is fair to good. Fleiss' criteria for agreement

were used to establish limits on the degree of reliability of responses to the breakfast-eating questionnaire. Responses to questionnaire completion scoring as "fair to good" in reliability testing were considered acceptable.

Asymptotic Standard Error

The asymptotic standard error (ASE1) was used to set confidence limits on the parameters and was based on multinomial sampling which is largely influenced by sample size. Both the confidence interval (alpha=.05) as well as the sample size determine the range of the lower confidence limit, against which Fleiss' criteria for agreement are compared to determine the statistical significance of results. The asymptotic standard error assumes that the alternate hypothesis is true: $H_a:\hat{k}\neq 0$, i.e., kappa is not equal to zero.

"Significance level" for the kappa statistic refers to the value obtained for the lower confidence limit, using a 95% confidence interval and the asymptotic standard error (ASE1).

In the results of the reliability tests performed, the asymptotic standard error was used to set confidence intervals at 95%. Results of this confidence interval calculation were then compared to Fleiss' criteria for agreement between responses.

Merging of data

Since some of the reliability tests incorporated a

small sample size (i.e., 18 subjects for the time alteration test), a few disagreements in responses resulted in large discrepancies in agreement. Therefore, all data from reliabilty tests were merged to obtain a larger sample size.

An alpha level of .05 was set as a significance level; differences of $p<.05$ were considered to be statistically significant.

The validity and reliability testing of the breakfast-eating questionnaire were accomplished through a series of "mini-studies". These studies yield a descriptive analysis of the validity and reliability of the breakfast-eating questionnaire, and include:

1) Symbol recognition to test the face validity of the questionnaire;
2) Word recognition, to test face validity;
3) Generic food recognition, whereby children's comprehension of food groupings is tested (face validity);
4) Usual breakfast intake to test the content validity of the breakfast-eating questionnaire;
5) Time effects, whereby the same questionnaire is administered to a group of children at two time periods to determine whether a time lapse has any influence on recall (reliability);

6) Symbol alteration effects, in which two questionnaires are administered to the same group of children at two time periods: the first questionnaire appears as in Appendix A, the second questionnaire has alterations in the order of symbols (Appendix A-1) (reliability);
7) Word alteration effects, whereby two questionnaires are administered to the same group of children: one questionnaire is presented in Appendix A and the other with alterations in the order in which words appear on the page (Appendix A-2) (reliability);
8) Observation of children's actual intake versus recalled intake to determine the accuracy of responses to questions involving food consumption;
9) Criterion validity testing which compared children's responses of recalled breakfast intake on the questionnaire to the criteria established for adequacy of breakfast.

PART III

STUDIES

Validity Testing

STUDY #1

Symbol Recognition

RESEARCH QUESTION: Can young elementary school children recognize the symbols on the breakfast-eating questionnaire?

The purpose of this investigation was to determine whether study children can accurately identify the symbols chosen for use on the breakfast-eating questionnaire. The degree of symbol recognition was taken as an indication of the face validity of the questionnaire.

Subjects

Subjects consisted of 65 children enrolled in grades 1 (n=31), 2 (n=23) and 3 (n=11), attending various sites: a Beaver Club meeting, a swim-meet at Dalplex, the Cornwallis Hot Lunch Program, the IWK out-patient clinic waiting area, YM/YWCA Lunch Programs and YMCA Special Camps (see Appendix C, Figure 2 and Appendix E). Data were collected from January to March, 1990.

Methods

The child was taken to a corner of the room, as far away from the activities of the other children as possible. Care was taken to ensure that results were kept "a secret" until each child had been interviewed.

After a brief introduction, the children were asked if they would "answer some fun questions to find out whether my questionnaire is (was) understandable to children in grades 1, 2 and 3". The child was then asked if he/she could identify the pictures on the paper, i.e., "Do you know what this picture is?", pointing to each symbol in the order in which it appeared on the questionnaire. If the child answered the question either correctly or incorrectly, no clue was given by the interviewer, other than "Okay, what about this picture?", pointing to the next symbol. Errors were recorded after the child had responded to all the symbols.

All interviews were conducted by the investigator. Consent was obtained either directly (as for the IWK cut-patient, and the swim-meet children) or indirectly for all others, as seen in Appendix C, Figure 3.

Results

Table 1 identifies the percentage of correct responses to symbol recognition by sex. A cut-off point was set at 80%; scores below 80% suggested that the symbol needed to be revised.

The clock represented the greatest difficulty in symbol recognition. Responses included a "microwave" and a "computer" on several occasions.

Table 2 illustrates the percentage of correct responses to symbol recognition by grade. As was expected, the grade

1's had more difficulty in identifying a wider range of symbols than did the grade 2's or 3's.

Grade 2's appeared to have some difficulty in identifying the flower. This may have been due to a poor quality reproduction of the questionnaire used on a group of grade 2 students.

Table 3 presents results of the Fisher's exact test (95% confidence limit) for symbol recognition for boys and girls tested. No significant differences were found between the sexes in terms of symbol recognition for any of the symbols, including the clock for which the greatest number of errors occurred.

Tables 4, 5 and 6 present results of the Fisher's Exact Test (alpha=.05) applied to differences in scores by grade. Again, no significant differences were noted between scores in grades 1, 2 or 3 children.

Discussion

Aside from being an important test in determining the face validity of the breakfast-eating questionnaire, the symbol recognition test was used as a means of developing rapport with the child.

Sample size was weighted more heavily in favour of the grade 1's. It was anticipated that if the grade 1's were able to correctly identify the symbols, then the grade 2's and 3's would have little difficulty in doing so.

The symbol which resulted in the greatest number of errors in identification was the CLOCK. It is suggested that the clock be given a round instead of a square face for easier identification during survey administration of the questionnaire.

The symbols for BOY and GIRL were added early on in data collection when it was discovered that several of the children tested for word recognition could not read the words "boy" and/or "girl" (Appendix F). For this reason, fewer subjects were tested for symbol recognition of BOY and GIRL.

It became necessary to make revisions to the list of words designating some of the symbols, i.e., a "flower" was synonymous with a "rose"; a "bow" was also a "ribbon"; the "cat" was sometimes referred to as a "dog" which was considered acceptable, since the outline of the animal could be taken either way; the "elephant" was referred to by one child as a "mammoth" (Appendix F). However, this will not prove to be a problem in questionnaire administration, since all symbols will be identified by the administrator, i.e., "If you had juice this morning, circle the dinosaur".

Despite precautions taken to ensure as little external distraction as possible, most of the symbol recognition tests took place in an area with considerable noise and activity. This level of distraction may have contributed to some of the errors which occurred in symbol recognition.

Conclusions and recommendations

The symbols presented on the breakfast-eating questionnaire appear to be identifiable by a sample of study children. Results of the symbol recognition test lend support to the face validity of the questionnaire.

RECOMMENDATIONS

-The clock should be changed to show a round rather than a square face for easier recognition;

-Symbols for "boy" and "girl" should be added.

Table 1: Percentage of Correct Responses to Symbol Recognition

Symbol	Percentage of Correct Responses		Symbol	Percentage of Correct Responses	
	Boys (n=37)	Girls (n=28)		Boys (n=37)	Girls (n=28)
Dinosaur	97.3	96.4	Cat	97.3	100.0
Tree	100.0	96.4	Phone	100.0	100.0
Duck	100.0	96.4	Clock	83.8	92.9
Train	100.0	100.0	House	100.0	100.0
Moon	100.0	100.0	Glasses	97.3	100.0
TV	100.0	100.0	Mitten	100.0	100.0
Star	100.0	100.0			
				n=22	n=22
Bow	97.3	100.0	Boy	100.0	100.0
Flower	97.3	96.4	Girl	100.0	100.0
Elephant	97.3	96.4			

Table 2: Percentage Recognition of Symbols by Grade

Symbol	% Recognition			Symbol	% Recognition		
	Gr 1 n=31	Gr 2 n=23	Gr 3 n=11		Gr 1 n=31	Gr 2 n=23	Gr 3 n=11
Dinosaur	93.5	100.0	100.0	Cat	100.0	95.7	100.0
Tree	96.8	100.0	100.0	Phone	100.0	100.0	100.0
Duck	96.8	100.0	100.0	Clock	80.6	91.3	100.0
Train	100.0	100.0	100.0	House	100.0	100.0	100.0
Moon	100.0	100.0	100.0	Glasses	96.8	100.0	100.0
TV	100.0	100.0	100.0	Mitten	100.0	100.0	100.0
Star	100.0	100.0	100.0	Boy	100.0	100.0	100.0
Bow	96.8	100.0	100.0	Girl	100.0	100.0	100.0
Flower	100.0	91.3	100.0				
Elephant	96.8	100.0	90.9				

Table 3: Symbol Recognition: Boys versus Girls by Fisher's Exact Test Scores

Symbol	% Recognition		Fisher's Exact* Test (p-value)		Symbol	% Recognition		Fisher's Exact* Test (p-value)	
	Boy	Girl	Boy	Girl		Boy	Girl	Boy	Girl
Dinosaur	97.3	96.4	0.680	0.680	Cat	97.3	100.0	0.569	0.569
Tree	100.0	96.4	0.431	0.431	Phone	100.0	100.0	0.999	0.999
Duck	100.0	96.4	0.431	0.431	Clock	83.8	92.9	0.239	0.239
Train	100.0	100.0	0.999	0.999	House	100.0	100.0	0.999	0.999
Moon	100.0	100.0	0.999	0.999	Glasses	97.3	100.0	0.569	0.569
TV	100.0	100.0	0.999	0.999	Mitten	100.0	100.0	0.999	0.999
Star	100.0	100.0	0.999	0.999	Boy	100.0	100.0	0.999	0.999
Bow	97.3	100.0	0.569	0.569	Girl	100.0	100.0	0.999	0.999
Flower	97.3	96.4	0.680	0.680					
Elephant	97.3	96.4	0.680	0.680					

Note: * No values p<.05

Table 4: Symbol Recognition: Grade 1 Subjects Versus all Others by Fisher's Exact Test

Symbol	% Recognition	Fisher's Exact Test* (p-value)	Symbol	% Recognition	Fisher's Exact Test* (p-value)
Dinosaur	93.5	0.223	Cat	100.0	0.523
Tree	96.8	0.477	Phone	100.0	0.999
Duck	96.8	0.477	Clock	80.6	0.101
Train	100.0	0.999	House	100.0	0.999
Moon	100.0	0.999	Glasses	96.8	0.477
TV	100.0	0.999	Mitten	100.0	0.999
Star	100.0	0.999	Boy	100.0	0 999
Bow	96.8	0.999	Girl	100.9	0.999
Flower	100.0	0.270			
Elephant	96.8	0.730			

Note: * No values at $p<.05$

Table 5: Symbol Recognition: Grade 2 Subjects Versus all Others by Fisher's Exact Test

Symbol	% Recognition	Fisher's Exact Test* (p-value)	Symbol	% Recognition	Fisher's Exact Test* (p-value)
Dinosaur	100.0	0.414	Cat	95.7	0.354
Tree	100.0	0.646	Phone	100.0	0.999
Duck	100.0	0.646	Clock	91.3	0.409
Train	100.0	0.999	House	100.0	0.999
Moon	100.0	0.999	Glasses	100.0	0.646
TV	100.0	0.999	Mitten	100.0	0.999
Star	100.0	0.999	Boy	100.0	0.999
Bow	100.0	0.999	Girl	100.9	0.999
Flower	91.3	0.122			
Elephant	100.0	0.414			

Note: * no values at $p<.05$

Table 6: Symbol Recognition: Grade 3 Subjects Versus all Others by Fisher's Exact Test

Symbol	% Recognition	Fisher's Exact Test* (p-value)	Symbol	% Recognition	Fisher's Exact Test* (p-value)
Dinosaur	100.0	0.688	Cat	100.0	0.831
Tree	100.0	0.838	Phone	100.0	0.999
Duck	100.0	0.831	Clock	100.0	0.206
Train	100.0	0.999	House	100.0	0.999
Moon	100.0	0.999	Glasses	100.0	0.831
TV	100.0	0.999	Mitten	100.0	0.999
Star	100.0	0.999	Boy	100.0	0.999
Bow	100.0	0.831	Girl	100.9	0.999
Flower	100.0	0.688			
Elephant	90.9	0.312			

Note: * No values at $p<.05$

STUDY #2

Word Recognition

RESEARCH QUESTION: Do young elementary school children have adequate reading skills to identify the words on the breakfast-eating questionnaire?

The purpose of this test was to determine whether young elementary school children in the Halifax-Dartmouth area are able to identify words on the questionnaire.

Subjects

The group of 51 subjects recruited for the word recognition test consisted of children enrolled in grades 1 65 (n=23), 2 (n=18) and 3 (n=10) (see Appendix C, Figure 2 and Appendix E), from the YM/YWCA Lunch Programs, YMCA Special Camps, the Cornwallis Hot Lunch Program, and the IWK out-patient waiting area, during February to March, 1990.

Methods

The children to be tested were taken to a corner of the room, away from the activities of the rest of the group, as in Study #1. Children were asked if they could identify various words on the questionnaire, based on the interviewer's assessment of the child's reading ability, i.e., "Do you know what this word is?". Words were identified in variable order, beginning with what the interviewer judged to be the more simple (one syllable) words. All children were asked if they could identify the words YES and NO.

Subjects were interviewed by the investigator; consent was achieved indirectly, through the aid of an intermediary who approached parents in all cases except the IWK out-patient area, where consent was obtained directly from the parent.

It should be noted that the reason the grade 1's had such a high percentage of "not asked" scores is because they were judged by the interviewer to be incapable of reading the words, either because they displayed anxiety at being asked, or because they struggled over the simpler words on the page, and therefore, the test was abandoned.

Results

Table 7 presents the percentage of words recognized, not recognized, or not asked, by sex. The words YES and NO were considered to be the most important words on the questionnaire. The girls appeared to have more difficulty in reading the word YES (Table 7), with 2 out of 24 girls (8.3%), not recognizing the word. None of the word recognition tests showed significant differences between the sexes, i.e., boys and girls appeared equally capable of reading the words on the questionnaire.

Table 8 looks at the word recognition test by grades. As was expected, the grade 1's had more difficulty in correctly identifying the words than did the grade 2's, who showed limited ability compared to the grade 3's.

Discussion

The word recognition test does not attempt to rate the reading level of the children tested; rather, it is a determination of the level of recognition of words on the questionnaire.

From Tables 7 and 8 it appears that the grade 1's are only marginally capable of reading, whereas almost all the grade 3's are able to read the words on the questionnaire. It cannot be concluded, however, that grade 1's are completely incapable of reading, nor that the grade 3's are entirely able to read the questionnaire. The child's ability to cooperate in the word recognition test may have played a major part in the successful completion of this test. The child tended to view the word recognition test as a school task and often lost interest or appeared anxious in attempting to correctly answer the questions. Younger children in particular (grade 1) showed signs of anxiety if they were unable to read the word correctly. The older children did not appear to be as anxious and tried to "sound out" the word more often than the grade 1's.

As discussed in the symbol recognition test, some distractions were occurring in the room, despite attempts to reduce interference, which may have contributed to a lack of interest in the word recognition test. Several children responded to testing with the name of the symbol. In one instance, the interviewer asked the subject "Do you know

what this is?", pointing to the word "CHIPS". The child responded "Bow", which was the symbol beside the word chips.

Conclusions and recommendations

Results of the word recognition test suggest that words alone could not be successfully used to elicit information on the breakfast-eating habits of young elementary school children. The use of symbols along with the words is highly recommended in this proced ıre to lend support to the face validity of the questionnaire.

RECOMMENDATIONS

-symbols must be incorporated with words to increase the likelihood of comprehension of the questionnaire by subjects.

Table 7: Percentage of Words Recognized, Not Recognized (or Not Asked) by Sex

Word	Boys (n=27)			Girls (n=24)		
	% Rec	% NR	(% NA)	% Rec	% NR	(% NA)
* yes	100	--	--	91.7	8.3	--
* no	100	--	--	100	--	--
Juice	55.6	3.7	(40.7)	66.7	8.3	(25.0)
Fruit	48.1	--	(51.9)	62.5	--	(37.5)
Cereal	63.0	--	(37.0)	62.5	--	(37.5)
Milk	63.0	--	(37.0)	79.2	--	(20.8)
Bread	59.3	--	(40.7)	62.5	--	(37.5)
Toast	51.9	--	(48.1)	62.5	--	(37.5)
Muffins	48.1	--	(51.9)	62.5	--	(37.5)
Rolls	48.1	--	(51.9)	62.5	--	(37.5)
Fish	55.6	--	(44.4)	62.5	--	(37.5)
Peanut Butter	48.1	--	(51.9)	58.3	--	(37.5)
Cheese	48.1	--	(51.9)	58.3	4.2	(37.5)
Chips	48.1	--	(51.9)	62.5	--	(37.5)
Eggs	51.9	--	(48.1)	62.5	--	(37.5)
Pop	59.3	--	(40.7)	62.5	--	(37.5)
Bacon	48.1	--	(51.9)	54.2	--	(45.8)
Sausage	44.4	3.7	(51.9)	50.0	--	(50.0)
Yogourt	48.1	--	(51.9)	58.3	--	(41.7)
Coffee	48.1	--	(51.9)	58.3	--	(41.7)
Tea	48.1	--	(51.9)	62.5	--	(37.5)
Pancakes	44.4	3.7	(51.9)	54.2	--	(45.8)
Waffles	44.4	3.7	(51.9)	58.3	--	(41.7)
Me	74.1	--	(25.9)	75.0	--	(25.0)
Other	55.6	--	(44.4)	62.5	--	(37.5)
Boy	88.9	3.7	(7.4)	91.7	--	(8.3)
Girl	85.2	7.4	(7.4)	91.7	--	(8.3)

Note % Rec = percentage of subjects recognizing the word
% NR = percentage of subjects not recognizing the word
% NA = percentage of subjects not asked

Table 8: Percentage of Words Recognized, Not Recognized (or Not Asked) by Grade (n=51)

Word	Grade 1 (n=23)			Grade 2 (n=18)			Grade 3 (n=10		
	% Rec	% NR	(%NA)	% Rec	% NR	(%NA)	%Rec	% NR	(%NA)
* yes	91.3	8.7	(-)	100	--	(-)	100	--	(-)
* no	100	--	(-)	100	--	( )	100	--	(-)
Juice	17.4	13.0	(69.6)	94.4	--	6)	100	--	(-)
Fruit	13.0	--	(87.0)	83.3	--	(16.7)	100	--	(-)
Cereal	17.4	--	(82.6)	100	--	(-)	100	--	(-)
Milk	39.1	--	(60.9)	94.4	--	(5.6)	100	--	(-)
Bread	17.4	--	(82.6)	94.4	--	(5.6)	100	--	(-)
Toast	13.0	--	(87.0)	88.9	--	(11.1)	100	--	(-)
Muffins	13.0	--	(87.0)	83.3	--	(16.7)	100	--	(-)
Rolls	13.0	--	(87.0)	83.3	--	(16.7)	100	--	(-)
Fish	17.4	--	(82.6)	88.9	--	(11.1)	100	--	(-)
Peanut Butter	13.0	--	(87.0)	83.3	--	(16.7)	90.0	--	(-)
Cheese	13.0	--	(87.0)	83.3	--	(16.7)	90.0	10.0	(-)
Chips	13.0	--	(87.0)	83.3	--	(16.7)	100	--	(-)
Eggs	17.4	--	(82.6)	83.3	--	(16.7)	100	--	(-)
Pop	21.7	--	(78.3)	88.9	--	(11.1)	100	--	(-)
Bacon	13.0	--	(87.0)	77.8	--	(22.2)	90.0	--	(10.0)
Sausage	13.0	--	(87.0)	66.7	--	(27.8)	90.0	--	(10.0)
Yogourt	17.4	--	(82.6)	72.2	--	(27.8)	100	--	(-)
Coffee	13.0	--	(87.0)	77.8	--	(22.2)	100	--	(-)
Tea	13.0	--	(87.0)	83.3	--	(16.7)	100	--	(-)
Pancakes	8.7	4.3	(87.0)	77.8	--	(22.2)	90.0	--	(10.0)
Waffles	8.7	4.3	(87.0)	77.8	--	(22.2)	100	--	(-)
Me	43.5	--	(56.5)	100	--	(-)	100	--	(-)
Other	17.4	--	(82.6)	88.9	--	(11.1)	100	--	(-)
Boy	78.3	4.3	(17.4)	100	--	(-)	100	--	(-)
Girl	73.9	8.7	(17.4)	100	--	(-)	100	-	(-)

Note: % Rec = percentage of subjects recognizing the word
% NR = percentage of subjects not recognizing the word
% NA = percentage of subjects not asked

STUDY #3:

Generic Food Recognition

RESEARCH QUESTION: Can young elementary school children correctly identify generic food groups, i.e., fruit = apples, oranges, bananas, etc..

The purpose of the generic food recognition study is to ascertain whether children have a clear understanding of food "groups" in terms of generic representation.

Subjects

Thirty-nine children in grades 1 (n=17), 2 (n=15), and 3 (n=7) were interviewed for generic food recognition (refer to Appendices C and E). Sites of recruitment included the YM/YWCA Lunch Programs, YMCA Special Camps, the Cornwallis Hot Lunch Program, the IWK out-patient waiting area, during February to March, 1990.

Methods

The children were interviewed by the investigator. Consent was obtained either through direct contact with the parents, in the case of the IWK waiting area, or indirectly, through the aid of a supervisor of one of the programs involved. See Studies 1 and 2 for a review of procedures used to minimize external distractions.

Each child participating in the generic food recognition test was asked: "Can you name three different types of fruit?". Responses were taken verbally and later recorded by the interviewer.

Results

As seen in Table 9, children in grade 1 appeared to have more difficulty in identifying types of fruit, and thereby recognizing generic food representation than did the grade 2's and 3's, who came up with perfect scores. However, the difference in ability to identify the foods was found in only one child having some difficulty; the child could only name two types of fruit. A perfect score required three types of fruit to be named. Children in grades 2 and 3 had no difficulty in the generic food recognition test.

Discussion

The lack of difficulty in identifying generic food groups seen in Grade 2 and 3 students suggests that either through the home and/or school, the child has been introduced to the generic concept of fruit. Fewer grade 3's than grade 1's or 2's were tested, as it was evident that grade 2's had no difficulty in identifying fruit. The fruits most often named were apple, orange, and banana.

It is necessary to have some comprehension about generic food groups in order to accurately identify foods on the breakfast-eating questionnaire and to further qualify its face validity. The concept of fruit was tested because of limited interviewing time. Also, it appeared to be the most abstract of food groups on the questionnaire. Through discussions with children, they seemed to be familiar with

what foods (brand names in particular) made up the heading of cereal in the majority of cases; for instance, children responded to questions on cereal with replies of "like Corn Flakes, Honey Comb", etc.

The concept of juice, another possible source of error, is used as a prompt in the breakfast-eating questionnaire to improve understanding. When asked "Did you have any juice to drink this morning?", the question could be qualified by prompting "like orange juice, apple juice or grapefruit juice?"

Conclusion

All children tested, with the exception of one child, had no difficulty in identifying "fruit". The face validity of the breakfast-eating questionnaire is further strengthened by the results of the generic food recognition test.

Table 9: Percentage of Correct Responses to Question on Generic Food Recognition (n=39)

Grade 1 (n=17)	Grade 2 (n=15)	Grade 3 (n=7)
94.1	100.0	100.0

STUDY #4

Criterion Validity

RESEARCH QUESTION: Is the criterion for an "adequate breakfast" suitable for a population of young elementary school children in Nova Scotia?

The criterion for breakfast adequacy was established in the hopes that protein and energy requirements could be met through the consumption of 3 of the 4 food groups of Canada's Food Guide, with one of these food groups being of high biological value protein, i.e., meat, fish, poultry and alternates or milk and milk products. The "minimum of 3 food groups" represents the GOLD STANDARD for validity testing.

Subjects

One hundred and thirty-seven subjects enrolled in grade 1 (n=53), grade 2 (n=47), and grade 3 (n=37), were recruited for the criterion validity study from the IWK out-patient waiting area, the YM/YWCA Lunch Programs, the YMCA Special Camps, and the Cornwallis Hot Lunch Program. Data collection took place between February to March, 1990. Please refer to Appendix E for details of sites chosen for investigation.

Methods

Children were interviewed by the investigator; parental permission was granted directly by having the investigator approach parents, or indirectly, with the help of

supervisors in the program who obtained parental consent. Results of the criterion validity study were obtained from responses to questionnaire completion for other tests (see Study 6, 7 and 8); data were merged and used for "adequacy of breakfast" testing. In the case where two questionnaires were completed in one day, the results of the first questionnaire were used in the criterion validity study.

Results

Table 10 tabulates the responses to questionnaire completion, illustrating breakfast intake based on the four food groups of Canada's Food Guide and includes the "adequacy" criteria whereby intake is compared to the GOLD STANDARD for validity, i.e., a minimum of three food groups consumed, with one group being of high biological value protein.

From the scores of the breakfast intake responses, presented in Table 10, it appears that only 75 out of 137 children (54.7%) consumed an adequate breakfast on the day studied (see Table 11). Therefore, 45.3% consumed an inadequate breakfast.

Discussion

The criterion established for an adequate breakfast is the consumption of three out of four food groups of Canada's Food Guide. Pollitt and his co-workers (1983) have provided us with evidence of the necessity of consuming high biological value protein at breakfast for its effect on

later cognitive and physiological functioning secondary to blood glucose control. Researchers in the past have also established the requirement of one-quarter of the day's protein and energy intake to be consumed at breakfast as indicating an "adequacy criteria".

Table 12 presents the energy and protein requirements for breakfast considered adequate to meet the day's total requirements for nutritional health (Health and Welfare, 1983, Tuttle, 1981). The RNI's are an estimate of requirements and should be treated as such, especially in the case of children, whose energy requirements vary greatly. The RNI's have established a margin of safety in order to ensure the nutrient needs of all healthy individuals be met.

The adequacy criteria was established so that protein and energy requirements could be met through the consumption of a minimum of 3 of the 4 food groups of Canada's Food Guide, with one of these food groups being of high biological value protein, i.e., meat, fish, poultry and alternates or milk and milk products. The "minimum of three food groups" represents our GOLD STANDARD for validity testing.

Food Portions:

Canada's Food Guide is suitable as a guide for children over two years of age. However, it is questionable whether children of the age group studied actually consume the

portion sizes recommended in Canada's Food Guide (1982, p. 31).

For this reason, Chery and Sabry's (1984) portion size of common foods eaten by young children" was used as a standard to compare actual intake with the criteria established in a determination of adequacy. On initial examination of the adequacy scores, it appears that only a little more than one-half of respondents met the criteria for adequacy of breakfast intake. This high number suggests that the population in question is either a nutritionally disadvantaged group, or that our criteria is set too high. The former appears unlikely as a predictor of poor nutritional health, since it has been shown that Canadian children are, for the most part, adequately nourished (Network of Federal/ Provincial/ Territorial Group on Nutrition and NIN, 1989). The population studied was a sample of convenience who tended to be an economically advantaged group and who were probably not at nutritional risk. It was concluded, then, that the criteria required closer examination.

Reassessment of Adequacy Criteria

Table 13 compares the Gold Standard criteria of one-quarter of the day's energy and protein requirements to be consumed at breakfast through a minimum of three food groups. Portion sizes are defined by Chery and Sabry (1984) as well as those recommended by Health and Welfare, in

Canada's Food Guide (1982). By comparing totals of energy and protein of the breakfasts listed in Table 13 with the recommended energy and protein intake (Health and Welfare, 1987) at breakfast (Table 12), it is evident with the sample breakfasts reported that it is impossible to meet the "one-quarter energy" requirements for breakfast.

Protein: The stipulation of one of the food groups being of high biological value protein was found to be redundant. If the child were to consume food from either the meat, fish, poultry or alternates group, or from the milk and milk products group, the protein requirements for the breakfast meal would probably be achieved, providing the portion sizes were adequate as assessed by Chery and Sabry.

Energy: A problem arose in meeting the one-quarter daily energy requirements. In almost every case taken from responses of the children, the requirements for energy could not be met, using Chery and Sabry's standard portion sizes. Neither could they be met by assuming Canada's Food Guide portions. In fact, it was difficult to reasonably achieve more than 250 kilocalories in a usual breakfast reported on the breakfast-eating questionnaire.

One way to achieve adequate energy was to increase the fat content of the breakfast meal through the use of whole milk rather than 2% or increased butter and margarine consumption (Table 13). However, the Report of the Communications/Implementation Committee, "Guidelines for

Healthy Eating" (Health and Welfare, 1990, p. 21) recommends a fat intake of not greater than 30% of the total energy intake. The examples provided in Table 13, "High Fat Breakfasts", are not unreasonable estimates of fat intake and tend to exceed 40% of energy as fat.

Redefinition of Adequacy Criteria

Protein requirements for an adequate breakfast should remain as "the inclusion of one food group of high biological protein". Specific nutrients have been found to be consistently lacking when breakfast is omitted. Whether energy requirements for the day can be met following an inadequate breakfast is unknown. On pilot testing of the questionnaire, approximately 34% of children responded as not having eaten an adequate breakfast (less than 3 food groups consumed). An even higher number, 54.7% of subjects in validity testing did not consume an adequate diet. The food group lacking was often one of high biological value protein. Therefore, in order to reinforce the necessity of consuming high protein foods, to maintain blood glucose control and thereby effect attention span and cognition, the stipulation of one of the food groups being of high biological value protein will be retained in the adequacy criteria. One quarter of the day's recommended protein intake for the study group includes 6 to 7 grams (see Table 12).

In order to meet the "one-quarter energy requirements for the day at breakfast", nearly twice the present average food consumption would have to be included in the breakfast meal. The safe range of error incorporated into the PNI's appears unreasonable in terms of energy intake at breakfast, based on the "one-quarter" criteria.

Conclusions and recommendations

It is recommended that the Gold Standard for criteria of an adequate breakfast be altered to include the consumption of 3 out of 4 food groups, with one-quarter of the day's protein requirements met through the intake of one food group of high biological value protein. Fat intake, through the consumption of high fat foods, should not be elevated in order to increase energy intake at breakfast.

RECOMMENDATIONS

GOLD STANDARD criteria for adequacy of breakfast includes the consumption of:

- **3 out of 4 food groups;**
- **a food of high biological value protein.**

Table 10: Servings Consumed From Four Food Groups According to Grade and Sex, as Indicated by Responses to Breakfast-Eating Questionnaire

No.	Subjects	Milk/Milk Products	Meat, Fish/ Alternates	Breads/ Cereals	Fruits/ Veg	Adequate
1	Girl/Grl	+		+	++	*
2	Girl/Grl	+		++	+	*
3	Girl/Grl	+		+		
4	Girl/Grl	+	+	++	+	*
5	Girl/Grl			+		
6	Girl/Grl	+		+	+	*
7	Girl/Grl	+		++	+	*
8	Girl/Grl	+		+		
9	Girl/Grl	+		+		
10	Girl/Grl	+		+	+	*
11	Girl/Grl	+		+	++	*
12	Girl/Grl	+		+		
13	Girl/Grl	+	+	+	+	*
14	Girl/Grl	+	+	+	+	*
15	Girl/Grl	+		+	+	*
16	Girl/Grl			+	+	
17	Girl/Grl	+		+	+	*
18	Girl/Grl	+	+	+		*
19	Girl/Grl			+	+	
20	Girl/Grl	+		+	+	*
21	Girl/Grl	+		+	+	*
22	Girl/Grl			++	+	
23	Girl/Grl	+		+		
24	Girl/Grl	+			+	
25	Girl/Grl	+		++	+	*
26	Girl/Grl	+		++	++	*
27	Girl/Grl	+				
28	Girl/Grl	+		++		
29	Girl/Grl	+	+	+	+	*
30	Girl/Grl			+		
31	Girl/Grl	+		+		
32	Boy/Grl	+	+	+	+	*
33	Boy/Grl	+				
34	Boy/Grl	+		++	+	*
35	Boy/Grl	+		+		
36	Boy/Grl	+	+	++		*
37	Boy/Grl	+		+	++	*
38	Boy/Grl	+		+	++	*
39	Boy/Grl	+		+++	+	*
40	Boy/Grl		++	+	+	*
41	Boy/Grl	+		+		
42	Boy/Grl	+	+		+	*

No.	Subjects	Milk/Milk Products	Meat, Fish/ Alternates	Breads/ Cereals	Fruits/ Veg	Adequate
43	Boy/Gr1			+		
44	Boy/Gr1			+		
45	Boy/Gr1	+		+		
46	Boy/Gr1	++	++	++	+	*
47	Boy/Gr1	+		+		
48	Boy/Gr1	+				
49	Boy/Gr1			++	+	
50	Boy/Gr1	+		+		
51	Boy/Gr1	++	+		++	*
52	Boy/Gr1	+			++	
53	Boy/Gr1	+		+		
54	Girl/Gr2	+		+	+	*
55	Girl/Gr2	+	+	+		*
56	Girl/Gr2	+				
57	Girl/Gr2			+		
58	Girl/Gr2	++	+	++	++	*
59	Girl/Gr2	+	++	++	+	*
60	Girl/Gr2	+	+	+		*
61	Girl/Gr2	+	+	+		*
62	Girl/Gr2	++		++	++	*
63	Girl/Gr2		+	+	++	*
64	Girl/Gr2	+	+	+		*
65	Girl/Gr2	+		+	+	*
66	Girl/Gr2			+		
67	Girl/Gr2	+			+	
68	Girl/Gr2	+	+	+	+	*
69	Girl/Gr2	+		++	++	*
70	Girl/Gr2	+		+		
71	Girl/Gr2			++	++	
72	Girl/Gr2	+		++	+	*
73	Girl/Gr2			+	+	
74	Girl/Gr2	+		+		
75	Girl/Gr2	+		+		
76	Girl/Gr2	+	+	+	+	*
77	Girl/Gr2	+	+	+	+	*
78	Boy/Gr2	+		+		
79	Boy/Gr2	+		++	+	*
80	Boy/Gr2	+		+		
81	Boy/Gr2	+		+	+	*
82	Boy/Gr2	+	+	+		*
83	Boy/Gr2	+		+	+	*

No.	Subjects	Milk/Milk Products	Meat, Fish/ Alternates	Breads/ Cereals	Fruits/ Veg	Adequate
84	Boy/Gr2	+		+		
85	Boy/Gr2	+		+		
86	Boy/Gr2	+		+	+	*
87	Boy/Gr2	+	+			
88	Boy/Gr2	+		+	+	*
89	Boy/Gr2	+		+	+	*
90	Boy/Gr2			+	+	
91	Boy/Gr2	+		++		
92	Boy/Gr2	+		+	+	*
93	Boy/Gr2	+		+		
94	Boy/Gr2	+		++	+	*
95	Boy/Gr2	+	+++	+	++	*
96	Boy/Gr2	+		+		
97	Boy/Gr2	+		+		
98	Boy/Gr2	+		+		
99	Boy/Gr2	+		+		
100	Boy/Gr2	+		++		
101	Girl/Gr3			+	++	
102	Girl/Gr3	+		++	++	*
103	Girl/Gr3	+		+	+	*
104	Girl/Gr3	+	+	++	+	*
105	Girl/Gr3	+	+	+	+	*
106	Girl/Gr3	+		+	+	*
107	Girl/Gr3			++		
108	Girl/Gr3		+	+	+	*
109	Girl/Gr3	+		++	+	*
110	Girl/Gr3		+		+	*
111	Girl/Gr3	+		++		
112	Girl/Gr2			+	+	
113	Girl/Gr3	+		+		
114	Girl/Gr3	+		+		
115	Girl/Gr3	+		+	++	*
116	Girl/Gr3		+	++	++	*
117	Girl/Gr3	+	+	+	+	*
118	Girl/Gr3	+		+	+	*
119	Girl/Gr3			+	+	
120	Girl/Gr3	++		+	+	*
121	Girl/Gr3	+		+	+	*
122	Girl/Gr3	+		+		
123	Girl/Gr3	+	+	+	++	*
124	Girl/Gr3	+		+		

No.	Subjects	Milk/Milk Products	Meat, Fish/ Alternates	Breads/ Cereals	Fruits/ Veg	Adequate
125	Girl/Gr3	+		+		
126	Girl/Gr3	+		++	++	*
127	Girl/Gr3	+	+	++	++	*
128	Boy/Gr3	+		++		
129	Boy/Gr3	+		+		
130	Boy/Gr3		+	+	+	*
131	Boy/Gr3	+		+	++	*
132	Boy/Gr3	++		+++	++	*
133	Boy/Gr3			+	+	
134	Boy/Gr3	++		+	+	*
135	Boy/Gr3	+		+	+	*
136	Boy/Gr3	+		++	++	*
137	Boy/Gr3		+	+		

Table 11: Percentages of Adequate and Inadequate Breakfast Intakes by Grade and Sex
Based on criteria established for adequacy and results of questionnaire

Grade 1		
Girls (n=31)		Boys (n=22)
54.8% adequate		45.5% adequate
45.2% inadequate		54.5% inadequate
Grade 2		
Girls (n=24)		Boys (n=23)
62.5% adequate		43.5% adequate
37.5% inadequate		56.5% inadequate
Grade 3		
Girls (n=27)		Boys (n=10)
63.0% adequate		60% adequate
37.0% inadequate		40% inadequate
Mean Total	54.7% adequate	45.3% inadequate

Table 12: Energy and Protein Requirements for the Breakfast Meal: Children Aged 4-9 Years, Based on One-Quarter of The Day's Recommended Energy and Protein Requirements

Age (years)	Sex	Average Weight (kg)	Daily Energy Requirements (kcal)	Breakfast Energy Requirements (kcal)
4-6	Both	18	1800	450
7-9	M	25	2200	550
	F	25	1900	475

Age (years)	Sex	Average Weight (kg)	Recommended Intake of Protein (g/kg/day)	Daily Protein Requirements	Breakfast Protein Requirements
4-6	Both	18	1.4	25.2	6.3
7-9	M	25	1.2	30	7.5
	F	25	1.2	30	7.5

(Health and Welfare, 1983)

Table 13: Comparison of Breakfast Responses with "Gold Standard" Criteria (CFG = Canada's Food Guide) (C&S = Chery & Sabry, 1984)

Typical Breakfast	Portions C&S (CFG)	Energy kcal	Protein grams
1) Cereal (eg. Corn Flakes)	284 ml (187.5 ml)	99 (66)	1.4 (.94)
Milk (2%)	184 ml (250 ml)	94 (128)	6.6 (9)
Juice	163 ml (125 ml)	80 (59)	--- (-)
	Total	273 (153)	8 (9.9)
2) Milk (2%)	184 ml (250 ml)	94 (128)	6.6 (9)
2 x Toast (cracked wheat)	2 sl (2 sl)	132 (132)	4 (4)
2 x Butter	10 ml (10 ml)	72 (72)	--- (-)
	Total	298 (332)	10.6 (13)
3) Milk (2%)	184 ml (250 ml)	94 (128)	6.6 (9)
2 x Toast (cracked wheat)	2 sl (2 sl)	132 (132)	4 (4)
2 x Peanut Butter	28 gm (28 gm)	166 (166)	8.8 (8.8)
	Total	392 (426)	19.4 (21.8)
4) Cereal (eg. Corn Flakes)	284 ml (187.5 ml)	99 (66)	1.4 (.94)
Milk (2%)	184 ml (250 ml)	94 (128)	6.6 (9)
Toast (cracked wheat)	1 sl (1 sl)	66 (66)	2 (2)
Peanut Butter	14 gm (15 ml)	83 (83)	95 (5)
	Total	342 (343)	105 (16.9)

(CFG = Canada's Food Guide) (C&S = Chery & Sabry, 1984)

Typical Breakfast	Portions C&S	(CFG)	Energy kcal	Protein grams
5) Cereal (eg. Corn Flakes)	284 ml	(187.5 ml)	99 (66)	1.4 (.94)
Milk (2%)	184 ml	(250 ml)	94 (128)	6.6 (9)
Toast (cracked wheat	1 sl	(1 sl)	66 (66)	2 (2)
Butter	5 ml	(5 ml)	36 (36)	--- (-)
Fruit (orange)	1 med	(1 med)	62 (62)	1 (1)
		Total	357 (358)	11 (12.9)
6) Yogurt (fruit flavoured)	N/A	(187.5 ml)	196 (196)	9 (9)
Milk (2%)	184 ml	(250 ml)	94 (128)	6.6 (9)
Cereal (eg. Corn Flakes)	284 ml	(187.5 ml)	99 (66)	1.4 (.94)
Juice (orange)	163 ml	(125 ml)	80 (59)	--- (-)
		Total	469 (449)	17 (19)
7) Cereal (eg. Corn Flakes)	284 ml	(187.5 ml)	99 (66)	1.4 (.94)
Milk (2%)	184 ml	(250 ml)	94 (128)	6.6 (9)
Toast (cracked wheat)	1 sl	(1 sl)	66 (66)	2 (2)
Butter	5 ml	(5 ml)	36 (36)	--- (-)
		Total	295 (296)	10 (12)
8) Egg	1 lg	(1 lg)	79 (79)	6 (6)
Toast (cracked wheat)	1 sl	(1 sl)	66 (66)	2 (2)
Butter	5 ml	(5 ml)	36 (36)	--- (-)
Cereal (eg. Corn Flakes)	284 ml	(187.5 ml)	99 (66)	1.4 (.94)
Milk (2%)	184 ml	(250 ml)	94 (128)	6.6 (9)
Juice (orange)	163 ml	(125 ml)	80.2 (59)	--- (-)
		Total	454 (434)	16 (18)

(CFG = Canada's Food Guide) (C&S = Chery & Sabry, 1984)

Typical Breakfast	Portions C&S (CFG)	Energy kcal	Protein grams
9) Peanut Butter	14 gm (15 ml)	83 (95)	4.4 (5)
Eggs x 2	2 lg (2 lg)	158 (158)	12 (12)
Toast (cracked wheat)	1 sl (1 sl)	66 (66)	2 (2)
Juice (orange)	163 ml (125 ml)	80.2 (59)	--- (-)
	Total	387 (378)	18.4 (19)
10) Cheese (slices)	1 sl (1 sl)	121 (121)	7.3 (7.3)
Toast (cracked wheat)	1 sl (1 sl)	66 (66)	2 (2)
Milk (2%)	184 ml (187.5 ml)	94 (128)	6.6 (9)
Fruit (orange)	1 med (1 med)	62 (72)	1 (1)
	Total	343 (387)	17 (19)
11) Toast (cracked wheat)	1 sl (1 sl)	66 (66)	2 (2)
Peanut Butter	14 gm (15 ml)	83 (95)	4.4 (5)
Juice (orange)	163 ml (125 ml)	80.2 (59)	--- (-)
	Total	229.2 (220)	6.4 (7)

N.B

In some cases, CFG portions were not reasonable for 1 serving e.g. peanut butter: CFG recommends 4 tablespoons for 1 serving Portions for cheese, egg and peanut butter were assumed to be similar to Chery and Sabry's portions or to actual intake, as reported by subjects.

High Fat Breakfasts
(CFG = Canada's Food Guide) (C&S = Chery & Sabry, 1984)

Typical Breakfast	Portions C&S (CFG)	Energy kcal	Protein grams
1) Milk (homogenized)	184 ml (250 ml)	117 (159)	6 (8)
Bacon	4 sl (4 sl)	150 (150)	8 (8)
Egg	1 lg (1 lg)	79 (79)	6 (6)
Toast (cracked wheat)	1 sl (1 sl)	66 (66)	2 (2)
Butter	5 ml (5 ml)	36 (36)	--- (-)
44.6% Fat		Total 448 (490)	22 (24)
2) Milk (homogenized)	184 ml (250 ml)	171 (159)	6 (8)
Cereal (eg. Corn Flakes)	284 ml (187.5 ml)	99 (66)	1.4 (.94)
Toast (cracked wheat)	1 sl (1 sl)	66 (66)	2 (2)
Butter	5 ml (5 ml)	36 (36)	2 (2)
Egg	1 lg (1 lg)	79 (72)	6 (6)
37% Fat		Total 397 (406)	15.4 (17)

N.B.
The above high fat breakfasts are examples of possible meals ingested by a population of children, grades 1, 2 and 3. Note that the percentage of fat in the diet is above the recommended levels of Health & Welfare's Guidelines for Healthy Eating (1990) of 30% energy as fat. While these breakfasts may meet the energy requirements of the original criteria established, their fat content is too high.

STUDY #5

Usual Breakfast Intake

RESEARCH QUESTION: Are the foods listed on the breakfast-eating questionnaire representative of the usual intake of young elementary school children in the province?

The content validity of the breakfast-eating questionnaire will be tested by asking the subjects, independent of questionnaire completion, what they usually have to eat for breakfast. It is expected that the foods listed on the questionnaire will be representative of breakfast foods normally consumed by the children surveyed.

Subjects

Thirty children in total, enrolled in grade 1 (n=11), grade 2 (n=13) and grade 3 (n=6) were targeted for the usual breakfast recall test, from the IWK waiting area, a Sunday School in Dartmouth, the Cornwallis Hot Lunch Program, the YM/YWCA Lunch Programs, and the YMCA Special Camps. Data collection occurred during the months of February to April, 1990.

See Appendices C and E for details of site selection and the consent process.

Methods

All children were interviewed by the investigator; parental consent was obtained directly in the case of the IWK out-patient clinic where parents were accessible, or

indirectly with the aid of the program supervisors who contacted parents.

With no reference to the breakfast-eating questionnaire, children were asked what they USUALLY have to eat in the morning, i.e., "What do you usually have to eat for breakfast?". If the child answered with a questionable response, e.g., pancakes, he/she was asked: "Do you have that almost every day?". Invariably, for "special" food responses, the answer was "no, only on the weekend".

Subjects were not forewarned that they would be asked to recall usual breakfast intakes and were not prompted, either visually, through observation of the breakfast-eating questionnaire, or verbally, by the aid of the interviewer, other than to ask "Do you usually have anything else?" or "Do you usually have something to drink?". Responses were recorded along with identification of the child's gender.

Results

From Table 14, which is based on a comparison of the breakfast-eating questionnaire, it becomes obvious that MILK, in 86.7% (26 responses out of 30), and CEREAL, in 73.3% (22 responses out of 30), were the most frequently reported foods consumed for breakfast. Toast, 40.0% (n=12), juice, 40.0% (n=12) and fruit, 33.3% (n=10), were also rated fairly high in terms of usual breakfast intake.

Table 15 represents the frequency of usual breakfast foods consumed by the various grades. Again, cereal, milk,

toast, fruit and juice appear to be the most commonly eaten foods.

Only one food was mentioned as being commonly consumed that did not appear on the breakfast-eating questionnaire: pop-tarts.

Discussion

Children appeared to respond differently to spontaneous questioning about usual breakfast intake than to specific questions regarding actual intake for that day. For example, from the breakfast-eating questionnaire, several children responded thay they had consumed pop, cheese, fish and tea for breakfast (Study #4); none reported consuming these foods on a "usual" day.

The breakfast-eating questionnaire is a comprehensive list of breakfast foods which may be consumed by children in the Halifax-Dartmouth area, based on oral interview and questionnaire responses of a sample of the population.

Although several of the high biological value protein foods (e.g., cheese and fish) are poorly represented by children's report of intake, either in usual breakfast intake studies, or in the results of study #4, these foods will remain in the final draft. It is essential that high protein foods be well represented in the breakfast-eating questionnaire in order to meet our criteria set out for adequacy in protein intake (i.e., one food group being of high biological value protein).

Foods such as chips and pop were included on the breakfast-eating questionnaire as a marker for poor nutritional consumption at breakfast and perhaps, inadequate parental supervision at the breakfast meal. It was not expected that children would admit to eating pop and chips at breakfast through oral interview; however, in responding to the questionnaire, some respondents did admit to having pop for breakfast.

Although it may be argued that pop and chips are only a small example of the types of foods of low nutritional value that may be consumed at breakfast, a limit had to be placed on the number of inadequate foods to be incorporated into the breakfast-eating questionnaire due to time limitations. Chips and pop were judged to be representative of the most commonly consumed empty calorie foods.

It was not assumed that children would be capable of estimating portion sizes of foods consumed. For this reason, questions regarding the quantity of breakfast foods usually consumed were avoided. The usual portion sizes of foods commonly consumed will be used, as estimated by Chery and Sabry (1984), and by Canada's Food Guide portion sizes (Health and Welfare, 1983).

The majority of children reported consuming cereal, milk, toast and juice for breakfast. Whether the foods on the breakfast-eating questionnaire, as represented by the "usual breakfast" intake study show a high correlation with

the breakfast foods consumed by the entire Nova Scotia population of grade 1's, 2's or 3's is unclear from this study. The generalizability of usual intake can be estimated through the selection and testing of a larger sample of eligible children across the province.

Conclusions and recommendations

Findings of the usual breakfast intake study suggest that one may not obtain valid information by asking a child what he/she usually has to eat for breakfast. It is more advantageous, for the purposes of determining actual intake, to specify one particular meal within a relatively short time period in the past, to ask the child to recall their intake for that meal. Results of usual breakfast intake suggests very little variation in foods consumed at the breakfast meal within the population studied.

RECOMMENDATIONS

- **foods such as pop and chips, as well as foods that were poorly represented in questionnaire responses, particularly foods of high biological value protein, will remain in the final questionnaire.**

Table 14: Usual Breakfast Foods Reported to be Consumed by Elementary School Children, Halifax-Dartmouth, Nova Scotia
Based on Breakfast-Easting Questionnaire in Oral Interview

Food	Percentage of Respondents Consuming the Food (%)
Juice	40.0
Fruit	33.3
Cereal	73.3
Milk	86.7
Bread	--
Toast	40.0
Muffins	10.0
Rolls	--
Fish	--
Peanut Butter	3.3
Cheese	--
Chips	--
Eggs	20.0
Pop	--
Bacon	6.7
Sausage	3.3
Yogourt	3.3
Coffee	--
Tea	--
Pancakes	3.3
Waffles	3.3

Table 15: Frequency of Consumption of Usual Breakfast Foods Reported to be Consumed by Subjects in Oral Interview, Based on Breakfast-Eating Questionnaire

Foods	Grade 1 (n=11)	Grade 2 (n=13)	Grade 3 (n=6)
Juice	6	4	2
Fruit	1	7	2
Cereal	7	10	5
Milk	9	11	6
Bread	-	-	-
Toast	4	5	3
Muffins	2	1	-
Rolls	-	-	-
Fish	-	-	-
Peanut Butter	-	-	1
Cheese	-	-	-
Chips	-	-	-
Eggs	-	4	1
Pop	-	-	-
Bacon	-	2	-
Sausage	-	1	-
Yogourt	-	1	-
Coffee	-	-	-
Tea	-	-	-
Pancakes	-	1	-
Waffles	1	-	-

RELIABILITY TESTING

STUDY #6

Time Effects

RESEARCH QUESTION: Do children's responses differ when the breakfast-eating questionnaire is administered at two different time periods on the same day?

The purpose of this study is to determine whether a time factor will influence children's ability to accurately recall what they had to eat for breakfast.

Subjects

Eighteen subjects were recruited from sites, as listed in Appendices C and E, including the YM/YWCA Lunch Programs, the YMCA Special Camps, and two private schools in Halifax: Sacred Heart School of Halifax and Armbrae Academy. Data were collected between February and March, 1990.

Methods

All questionnaires were administered by the investigator; parental consent was obtained indirectly, with the aid of program supervisors and school teachers, in the case of the private schools.

Children participating in the time effects study were gathered in a quiet room (or section of the room in the case of the Y-programs), and a breakfast-eating questionnaire and pencil were supplied to each child. Subjects were asked to record their first name and grade at the top of the page for both questionnaire administrations. This was done for later

matching purposes. The questionnaire was administered as per the script, Appendix A. Children were reminded to keep their answers "a secret", and not to talk during questionnaire administration. The time of completion of the first questionnaire ranged from 9:15 a.m. to 11:00 a.m. (time 1).

Again in the early afternoon (12:30 p.m. to 2:00 p.m., time 2), the same children were gathered together, supplied with a breakfast-eating questionnaire and a pencil, and under identical conditions, were asked to recall what they had to eat and drink for breakfast that day.

Responses were analyzed with respect to recall ability and congruency of responses at time 1 and time 2.

Results

Results of the agreement of responses to the breakfast-eating questionnaire administered at two different time periods are presented in Table 16. Responses were compared for their consistency from time 1 to time 2.

Excellent agreement ($\hat{k}>0.75$) was noted between responses obtained at time 1 and time 2 for juice, cereal, bread/toast/muffins/rolls, pop, coffee/tea and to the question regarding who made breakfast (q3) and gender identification (q4). Fair to good agreement ($0.40<=\hat{k}>=0.75$) was found between responses at two time periods for pancakes/waffles, peanut butter/cheese, eggs and bacon/sausage. Responses to time differences were poor

($\hat{k}$<0.40) for milk and fruit. All children reported similarly for question 1 ("Did you have anything to eat or drink this morning before coming to school?") and for fish, chips, and yogourt. Thus, there were no data for reliability assessment ($\hat{k}$≠0), which represents neither agreement nor disagreement.

Using the asymptotic standard error (ASE1) to set confidence limits at 95%, only pop and question 4 (gender identification) were found to have excellent agreement at the two time periods in which the questionnaire was completed that day. There appeared to be fair to good agreement at time 1 and time 2 for juice, cereal, and bread/toast/muffins/rolls at alpha=.05, using the asymptotic standard error. Poor agreement was found when the confidence interval was set at alpha =.05 for pancakes/waffles, milk, peanut butter/cheese, eggs, bacon, coffee/tea, fruit and question 3 "Who prepared breakfast this morning?"

Discussion

The most significant finding in these results was the fair recall of milk intake from time 1 to time 2. On closer examination it was noted that the disagreement was caused by only two children, one responding that he had milk at time 1, but not at time 2, and a second child who responded that he had the opposite. The direction of bias, either in remembering or in forgetting, is unclear. A confounding

factor with "milk" is the fact that children tended tc forget about milk on their cereal as being a legitimate intake of milk at breakfast. To decrease the incidence of forgetting, children were asked: "Did you have any milk this morning? Remember, if you had milk on your cereal this morning, that counts as a milk serving". It may have been clearer to repeat: "Remember, if you had milk on your cereal this morning, circle the (symbol), too."

The breakfast-eating questionnaire was administered at two time periods in an attempt to determine whether time has any effect on recall ability. A time lapse of at least one hour and up to four hours was incorporated in an effort to reduce a training effect which may occur when the survey tool was administered twice.

The criteria for agreement, either as a kappa statistic for responses at time 1 versus time 2 and for the statistical significance of confidence intervals set at 95% is based on the Fleiss criteria (see Table 16). From the results of agreement based on the Fleiss standards it is suggested that there is neither strong recall, nor strong forgetting in responses; it is impossible to determine the direction of the bias.

The time 1 and time 2 responses were found to have relatively poor agreement overall because of the small sample size and in particular, the small number of subjects who recalled a variety of foods at time 1 and time 2, i.e.,

the differences of one response can cause major disagreement scores at time 1 and time 2. A small sample size results in large standard errors. This is most clearly seen in the statistical significance at a confidence interval set at alpha=0.05. It may be that the level of significance itself is set too high for our standards of reliability.

For these two reasons, a small sample size (i.e., a small statistical power) and statistical significance of alpha=.05, it was decided that the results of the time effects study would be merged with responses from symbol alteration, word alteration and inter-observer tests to determine whether agreement improves when the sample size is increased. For all of the above tests, a time lapse was incorporated into the design of the study to reduce any possible training effect.

Conclusions and recommendations

It appears from the results of this study that children are fairly good reporters of their actual breakfast consumption even when a time lapse is incorporated between the time the child ate the meal and the time of recall of foods eaten at the meal.

Statistical significance at a 95% confidence interval was found on average to be poor in the time effects study.

Further tests to study the accuracy of agreement of children's responses at two time periods, using a larger sample size will be reported (Study #10).

RECOMMENDATIONS

- when administering the questionnaire, it is essential that children be reminded about milk consumption in their cereal, as well as in their glass.

Table 16: Reliability of Responses to Questionnaire Administered at Two Different Time Periods (n=18)

Category	Kappa	Agreement Based on Fleiss	Asymptotic Standard Error (ASEI)	Confidence Interval α =.05	Statistical Significance (Fleiss)
q 1	0	--	--	--	--
juice	0.886	E	0.110	±0.216	FG
pancakes	0.609	FG	0.240	±0.470	P
cereal	0.870	E	0.126	±0.247	FG
milk	0.438	P	0.332	±0.651	P
bread	0.886	E	0.110	±0.2156	FG
fish	0	--	--	--	--
peanut butter	0.471	FG	0.258	±0.506	P
chips	0	--	--	--	--
eggs	0.471	FG	0.258	±0.506	P
pop	1.0	E	0	0	E
bacon	0.600	FG	0.256	±0.502	P
yogourt	0	--	--	--	--
coffee	0.769	E	0.218	±0.427	P
fruit	0.333	P	0.217	±0.425	P
q 3	0.769	E	0.218	±0.427	P
q 4	1.0	E	0	0	E

Fleiss: $\hat{\kappa}$ > 0.75 excellent agreement = E
0.45-0.75 fair to good agreement = FG
$\hat{\kappa}$ < 0.45 poor agreement = P
$\hat{\kappa}$ = 0; neither agreement nor disagreement

STUDY #7

Symbol Alteration Effects

RESEARCH QUESTION: Will changing the position of the symbols alter responses to the questionnaire administered at two different time periods?

The purpose of this study is to determine whether children can accurately report their breakfast intake, even when changes are made to the order in which the symbols appear on the breakfast-eating questionnaire. This will, in effect, test whether the symbols act as distractors in children's responses to the breakfast-eating questionnaire when all other administrative details are kept constant during the two time periods of questionnaire completion.

Subjects

Forty-one subjects were recruited to test the effect of alterations between symbols from the YM/YWCA Lunch Programs, the YMCA Special Camps, and two private schools: Sacred Heart School of Halifax and Armbrae Academy, during March, 1990. For further details of selection criteria, see Appendices C and E.

Methods

Questionnaire administration was accomplished by the investigator; parental consent was obtained indirectly, with supervisors and teachers sending the consent form home with the child.

On the morning of the study day, children were removed from the classroom or taken to a quiet corner of the room in the case of the Y-programs. Each child was provided with a breakfast-eating questionnaire, (Appendix A), and a pencil. Instructions for questionnaire completion were given, as in Appendix A. Later that day (early afternoon) these same children responded to a second questionnaire under exactly the same conditions, this time with alterations appearing in the order of the symbols (Appendix A-1).

By necessity, a time lapse of approximately one-half hour to four hours had to be incorporated into the study design. This was done to prevent the results of a training effect from occurring, as well as for a matter of convenience. Teachers could not accommodate more than a ten-minute absence of the children from class. Since the questionnaire takes from eight to ten minutes to complete, it was both impossible and impractical to incorporate a back-to-back response to questionnaire completion.

Results and Discussion

Children's responses to questionnaire 1 versus questionnaire 2 (symbol alterations) were compared for reliability of responses (see Table 17). It was hypothesized that if children's responses differed, it would be due to either: i) distractions caused by alterations in the order of symbols, or ii) the children's forgetting actual intake from time 1 to time 2.

Based on Fleiss' criteria adapted for the kappa statistic, agreement was excellent between responses on the two questionnaires with symbol alterations for recall of juice, pancakes/waffles, cereal, milk, bread/toast/etc., peanut butter/cheese, eggs, bacon/sausage, yogourt, coffee/tea, fruit, question 3 (who prepared breakfast) and question 4 (gender identification).

Using the asymptotic standard error ($H_a: \hat{k} \neq 0$) at a confidence interval set at 95%, excellent agreement was found between responses for all but peanut butter/cheese, bacon/sausage, yogourt and fruit, as opposed to the results found above, for the kappa statistic taken by itself. These foods were found to have fair to good agreement in response to the two questionnaires. Agreement may have been slightly lower using the standard error because these foods are fairly uncommon in consumption. A small deviation in responses could result in a rather large standard error and thus less accurate agreement, when confidence intervals are imposed.

Conclusions

Excellent to good agreement was found between responses to the breakfast-eating questionnaire when the order of symbols was altered. It does not appear, therefore, that the symbols themselves acted as a distraction in children's response to the breakfast-eating questionnaire and may, in fact, have improved the accuracy of responses.

Table 17: Reliability of Responses to Questionnaire Administered Under Normal Circumstance (Time 1) Versus Questionnaire Administered With Alterations in the Positions of Symbols (n=41)

Category	Kappa	Agreement Based on Fleiss Criteria	Asymptotic Standard Error (ASEI)	Confidence Interval α =.05	Statistical Significance (Fleiss)
q 1	0	--	--	--	--
juice	0.950	E	0.049	$\pm$0.096	E
pancakes	1.0	E	0	0	E
cereal	1.0	E	0	0	E
milk	0.932	E	0.067	$\pm$0.131	E
bread	0.951	E	0.049	$\pm$0.096	E
fish	0.655	FG	0.319	$\pm$0.625	P
peanut butter	0.845	E	0.107	$\pm$0.210	FG
chips	0	--	--	--	--
eggs	1.0	E	0	0	E
pop	0	--	--	--	--
bacon	0.844	E	0.152	$\pm$0.298	FG
yogourt	0.875	E	0.122	$\pm$0.239	FG
coffee	1.0	E	0	0	E
fruit	0.876	E	0.086	$\pm$0.169	FG
q 3	1.0	E	0	0	E
q 4	1.0	E	0	0	E

Fleiss: $\hat{K}$ > 0.75 excellent agreement = E
$\hat{K}$ 0.45-0.75 fair to good agreement = FG
$\hat{K}$ < 0.45 poor agreement = P
$\hat{K}$ = 0; neither agreement nor disagreement

STUDY #8

Word Alteration Effects

RESEARCH QUESTION: Does changing the position of the words alter children's responses to the breakfast-eating questionnaire?

The purpose of this study is to determine whether alterations in the order of the words make any difference in terms of children's responses, particularly in a group with limited reading ability.

It is assumed that children who can read will use the words on the questionnaire along with the verbal instructions give to them as cues in questionnaire completion. For those children who cannot read, it is questionable whether the words will serve only to confuse the child and thereby reduce the reliability of responses.

Subjects

In total, 33 children participated in the word alteration test, recruited from the Y-Lunch and Special Camp Programs, as well as the Sacred Heart School of Halifax and the Armbrae Academy during March, 1990. Sites of selection were chosen as described in Appendices C and E.

Methods

Parental consent was obtained indirectly, with the aid of teachers at the private schools and supervisors at the Y-Programs contacting parents for consent. Questionnaires were administered by the investigator in all cases.

Procedures for word alteration effect testing were similar to the symbol alteration test (Study #7). This time, however, the words appeared on the page in a different order and the script was altered accordingly (see Appendix A-2).

Results

Results of the word alterations test (Table 18) indicated excellent agreement between breakfast-eating questionnaire A and A-2 for juice, pancakes/waffles, milk, bread/toast/muffins/rolls, fish, peanut butter/cheese, chips, pop, yogourt, coffee/tea, fruit and for the gender identification question (q4), based on analysis by kappa statistic. Agreement was fair to good on responses to the intake of cereal, eggs, bacon/sausage and q3 (who prepared breakfast?).

With a confidence limit of alpha=.05, and calculating for the range of standard error at H_a:k=0, a measure of statistical significance was obtained and compared with Fleiss' criteria for agreement, with arbitrary limits set in consultation with the statistician. Excellent agreement was obtained for pancakes/waffles, chips, and q4 (gender identification). Fair to good agreement was achieved for juice, cereal, milk, bread/toast/muffins/rolls, peanut butter/cheese, yogourt, fruit and q3 (who prepared breakfast?). Poor agreement in word alteration effects was found for fish, eggs, pop, bacon/sausage and coffee/tea.

Discussion

When the kappa statistic alone is rated against Fleiss' criteria, the vast majority of responses (12 out of 17) show excellent agreement for word alteration effects. However, when a confidence limit of 95% is introduced to the criteria, the lower confidence limit tends to cause more stringent guidelines for agreement, still based on Fleiss' criteria. At alpha=.05, most responses (8 out of 17) offered fair to good agreement, while only 3 out of 17 showed excellent agreement (Table 18).

What these results indicate is that, for the most part, changing the order in which the words appear on the page does not have a detrimental effect on changing children's responses to food recall, in this case, to breakfast recall.

By incorporating a good script with enticing breakfast items (e.g., pancakes, bacon) strategically placed throughout the breakfast-eating questionnaire, children will respond in a similar fashion to what they had to eat for breakfast when questioned twice. The words on the page do not appear to have a significant effect on response.

For those foods that are rarely consumed (eggs, pop, bacon/sausage, coffee/tea, fish), a small deviation in response will cause major changes in the level of significance of agreement.

Conclusions

Changing the order of the words on the breakfast-eating questionnaire will not seriously alter children's responses to questions on actual intake.

Children who are able to read the words do not appear to be influenced by changes in the order of the words. For those children who are able to read, the words seem to aid in breakfast recall; these children tended to circle words rather than symbols. However, for the vast majority of subjects, who are barely able to read at best, the words have little influence on breakfast recall.

Table 18: Reliability of Responses to Questionnaire Administered Under Normal Circumstance (Time 1) Versus Questionnaire Administered With Alterations in the Order in Which Words Appear (Time 2) (n=33)

Category	Kappa	Agreement Based on Fleiss Criteria	Asymptotic Standard Error (ASEI)	Confidence Interval $\alpha = .05$	Statistical Significance (Fleiss)
q 1	0	--	--	--	--
juice	0.878	E	0.084	$\pm$0.165	FG
pancakes	1.0	E	0	0	E
cereal	0.742	FG	0.140	$\pm$0.274	FG
milk	0.847	E	0.104	$\pm$0.204	FG
bread	0.874	E	0.086	$\pm$0.168	FG
fish	0.784	E	0.207	$\pm$0.406	P
peanut butter	0.820	E	0.122	$\pm$0.239	FG
chips	1.0	E	--	--	E
eggs	0.569	FG	0.171	$\pm$0.335	P
pop	0.784	E	0.207	$\pm$0.406	P
bacon	0.718	FG	0.185	$\pm$0.363	P
yogourt	0.764	E	0.159	$\pm$0.312	FG
coffee	0.784	E	0.207	$\pm$0.406	P
fruit	0.750	E	0.113	$\pm$0.221	FG
q 3	0.744	FG	0.136	$\pm$0.266	FG
q 4	1.0	E	0	0	E

Fleiss: $\hat{K}$ > 0.75 excellent agreement = E
$\hat{K}$ 0.45-0.75 fair to good agreement = FG
$\hat{K}$ < 0.45 poor agreement = P
$\hat{K}$ = 0; neither agreement nor disagreement

STUDY #9

Observer Alteration Effects

RESEARCH QUESTION: Will having two different observers administering the breakfast-eating questionnaire under similar conditions cause alterations in children's responses from time 1 to time 2?

The purpose of this test is to determine whether observer bias will influence children's responses to the breakfast-eating questionnaire.

Subjects

Twenty-three subjects were recruited from grades 1 and 2 of the Sacred Heart School of Halifax in March, 1990.

Methods

Parental consent was obtained indirectly, by having teachers send consent (Appendix D) forms home with students.

Children participating in the inter-observer effect study were treated as described in the Methods section of Study 6. The original questionnaire was administered in the early morning, (9:00 a.m. to 10:00 a.m.). Later that same day, between 1:30 p.m. and 2:00 p.m., the identical questionnaire (Appendix A) was administered to the same group of children, this time by a different trained observer, a first year medical student attending Dalhousie University.

The questionnaires were administered under nearly identical conditions: the only differences were in the

timing of administration, and the person delivering the instructions.

Questionnaires were collected from the children and responses compared from time 1 to time 2, using the kappa statistic for reliability between responses.

Results

Results using the kappa statistic indicated excellent reliability between Observer 1 and Observer 2 administration of the questionnaire for juice, pancakes/waffles, cereal, pop, fruit, q3 (Who prepared breakfast?) and q4(gender identification), based on the Fleiss criteria, as indicated in Table 19. Fair to good agreement could be found for responses to the intake of milk, bread/toast/muffins/rolls, peanut butter/cheese and eggs. Poor agreement was found for yogourt, whereby one child reported having had yogourt on the second administration of the questionnaire, but had not reported yogourt consumption at time 1. A second error occurred whereby a child reported having consumed yogcurt at time 1, but "forgot" at time 2. Four food groups: fish, chips, bacon/sausage, and coffee/tea were never mentioned as having been consumed. This may be considered as neither agreement not disagreement, but results appear to be reliable at the two time periods. The same situation occurred for question 1: "Did you have anything to eat or drink this morning before you came to school?". All children reponded "yes".

The significance of results based on the levels of agreement can be found by introducing a confidence limit of alpha=.05 and incorporating the asymptotic standard error. Excellent agreement between Observer 1 and Observer 2 administration of the questionnaire occurred for responses to juice, pancakes/waffles, pop, q3 (who prepared breakfast?) and q4 (gender identification). Fair to good agreement was found for cereal and fruit. Results indicated poor agreement between responses for milk, bread/toast/etc., peanut butter/cheese, eggs and yogourt.

Discussion

Plans are for the breakfast-eating questionnaire to be administered to subjects through the aid of videotaped instructions. In this manner, all subjects will receive identical instructions, thereby eliminating the possible effects of bias caused by inter-observer variation.

During pilot-testing it was found that teachers tended to influence children's responses by prompting recall of breakfasts consumed. The results of having two different observers administer the breakfast-eating questionnaire do not appear to be as reliable as when the same person administers the test at time 1 versus time 2, with simple word or symbol alterations. This may have been the result of a small sample size (n=23), causing a large standard error to occur.

It is not possible to identify the direction of bias in this test. Two children responded incorrectly at time 1 or time 2; whether this is a result of observer effects is unclear.

Conclusions and recommendations

Results of having two different female observers administer the breakfast-eating questionnaire under similar circumstances were reliable for only five food categories. This finding suggests that a consistent method of communicating instructions for the breakfast-eating questionnaire would be more reliable than having many different administrators, for example, teachers. Altering the script for questionnaire completion tends to bias children's responses. No effect of male observers were included in this study.

It has been proposed that a videotaped mode of communication be used in administering instructions for the questionnaire. This would appear to be an ideal answer to the problem of poor reliability of responses with different observers.

RECOMMENDATIONS:

- **standardized administration of the questionnaire should be used for the provincial survey, i.e., a videotaped set of instructions should be used to communicate instructions on questionnaire completion.**

Table 19: Reliability of Responses to Questionnaire Administered To the Same Subjects by Two Different Observers (n=23)

Category	Kappa	Agreement Based on Fleiss Criteria	Asymptotic Standard Error (ASEI)	Confidence Interval α =.05	Statistical Significance (Fleiss)
q 1	0	--	--	--	--
juice	1.0	E	0	0	E
pancakes	1.0	E	0	0	E
cereal	0.810	E	0.126	±0.247	FG
milk	0.465	FG	0.305	±0.598	P
bread	0.654	FG	0.155	±0.304	P
fish	0	--	--	--	--
peanut butter	0.623	FG	0.236	±0.463	P
chips	0	--	--	--	--
eggs	0.452	FG	0.326	±0.639	P
pop	1.0	E	0	0	E
bacon	0	--	--	--	--
yogourt	-0.045	P	0.032	±0.063	P
coffee	0	--	--	--	--
fruit	0.796	E	0.135	±0.265	FG
q 3	1.0	E	0	0	E
q 4	1.0	E	0	0	E

Fleiss: $\hat{\kappa}$ > 0.75 excellent agreement = E
0.45-0.75 fair to good agreement = FG
$\hat{\kappa}$ < 0.45 poor agreement = P
$\hat{\kappa}$ = 0; neither agreement nor disagreement

STUDY #10

Reliability of Responses

RESEARCH QUESTION: Would the reliability of responses to the breakfast-eating questionnaire obtained thusfar improve if a larger sample size were used?

The purpose of this study was to determine whether responses to the breakfast-eating questionnaire administered at two different times are reliable using data which had already been gathered for time 1 and time 2 administrations of the questionnaire.

Subjects

Subjects consisted of all those participating in the time effects, symbol alteration effects, word alteration effects and observer alteration effects tests (N=115) (see Appendices C and D). Data were collected between February and March, 1990.

Methods

Questionnaires were administered by the investigator in all cases except for the inter-observer agreement test, whereby a second observer administered the questionnaire. Parental consent was obtained as per methods described in the preceding studies, either directly or indirectly.

By assuming a minimum average of fair to good agreement across all responses, data were merged for all "alteration effect" studies.

A separate testing procedure was not performed in this study. Rather, data were merged and results investigated for studies looking at two time effects. The confounding variables of symbol alteration, word alteration and observer alteration were ignored in order to determine time effects at a greater statistical power than in Study #6. All subjects were tested in early morning and again in the early afternoon.

Results

Results, seen in Table 20, suggest that agreement of children's responses taken at time 1 and time 2 were more consistent than those found in Study #6 (Time Effects). Agreement at time 1 and time 2 for juice, pancakes/waffles, cereal, milk, bread/toast/muffins/rolls, pop, coffee/tea, q3 (Who prepared breakfast this morning?) and q4 (gender identification) were all excellent, based on the criteria established for reliability using the kappa statistic (Fleiss, 1981). Fair to good agreement, as seen in Table 20, could be found between responses for the intake of fish, peanut butter/cheese, chips, eggs, bacon/sausage, yogourt and fruit.

With a confidence limit of 95%, results in agreement between time 1 and time 2 in the merged data showed excellent agreement for juice, pancakes/waffles, cereal, bread/toast/etc., q3 and q4. Fair to good agreement was found for milk, peanut butter/cheese, eggs, pop,

bacon/sausage, yogourt, coffee/tea and fruit. Poor agreement was found between responses for fish and chips, probably due to their small statistical power.

Results of question 1, "Did you have anything to eat or drink this morning before you came to school?", represented neither agreement nor disagreement, since all children responded "yes" to this question.

Discussion

Results of all "alteration tests", whereby the breakfast-eating questionnaire was administered at two different time periods, were merged in an attempt to increase the statistical power of reliability responses.

Although differences in agreement existed between responses to the tests, it was felt that agreement overall was sufficient to incorporate results into one study.

These results suggest that reliability in responses to the breakfast-eating questionnaire improves with a larger sample size.

Conclusion

The breakfast-eating questionnaire appears to be a reliable test in determining children's breakfast intake based on reliability-testing of merged data.

Table 20: Reliability of All Responses (n=115)

Category	Kappa	Agreement Based on Fleiss Criteria	Asymptotic Standard Error (ASEI)	Confidence Interval ∝ =.05	Statistical Significance (Fleiss)
q 1	0	--	--	--	--
juice	0.930	E	0.034	±0.066	E
pancakes	0.913	E	0.061	±0.119	E
cereal	0.886	E	0.045	±0.088	E
milk	0.807	E	0.070	±0.137	FG
bread	0.861	E	0.047	±0.092	E
fish	0.742	FG	0.175	±0.343	P
peanut butter	0.743	FG	0.081	±0.159	FG
chips	0.742	FG	0.175	±0.343	P
eggs	0.655	FG	0.101	±0.198	FG
pop	0.905	E	0.095	±0.186	FG
bacon	0.739	FG	0.111	±0.218	FG
yogourt	0.698	FG	0.116	±0.227	FG
coffee	0.755	E	0.136	±0.266	FG
fruit	0.729	FG	0.067	±0.131	FG
q 3	0.888	E	0.055	±0.108	E
q 4	1.0	E	0	0	E

Fleiss: κ > 0.75 excellent agreement = E
0.45-0.75 fair to good agreement = FG
κ < 0.45 poor agreement = P
κ = 0; neither agreement nor disagreement

STUDY #11

Actual versus Recalled Food Intake

RESEARCH QUESTION: Are children able to accurately recall what they had to eat for a meal, within a three hour time frame?

The purpose of this study is to determine whether young elementary school (grades 1, 2 and 3) children are valid and reliable reporters of their own food intake.

Subjects

A total of 61 subjects were recruited from the Y-Lunch Programs, the Cornwallis Hot Lunch Program, and a private school, Sacred Heart School of Halifax, for the "actual versus recall" study, during February and March, 1990, as per procedures outlined in Appendices C and E. All children were enrolled in grades 1 (n=18), 2 (n=26) and 3 (n=17), at the time of the study.

Methods

Lunch was chosen as the most convenient meal to study children's ability to recall intake. Parental consent was obtained indirectly, with the aid of the Y-Lunch program and Cornwallis Hot Lunch Program staff, and teachers at the private school. All interviews were conducted by the chief investigator.

At each YMCA Lunch Program site studied in Halifax and Dartmouth, subjects brought their own lunch from home. The YWCA in Halifax provided the participants with a hot lunch

daily, as did the Cornwallis Hot Lunch Program. Children attending the Sacred Heart School of Halifax, who did not return home for lunch, were interviewed on the lunch they brought from home.

Children were introduced to the observer as they arrived in the "lunch room", but were not informed about the upcoming test of recall. While the children ate their lunch, their exact intake was recorded with the help of supervisors present in the lunch rooms. This procedure was done as unobtrusively as possible.

Within one-half hour to two hours after the children had finished their lunch, they were orally interviewed on an individual basis, regarding their lunch intake. Precautions were taken to prevent other children from overhearing the questions being asked, thereby warning them of the upcoming recall. Children were asked "(Name of child), do you remember what you had for lunch today?" The only prompting allowed was "Did you have anything else?" and "Did you have anything to drink?". Responses were recorded and compared with recorded actual intake.

Results

Results of recalled intake were compared with actual intake based on a Food Item Agreement Score (Krantzler, et al., 1981).

$$\text{food item agreement score} = \frac{\text{number of foods correctly identified} \times 100\%}{\text{total number of foods reported}}$$

Results of the food item agreement score are presented in Tables 21 and 22. The ability to recall 100% of actual food intake appeared to increase with grade; i.e., 55.6% of grade 1's reported 100% of correct responses, 61.5% of grade 2's and 76.5% of grade 3's did so.

The Scheffe test for significance was applied to differences in reported means by grade (Table 23) at alpha=.05 for 56 of the 61 subjects. Five subjects were not given anything for breakfast in preparation for day surgery; results of their recall were not presented in Scheffe calculations.

No significant differences were found between grades 1, 2 or 3, in their ability to recall lunch intake.

Discussion

In the actual versus recall intake study, the investigator is testing the validity, or "truthfulness" of children's responses to questions about food intake. However, since this test is a comparison of known intake with children's recalled intake, it is in effect also a test of how consistently children can recall and report food consumption. Results will be assessed considering both of these factors.

Recording of actual intake for those children who brought their own lunches was more difficult and had to be restricted at Sacred Heart School to a limited number of subjects. It was impossible for the observer to record the

intakes of greater than ten children at one time. This severely limited possible data collection, but allowed 100% accuracy in recording.

Five day surgery patients were tested for their ability to recall actual breakfast intake. Subjects were recruited in the clinic waiting area and consisted of two girls in grade 1, two boys in grade 1, and a girl in grade 3. All five children were able to reliably and validly report that they had nothing to eat for breakfast that morning. Results were confirmed with the parent in attendance with the child.

The Scheffe test for significance controls for type I error. Results indicated that no significant differences were noticable for children in grades 1, 2 or 3 studied, or between boys and girls.

Ideally, the breakfast meal would have been chosen for investigation into children's ability to recall intake. Unfortunately, it was impossible to recruit children for this time period for study. Two attempts were made to ask parents to record their child's breakfast intake, one at a Y-Lunch program at Rockingham Elementary School, and another at a Sunday School in Dartmouth. The study was explained to parents in detail (Appendix D), and a sealed envelope was supplied for the children to return responses. The proposed procedure was that children would be asked to verbally recall what they had to eat for breakfast that day. Results

would then be compared to parents' written record of the child's breakfast intake.

Only five responses were received at the Rockingham Elementary Y-Lunch Program. Children were asked to recall breakfast intake that day at 12:30 p.m., approximately five hours after eating breakfast. Sixty percent of children were able to recall 100% of breakfast intake; 40% could recall 75% of intake.

A second attempt to gather information on children's breakfast intake was tried at a Sunday School in Dartmouth. Parents did not record their child's breakfast intake on the day of study because they did not receive instruction to do so in time: a mail-out explaining the study (Appendix D), along with other Sunday School information was to be sent to parents in sufficient time, based on an arrangement made with the Sunday School coordinator. As a result, this study had to be abandoned.

Other methods of obtaining information on children's ability to recall intake were considered. One involved taking a "before" and an "after" picture of the child's plate for documentation of breakfast intake. This method of data collection was impossible for a number of reasons: i) it was too invasive a test to occur within the child's home, ii) it would still require an observer to ensure that foods missing at the end of the meal were actually eaten,

and iii) the picture-taking would arouse suspicion in the child as to upcoming questions regarding food intake.

Conclusion

Children in grades 1, 2 and 3 are truthful and reliable reporters of their actual food intake. No significant difference in recall ability was found between boys and girls. These subjects should be used as respondents of their own intake, rather than relying on parents to report the child's intake in future studies.

Table 21: Food Item Agreement Score by Grade and Sex (n=61)

Subject Number	Grade 1		Grade 2		Grade 3	
	Boy (n=11)	Girl (n=7)	Boy (n=13)	Girl (n=13)	Boy (n=5)	Girl (n=12)
1	0.50	1.0	0.75	1.0	0.80	0.66
2	1.0	1.0	0.75	1.0	1.0	1.0
3	1.0	0.75	0.75	0.66	1.0	1.0
4	1.0	0.75	0.75	1.0	1.0	1.0
5	1.0	1.0	0.80	1.0		1.0
6	1.0	0	0.75	1.0		1.0
7	1.0	0	1.0	0.75		1.0
8	1.0		0.80	1.0		1.0
9	0.80		1.0	1.0		0.50
10	0		1.0	1.0		1.0
11	0		1.0	0.80		1.0
12			1.0	1.0		1.0
13			1.0	1.0		

Note: Food Item Agreement Score

$$= \frac{\text{Number of foods correctly identified}}{\text{total number of foods reported}} \times 100$$

Table 22: Percentage of Correct Responses to Actual Recall of Intake by Grade

	100% Correct	75-100% Correct	50-75% Correct	<50% Correct	No Intake 100% Correct
Grade 1	55.6	16.7	5.5	0	22.2
Grade 2	61.5	34.6	3.9	0	--
Grade 3	76.5	5.9	11.8	--	5.8

Table 25: Scheffé Test for Significance of Correct Recall Percentages by Grade

(α =.05, confidence = 0.95, df = 50, MSE = 0.015386, F_{crit} = 3.18261)

	Signifcance Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
Grade 1	-0.1672 (gr 3)	-0.0420 (gr 3)	0.0832 (gr 3)
	-0.1055 (gr 2)	0.0079 (gr 2)	0.1213 (gr 2)
	No significant difference at α = .05		
Grade 2	-0.1585 (gr 3)	-0.0498 (gr 3)	0.0598 (gr 3)
	-0.1213 (gr 1)	-0.0079 (gr 1)	0.1055 (gr 1)
	No significant difference at α = .05		
Grade 3	-0.0832 (gr 1)	0.0420 (gr 1)	0.1672 (gr 1)
	-0.0589 (gr 2)	0.0498 (gr 2)	0.1585 (gr 2)
	No significant difference at α = .05		

General Discussion

Surveys often possess hidden biases which must be acknowledged in the interpretation of results.

External Validity

External validity is concerned with the generalizability of conclusions drawn through observation of a sample of the population (Leedy, 1980, chap.2). Attempts were made to include a low-income population in the study; however, a sample of convenience was chosen for investigation.

The use of children in grades 1, 2 and 3 only, limits the generalizability of results from this grade range to other age groups. It is possible that younger or older age groups may receive more attention at home, in terms of their nutritional health, than their siblings. However, this age group was chosen since it was hypothesized that the detrimental effects of not consuming breakfast would impact on younger children more severely than on older school-aged children.

Representativeness of Sample

The representativeness of the sample in terms of socioeconomic (low income versus high income) and geographic (rural versus urban) characteristics may present a limitation in the generalizability of results since only urban children were chosen for validity testing. Attempts

were made, however, to include a representative sample of low-income children.

The questionnaire cannot solicit information about why the child did not eat breakfast on the day in question. This information is not needed to interpret the validity and reliability of the questionnaire. The investigator was not concerned with numbers of children admitting to breakfast-skipping per se in this validation study.

Sample Size

Since eligibility for participation in the study included grade limitations and parental consent, it was difficult to predict exact numbers of subjects that could potentially fulfill the requirements for the study. It was necessary to accept all eligible children for investigation and to forego any attempts at random selection.

Design of Study

The design of the study itself, with a lack of randomization and a convenience sample chosen for investigation presents a potential source of bias. Randomization and blinding were not essential components to obtain the objectives set out at the beginning of the study.

Validity of Breakfast-skippers

Few real "breakfast-skippers" were expected to be revealed in validity-testing. No attempts were made to validate breakfast-skipping, other than by investigation of day surgery patients who were known to have skipped

breakfast. The incidence of breakfast-skipping was therefore not tested, nor sought out in validity testing.

Usual Breakfast Intake

Response bias may have been present in the report of usual breakfast intake as it was anticipated that some children would respond with "desirable answers" in an attempt to please the interviewer. The same potential for bias exists with any questionnaire completion.

Questionnaire Administration

Incomplete data collection:

In view of the age group under investigation, it was expected that data would be incomplete for assessment purposes, e.g., questionnaires would have to be abandoned due to distraction, anxiety, or incomplete word recognition. Results of these incomplete questionnaires were tabulated but should not be interpreted as final responses.

Consent:

It was not clear what a lack of parental consent indicated: possible reasons for lack of consent include misunderstanding about the study, the consent form may not have reached the parents, or a fear of exposure with regards to feeding of their children.

The consent process may also have limited the potential number of subjects for investigation.

Administration:

Interviewer bias may have been introduced into validity-testing of the questionnaire when one person, and sometimes two people, administered the set of instructions, despite attempts to maintain as precise a script as possible. Some deviations from the script were bound to occur depending on the nature of the subjects and their level of understanding. A test performed to determine whether differences occurred in test-retest studies occurred as a result of inter-observer administration of the questionnaire.

The problem of deviations occurring in response to different observers administering the questionnaire will be alleviated with the aid of a videotaped set of instructions which will provide a consistent mode of communication during the provincial survey.

Adequacy Criteria

Another potential limitation was reflected in the adequacy criteria for breakfast intake. Problems arose in interpretation of portion size for children completing the questionnaire.

Criteria for adequacy were set at three out of four food groups and one-quarter of the day's estimated energy and protein requirements (Health and Welfare's RNI's, 1983) to be consumed at breakfast. On later assessment, it was decided that with the intake of three out of four food

groups, it was impossible to achieve one-quarter of the day's estimated energy requirements (450 kilocalories for this age group) without consuming a high fat diet. Therefore, criteria for adequacy were altered to include the intake of three out of four food groups, with one food being of high biological value protein to achieve one-quarter of the protein requirements for the day.

Criterion-based Assessment

A subjective criterion of 80% recognition of symbols was established as a cut-off limit for face validity of the questionnaire. This 80% limit, based on Fleiss' criteria for agreement, was considered reasonable for this study.

Time Frame

Bias may also have been introduced in the time allocated for interviews after the breakfast meal. Children eat breakfast at various times and access to interviews were limited by school classes and lunch time, i.e., the time elapsed between breakfast and interviews were not always identical. It was not possible to set strict guidelines regarding a time frame for recalls after breakfast.

The length of the interview varied according to the time allowed without restrictions imposed by upcoming events, (i.e., classes), by external distractors, limited attention-span and anxiety.

A seasonal bias may have been incorporated into the results since only data from the winter semester of 1990

were able to be collected; however, there is no reason to believe that a seasonal bias would occur (Rasanen, 1979).

GENERAL CONCLUSIONS

The research design of the validity- and reliability-testing of the breakfast-eating questionnaire employed the use of a convenience sample of children enrolled in grades 1, 2 and 3 in the Halifax-Dartmouth area. Sites for data collection were tailored toward achieving a representative sample of low-income areas, in an attempt to obtain a generalizable sample. However, difficulty in receiving parental consent, particularly in these low income areas resulted in a smaller percentage of low income subjects than were desired.

Results of reliability- and validity-testing of the breakfast-eating questionnaire are presented in Part III.

The face validity of the questionnaire was demonstrated through testing of symbol, word and generic food recognition. Criterion-based validity set for symbol recognition established guidelines for acceptability of response. Children appeared to recognize all symbols, but had some difficulty in recognizing the square-faced CLOCK; therefore, the symbol itself will be altered to incorporate a round-faced CLOCK. Symbol recognition was deemed the most important test in the comprehension of the questionnaire. Criterion-based guidelines could not be established for word

recognition due the vast differences in reading abilities of the subjects. As well, word recognition was not vital to questionnaire understanding. Nearly 100% of subjects successfully completed the generic food recognition test, indicating that children in this age group have a good understanding of food groups as they appear on the breakfast-eating questionnaire.

The phenomenon of "circling", whereby the subject circled more foods than could possibly have been consumed occurred in only 2 out of 137 respondents. Both children were in grade 1, and appeared not to understand the nature of the questions asked them. Results of "circlers'" responses were not used in the final analysis of data. The experience demonstrated the need for a quiet, controlled environment in which to administer the questionnaire.

Evidence for the criterion validity of the questionnaire was gathered through assessments of the reported breakfast intakes of a group of children. It appears that the best criterion for adequacy of breakfast is that the meal must contain at least 3 of the 4 food groups of Canada's Food Guide. By necessity, one of these food groups must be of high biological value, i.e., either Milk and Milk Products or Meat, Fish, Poultry and Alternates. It was impossible to meet the one-quarter energy requirements for the day to be consumed at breakfast time without the intake of a high fat diet. Approximately 250 kilocalories

of energy can be met with consumption of 3 of the 4 food groups of Canada's Food Guide. One-quarter of the day's protein intake is achieved through the above criteria, assuming common portion sizes are consumed, as noted by Chery and Sabry (1984). This protein intake should be adequate to maintain blood glucose levels at or near normal levels up until mid- or late-morning, thereby positively influencing cognitive performance.

Content validity of the breakfast-eating questionnaire was studied by asking subjects to respond with their usual breakfast intake. Although subjects did not volunteer information regarding the intake of coffee, tea, pop, or chips on food frequency testing, they did report to have eaten the above foods when asked to recall a specific meal. The low nutrient foods will remain on the breakfast-eating questionnaire as markers of some poor quality foods consumed at breakfast.

Since responses to the validity and reliability study were obtained from a sample of convenience, external validity cannot be proven unequivocally from the results. A much larger sample from across the province would have had to have been recruited to test for external validity. However, it is suggested that the responses to reliability and validity of the sample tested indicate comprehension of the breakfast-eating questionnaire in a population of grade 1, 2 and 3 children in the province.

The reliability and validity of the questionnaire were established indirectly through an assessment of children's ability to accurately recall food intake. Children of the age group studied were found to be reliable reporters of their own intake when one particular meal was tested. It is suggested that the questionnaire be administered in the early morning to avoid memory lapses regarding breakfast intake.

The breakfast-eating questionnaire, therefore, appears to be a valid and reliable survey instrument and may be used to assess the breakfast-eating habits of a population of elementary school children, in grades 1, 2 and 3.

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APPENDIX A
Breakfast-skipping questionnaire
and script for administration

APPENDIX A

Breakfast-skipping questionnaire and script for administration

Subjects should be in a classroom setting with as few external distractors as possible. Desks should be cleared of all school work and the child given a pencil for questionnaire completion. It is important to remind the subjects that the questions he/she will be asked are to be kept confidential, i.e., that their answers will be kept "a secret". It is hoped that by portraying a sense of confidentiality, the child will feel less threatened and will answer questions truthfully. Plans are to have the questionnaire administered to the various classrooms through a video-taped set of instructions designed to be "fun", i.e., non-threatening.

Respondents will be asked the first question when the classroom is quiet: "Did you have anything to eat or drink this morning before you came to school? If you did, circle YES at number 1 on the page in front of you; if you did not have anything to eat or drink yet this morning, circle NO. Next, I am going to ask you to remember what you had to eat or drink today. If you answered NO to question 1, I want you to circle the picture beside the foods you usually have to eat for breakfast. If you said that you had something to eat this morning, I want you to think very carefully about

what you had today, not what you had yesterday, or what you want to have tomorrow morning: think back to what you had TODAY. I am going to go over a list of foods that you may have had, and I want you to circle the picture beside the food if you ate it today. If you had juice this morning, circle the dinosaur. If you had pancakes or waffles (like Eggo's) circle the house. If you had cereal this morning, circle the duck. If you had milk this morning, circle the train. Remember, if you had milk on your cereal, that counts, too, so circle the train if you had milk on your cereal, or in a glass".

Instructions continue down the list of foods.

"Question 3 asks "who prepared breakfast this morning? Did you make breakfast for yourself, or did someone else make breakfast, like your mother, your father, or your brother or sister or babysitter? If you made something or got something for yourself for breakfast, circle the glasses. If someone else made breakfast for you, circle the mitten.

Finally, I want you to circle whether you are a boy or a girl."

1. **YES** **NO**

2.

 juice

 fruit

 cereal

 milk

 bread o. toast or muffins or rolls

 fish

 peanut butter or cheese

 chips

 eggs

 pop

 bacon or sausage

 yogourt

 coffee or tea

 pancakes or waffles

3.  **ME**  **OTHER**

 BOY  GIRL

1. **YES** **NO**

2.

 juice

 fruit

 cereal

 milk

 bread or toast or muffins or rolls

 fish

 peanut butter or cheese

 chips

 eggs

 pop

 bacon or sausage

 yogourt

 coffee or tea

 pancakes or waffles

3.  **ME** ☆ **OTHER**

 BOY  GIRL

1. NO YES

2.

 pancakes or waffles

 fish

 pop

 cereal

 bacon or sausage

 coffee or tea

 yogourt

 juice

 chips

 peanut butter or cheese

 fruit

 milk

 bread or toast or muffins or rolls

 eggs

3.  OTHER  ME

 GIRL  BOY

APPENDIX B
Canada's Food Guide

Canada's Food Guide

Eat a variety of foods from each group every day

I60

milk and milk products

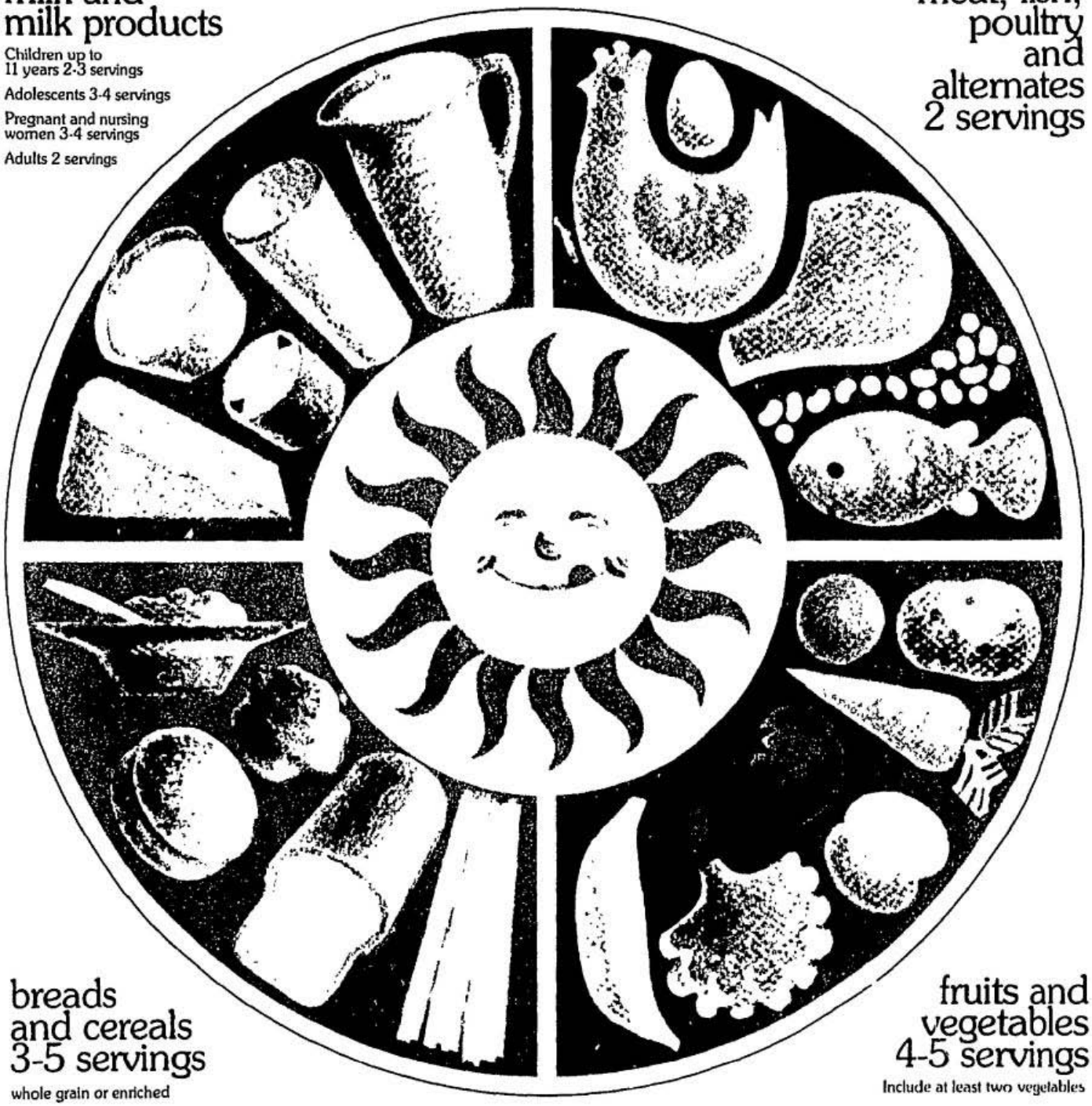
Children up to 11 years 2-3 servings

Adolescents 3-4 servings

Pregnant and nursing women 3-4 servings

Adults 2 servings

meat, fish, poultry and alternates 2 servings



breads and cereals 3-5 servings

whole grain or enriched

fruits and vegetables 4-5 servings

Include at least two vegetables

Ministry of Health

Ontario

Murray J. Elston, Minister

Health and Welfare Canada / Santé et Bien-être social Canada

Canada

Canada's Food Guide

Variety

Choose different kinds of foods from within each group in appropriate numbers of servings and portion sizes.

Energy Balance

Needs vary with age, sex and activity. Balance energy intake from foods with energy output from physical activity to control weight. Foods selected according to the Guide can supply 4000 – 6000 kJ (kilojoules) (1000 – 1400 kilocalories). For additional energy, increase the number and size of servings from the various food groups and/or add other foods.

Moderation

Select and prepare foods with limited amounts of fat, sugar and salt. If alcohol is consumed, use limited amounts.

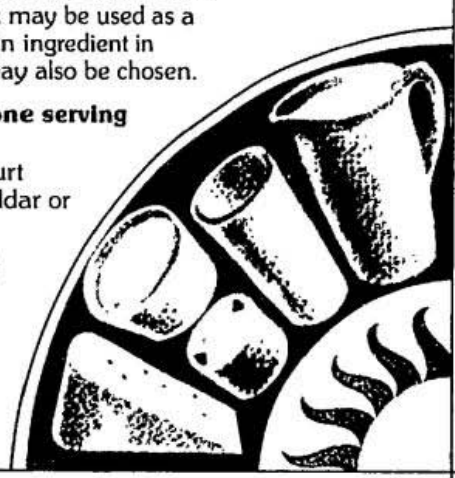
milk and milk products

Children up to 11 years	**2-3 servings**
Adolescents	**3-4 servings**
Pregnant and nursing women	**3-4 servings**
Adults	**2 servings**

Skim, 2%, whole, buttermilk, reconstituted dry or evaporated milk may be used as a beverage or as the main ingredient in other foods. Cheese may also be chosen.

Some examples of one serving
250 mL (1 cup) milk
175 mL (¾ cup) yoghurt
45 g (1½ ounces) cheddar or process cheese

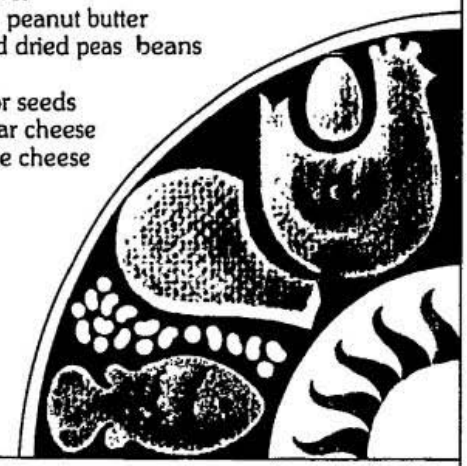
In addition, a supplement of vitamin D is recommended when milk is consumed which does not contain added vitamin D



meat, fish, poultry and alternates

2 servings

Some examples of one serving
60 to 90 g (2–3 ounces) cooked lean meat, fish, poultry or liver
60 mL (4 tablespoons) peanut butter
250 mL (1 cup) cooked dried peas beans or lentils
125 mL (½ cup) nuts or seeds
60 g (2 ounces) cheddar cheese
125 mL (½ cup) cottage cheese
2 eggs

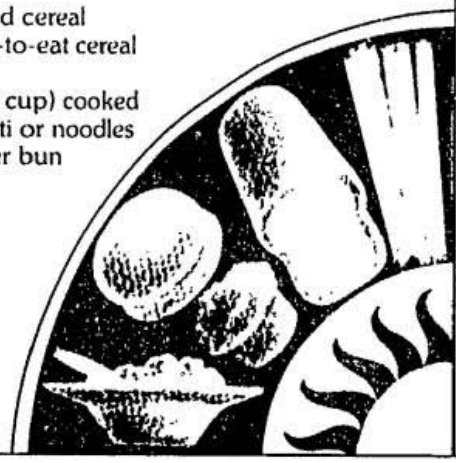


breads and cereals

3-5 servings

whole grain or enriched. Whole grain products are recommended.

Some examples of one serving
1 slice bread
125 mL (½ cup) cooked cereal
175 mL (¾ cup) ready-to-eat cereal
1 roll or muffin
125 to 175 mL (½ – ¾ cup) cooked rice, macaroni, spaghetti or noodles
½ hamburger or wiener bun



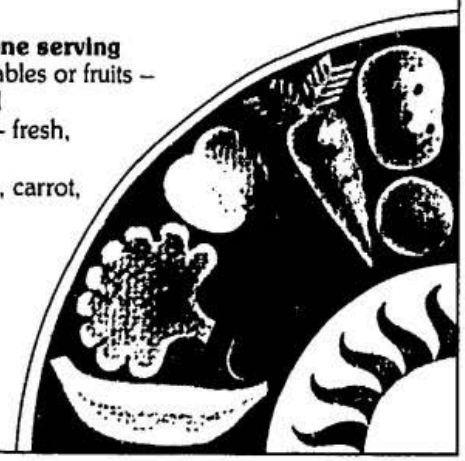
fruits and vegetables

4-5 servings

Include at least two vegetables.

Choose a variety of both vegetables and fruits — cooked, raw or their juices. Include yellow, green or green leafy vegetables.

Some examples of one serving
125 mL (½ cup) vegetables or fruits – fresh, frozen or canned
125 mL (½ cup) juice – fresh, frozen or canned
1 medium-sized potato, carrot, tomato, peach, apple, orange or banana



APPENDIX C
FLOW DIAGRAMS

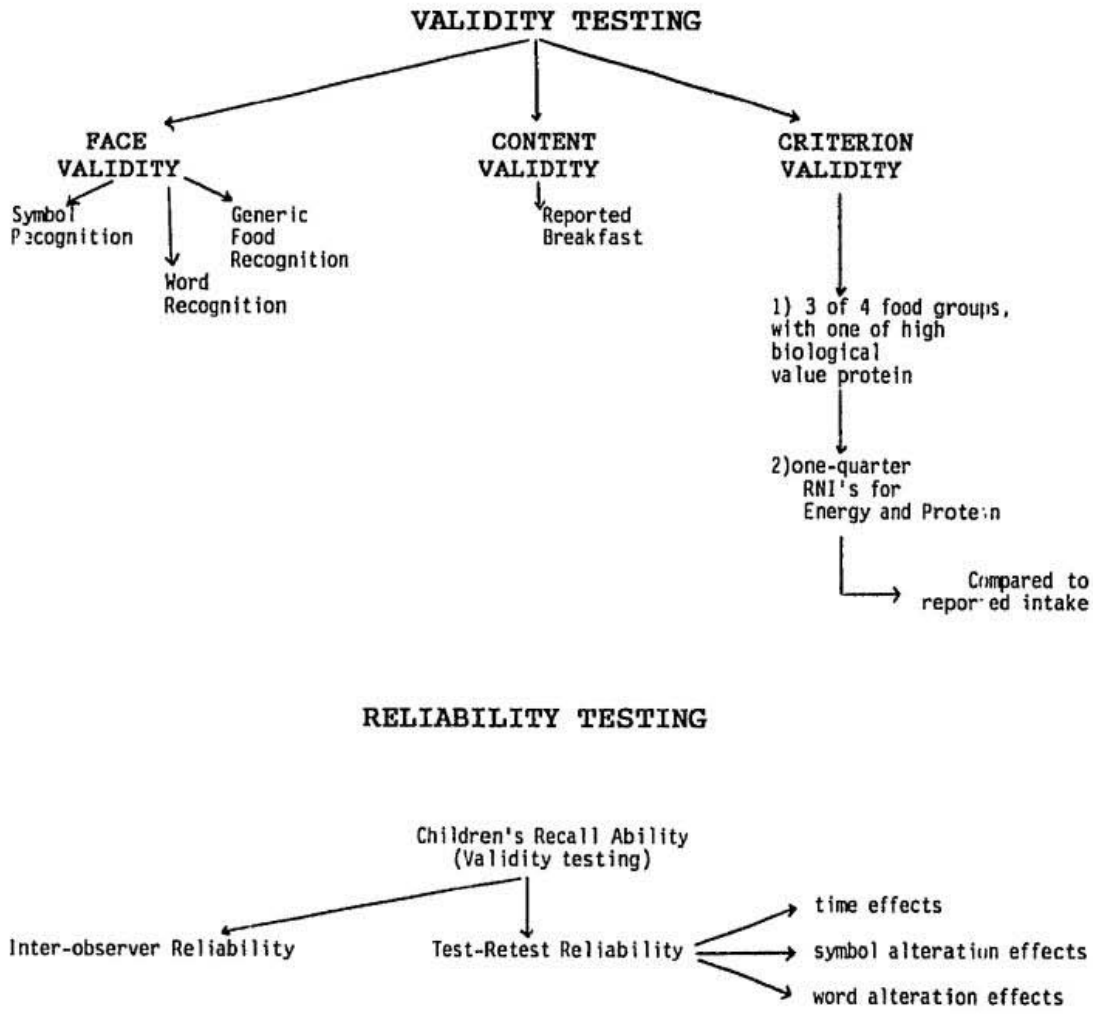
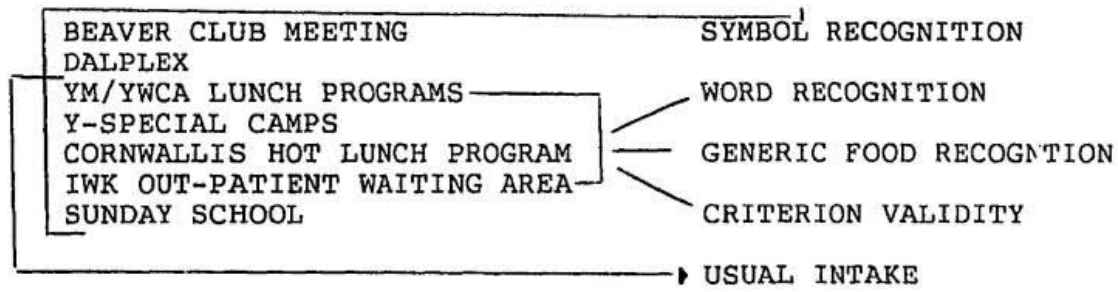


Figure 1: FLOW DIAGRAM - Validity and reliability testing

VALIDITY:



RELIABILITY:

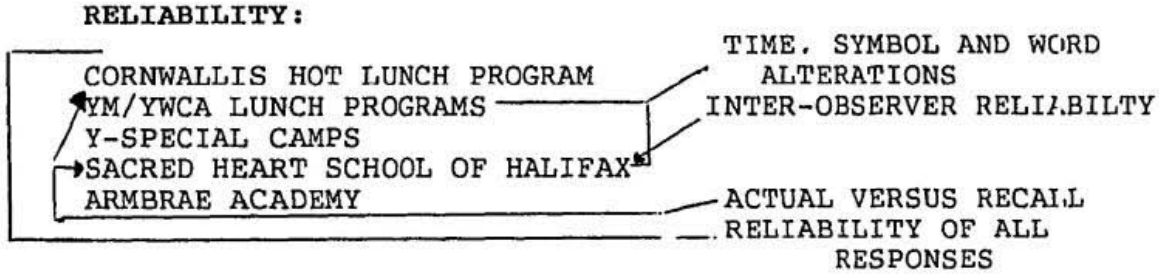


Figure 2: Flow diagram - SITES ON WHICH TESTS WERE PERFORMED

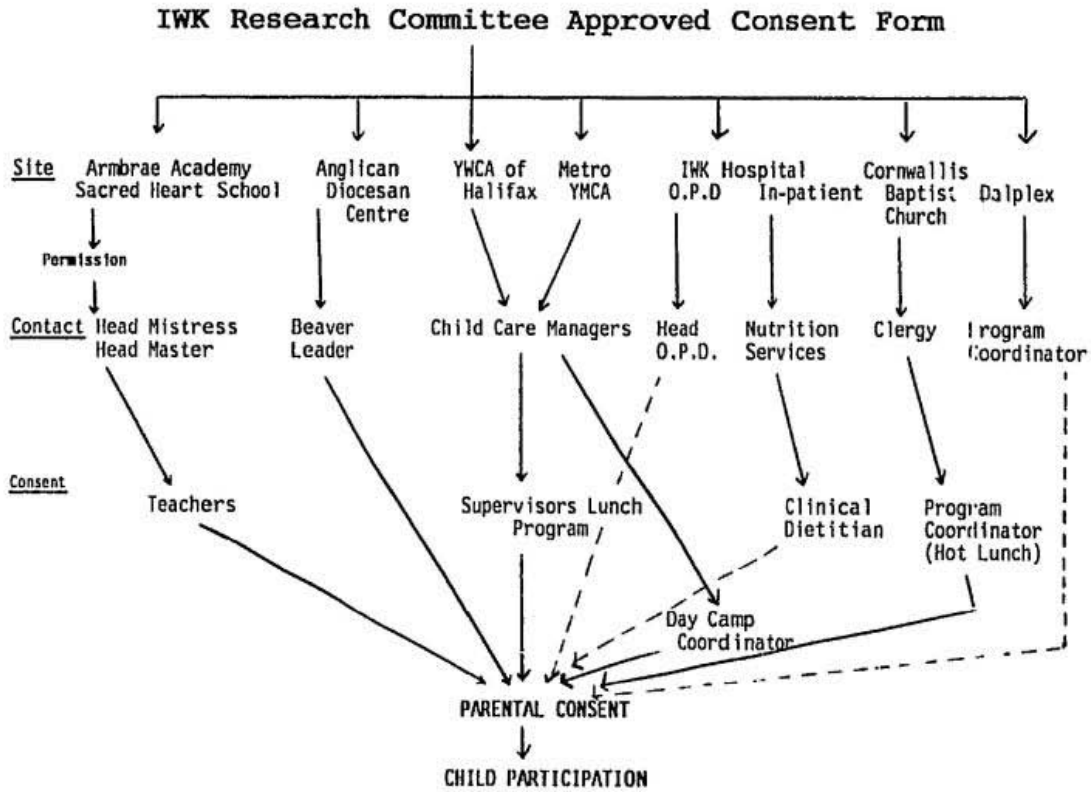


Figure 3: FLOW DIAGRAM - METHODS OF OBTAINING PARENTAL CONSENT

footnotes

1) - - -indicates direct interaction with parent; no intermediary

2) Sunday School: permission granted on day of study indirectly

APPENDIX D
Consent Forms

Izaak Walton Killam
Children's Hospital

5850 University Avenue
Post Office Box 3070
Halifax, Nova Scotia
Canada B3J 3G9
(902) 428-8111

Incorporated as The Izaak Walton Killam Hospital for Children

MORNING FOOD HABITS SURVEY

As part of a province-wide project to determine the morning food habits of young elementary school children in Nova Scotia, we would like your child to help us develop a survey form.

Your child may be asked to complete a simple questionnaire on what he/she ate that morning or we may ask your child if he/she understands the pictures on the form, can identify different foods, or can remember what food he/she ate that morning. We may ask you as well what your child ate on the morning he/she is tested. The results of these food habit exercises will be used to determine the usefulness of the questionnaire as an information-gathering tool, not whether or not your child eats well. Your child's identity will be kept strictly confidential and, once your child has completed the tasks, his/her name will be removed from the results.

If your child doesn't want to participate in any of the tasks, he/she can withdraw at any time.

Failure to participate in this project will not affect your child's present or future care at the IWK Children's Hospital in any way.

If you have any questions regarding this study, please feel free to contact Ms. Ann Leahey, Master's student, at 494-1686, or Dr. Lynn McIntyre, Hospital Epidemiologist, IWK Children's Hospital at 428-8517.

I _____, parent/guardian of _____ agree to allow my child to participate in the Food Habits Survey.

_____ DATE:_____
Witness

Izaak Walton Killam
Children's Hospital

5850 University Avenue
Post Office Box 3070
Halifax, Nova Scotia
Canada B3J 3G9

(902) 428-8111

Revised I67

Incorporated as The Izaak Walton Killam Hospital for Children

MORNING FOOD HABITS SURVEY

As part of a province-wide project to determine the morning food habits of young elementary school children in Nova Scotia, we would like your child to help us develop a survey form.

Your child may be asked to complete a simple questionnaire on what he/she ate that morning or we may ask your child if he/she understands the pi tures on the form, can identify different foods, or can remember what food he/she ate that morning. We may ask you as well what your child ate on the morning he/she is tested. The results of these food habit exercises will be used to determine the usefulness of the questionnaire as an information-gathering tool, not whether or not your child eats well. Your child's identity will be kept strictly confidential and, once your child has completed the tasks, his/her name will be removed from the results.

If your child doesn't want to participate in any of the tasks, he/she can withdraw at any time.

Please feel certain that if you choose not to participate in this project, it will not affect your child's present or future care at the IWK Children's Hospital in any way.

If you have any questions regarding this study, please feel free to contact Ms. Ann Leahey, Master's student, at 494-1686, or Dr. Lynn McIntyre, Hospital Epidemiologist, IWK Children's Hospital at 428-8517.

I _____, parent/guardian of _____ agree to allow my child to participate in the Food Habits Survey.

_____ DATE:_____

Witness

Izaak Walton Killam
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Incorporated as The Izaak Walton Killam Hospital for Children

Dear Parent(s):

Breakfast-skipping, as a marker for hunger in young children, has been shown to produce short-term harmful effects on the child's learning, behaviour, concentration and motor skills. However, the prevalence of breakfast-skipping in Nova Scotia elementary school children has never been studied. In an upcoming survey to be conducted in the schools, this problem will be addressed.

Prior to the survey being conducted, a questionnaire must be developed that will accurately measure the breakfast-eating habits of school children in grades one, two and three.

In order to help us with our study, we are requesting that you write down, on the back of the consent form, what your child had to eat for breakfast (if anything at all), on Sunday April 1st., before coming to Sunday School. If your child does not like to eat breakfast, we would like to know that as well. If at all possible, please record your child's breakfast intake WITHOUT YOUR CHILD'S KNOWLEDGE. Please write your child's first name on the paper, seal the above information in the envelope provided and have your child bring it to Sunday School with him/her.

During Sunday School that morning, your child will be asked to remember what he/she had to eat for breakfast that morning (April 1st). The purpose of this survey is not to determine whether your child is eating a nutritious breakfast, but rather to see if the questionnaire is understandable to children who are just learning to read. We are also attempting to determine whether children of this age group are able to remember what they had to eat several hours before, without being previously warned that they will be asked to do so. All responses will be kept strictly confidential.

Your cooperation in this regard will help us to develop a questionnaire that will be most suitable for the upcoming survey.
Thank you in advance for your cooperation.

Yours sincerely,

Ann Leahey
Phone #: 494-1686

APPENDIX E

Details of Sites

APPENDIX E

Details of Sites

The following details the sites, dates and contact persons involved in data collection. Included are some of the confounding factors which hindered data collection.

Data were collected from:

i) the IWK out-patient waiting area over the course of January, 1990 through April, 1990.

This area did not prove to be very helpful in data collection since it was difficult to judge the child's age through observation alone. This location was very time consuming and therefore presented little in the way of results, in that the researcher was forced to wait for a child of the appropriate age and grade to show up. It was not possible to obtain a detailed schedule of appointments, other than for Day Surgery patients.

It is questionnable whether data gathered were unbiased, as parents were generally present during the interviewing of the child and tended to interrupt if the child was having difficulty in answering. The data were not used in cases where the parent contributed to the child's answers.

Contact person: Corinne Hodder-Malloy, Head Nurse, Out-Patient Department, IWK Hospital.

The IWK in-patient population was approached for data collection. Data collection proved to be very difficult in

the identification of eligible subjects and in obtaining an unbiased response. With the aid of a clinical dietitian, several children per week were identified as possibly being eligible for the study: i.e., children who were not admitted for severe illnesses, with parents who tended to be present with the child during the day for the acquisition of consent.

In reality, the IWK in-patient population proved to be a very poor one for data collection. It was nearly impossible to obtain parental consent; parents were often not present during the day. Parents who were present tended to influence their child's responses. Children were receiving a multitude of tests, which often impaired their normal appetite. The children were sometimes unwilling to cooperate. Hospitalized children are not a free-living population and their results would not be generalizable to the entire population. The nursing staff found it difficult to work around the interviewer: i.e., interruptions to the interview were necessary in order to disperse medications and treatments. Thus, the IWK in-patient population was abandoned as a possible source of validity testing of the questionnaire after only one "successful" test.

Contact persons: Department of Dietetics, specifically Mary Height, P.Dt. (Clinical Dietitian), and Head Nurses of Wards 4S, 5E, 5S, 5W, 6E, and 7E.

ii) a Beaver meeting, held in the Anglican Diocesan Centre, January 24, 1990. The Beaver organization has as its members boys, ages of approximately 4 to 7 years of age.

This meeting proved to be the first of a series of "group" data collection, and much was learned at the Beaver meeting with regard to achieving usable data from a group of young children. Unfortunately, a large percentage of this group proved to be in grade primary, and their results could not be used in the final analysis of data.

Contact person: Dr. B. Favara, Pathology, IWK Children's Hospital.

iii) Swim Meet for children aged 12 and under, held at Dalplex, January 13, 1990.

The Dalplex proved to be a very limited location as well in obtaining data for the validity and reliability testing of the breakfast-eating questionnaire. The researcher had to peruse the stands where parents and children were attending the swim meet, in an attempt to judge the ages of possibly eligible children. Parents were approached, the study explained to them briefly, and they were asked what grade their child was attending. Although this was a very difficult and perhaps threatening manner to obtain study results, all parents who were approached were extremely responsive and willing to cooperate. Problems lay in the fact that the observers of the Swim Meet tended to be the younger siblings of the swimmers, and generally proved

to be too young to take part in the study. The distraction of a cheering crowd surrounding the child also made data collection difficult. A limited number of children were surveyed in this area.

Contact Person: Nigel Kemp, Department of Recreation, Dalhousie University.

iv) the YM/YWCA Lunch Programs

Many of the schools in the Halifax-Dartmouth region do not provide a supervised area for children to eat their lunch. Children are expected to return home for the lunch meal. In some cases, however, both parents are working and are not able to be home at lunch. The Y-Lunch Program is a service provided by the community YM/YWCA whereby children who would otherwise have no supervision at lunch time are given a supervised place to eat their meal.

The Y-Lunch programs of Halifax and Dartmouth provided a convenient setting to test the reliability of children's responses, i.e., it was possible to observe the child's actual food intake, and then to question the child as to what he/she had to eat at that particular meal. While it would have been ideal to observe a breakfast meal, this proved to be impossible. For the purposes of reliability testing, it was necessary only to determine whether children could correctly recall what they had had to eat at a specific time period. The Lunch Programs were used as a means of obtaining this data.

Consent forms were delivered to the Child Care Managers responsible for the Lunch and After-School Programs. The study was explained in detail to these Managers who in turn either scheduled a meeting with the supervisors to explain the study to them and have them obtain parental consent, or who scheduled a time for the researcher to explain the study to the supervisors. These supervisors were then responsible for consent form completion to the best of their ability. This was judged to be the best method of consent retrieval by all parties concerned, since the supervisors were known to the parents.

1. YMCA Lunch Program - Grace United Church, Dartmouth, Nova Scotia, February 16, 1990.

Children were picked up from the elementary school which they attended in Dartmouth by Y staff and delivered to the Grace United Church hall for a supervised lunch program. On the particular day in which the researcher attended the Lunch Program, teachers were involved in an in-service that afternoon, which allowed children to remain at the Program all afternoon. Activities were scheduled for the children; data collection was worked around these activities.

With the aid of the supervisors of the program, children were identified and their lunch consumption was unobtrusively recorded. After the children were finished eating, those eligible for the study (i.e., those with signed parental consent and of eligible age) were tested for

comprehension of the questionnaire (studies reported explained procedures and results of data collection). Later that afternoon, children were questioned regarding the content of their lunch, concentrating on the types of foods eaten, but not the quantities.

Contact person: Heather Kellarman, Child Care Manager, YM/YWCA, Dartmouth. Supervisors of the Grace United Church program: Lisa Cochrane and Brenda Whittaker.

2. YM/YWCA Lunch Program - St. Peter's Parish Hall, March 23, 1990.

Actual versus recalled food intake tested. Only three consent forms were signed, therefore few results were obtained.

Contact person: Heather Kellerman, Child Care Manager, YM/YWCA, Dartmouth.

3. YWCA of Halifax, Barrington Street, Lunch Program, March 15, 1990.

Children participating in the YWCA Lunch Program receive a hot meal prepared for them by the Y staff. This proved to be a good opportunity to observe actual intake and to ask the children to recall what they had consumed for lunch.

Contact person: Karen Paddock, Child Care Manager.

4. YMCA of Metro Halifax, Lunch Program and Special Camps during the school March Break.

Children enrolled in the YMCA Lunch Program at two sites: Rockingham Elementary School (March 6 and March 28, 1990) and Springvale Elementary School (March 7, 1990) were chosen for inclusion in the study.

As well, children enrolled in the Special Camps, organized during the March Break (March 14, 1990) were also eligible for study, pending parental consent.

After a meeting with the Child Care Manager, another session was set up with the supervisors of the Lunch Programs to explain the study and to elicit the help of the supervisors in obtaining parental consent.

Both the Lunch Programs as well as the Special Camp proved to be profitable areas for data collection.

Contact person: Paula Latham, Child Care Manager, Supervisors, Lunch Programs: Nancy Wilkinson and Margaret Fraser.

Contact person, Special Camps: Roger Dillon.

v) The Cornwallis Hot Lunch Program, Cornwallis Baptist Church Hall, March 29, 1990.

The Cornwallis Hot Lunch Program provides a free, hot lunch to children attending St. Patrick's and Joseph Howe Elementary Schools. Participants in the program tended to come from an underpriveleged community of Halifax.

Contact person: Reverend Mack, Cornwallis Baptist Church, Mrs. Eva Cromwell, Project Coordinator and Mrs. Evelena Upshaw, Supervisor.

vi) Private Schools: Armbrae Academy (March28, 1990) and Sacred Heart School of Halifax (March 26 and 27, 1990).

Students of two private schools in the city aided in the validity and reliabilty testing of the breakfast-eating questionnaire.

Contact persons: Mr. M^{c}Gill, Head Master, Armbrae Academy and Sr. Judith Burns, Head Mistress, Sacred Heart School of Halifax, and Mrs. Joan Dorrington, Assistant.

vii) Sunday School, Anglican Church, Dartmouth, April 1, 1990.

The Sunday School did not prove to be very profitable in terms of data collection due to timing problems (many members of the congregation were on vacation during the time of data collection, followed by the Easter season.

Consent forms and requests that parents record their child's intake on the morning of April 1, 1990 were to be distributed by one of the Sunday School leaders on an agreed upon date. Confusion in this regard resulted in no information from parents regarding their child's intake. This part of data collection had to be abandoned. Children were tested as to usual breakfast intake.

APPENDIX F

Anecdotes

Appendix F

Anecdotes

1. Gender Identification

One tough-looking little boy in grade 1, known to be the "terror" in the group was filling out the breakfast-eating questionnaire with his lunch-mates. When asked to circle whether he was a BOY or a GIRL, in response to question 4, he circled the GIRL by mistake. One of the older (grade 3) girls took notice of his error and started laughing and taunting him. Meanwhile, the poor boy was madly trying to erase his mistake, saying "I know, I just made a mistake!".

2. Symbol Recognition

One boy (grade 1) was breezing through the symbol recognition test. When he came to the symbol for the "elephant", he paused a moment and answered "mammoth!". When asked, "what's a mammoth?", he replied, "it's an elephant!", as if this were common knowledge.

3. Word Recognition

Children are not as naive as we would make them out to be. Several children being interviewed for word recognition, responded with the name of the symbol beside the word. For example, with the interviewer pointing to the word JUICE, the child responded to the question "do you know what this word is?" as: "yes, it's DINOSAUR!" This is an

example of Chall's (1979) Stage 1 "guessing and memory game".

4. Generic Food Recognition

When asked "did you have any cereal this morning...?", one girl raised her hand and asked, "I had porridge; is that cereal?". This was the only potential error that occurred during the testing period in which food groups were unclear to the subjects.

5. Y-Special Camp

Evidence of the "space-age" technology filtering down to children in the 1990's: children most often confused the symbol for the CLOCK with either a microwave or a computer.

One boy, when asked to write his first name on the questionnaire for later identification for comparison purposes, queried, "would you like that in SCRIPT?"

6. Peer Influence

In testing the breakfast-eating questionnaire on a group of "Beavers", the first question was posed to the group: "Did you have anything to eat or drink this morning before you went to school?" One child called out, amidst the retorts of the other children, "I didn't have anything this morning!". There was much laughter over this comment by the other boys. When all questionnaires were collected, it was noted that no one answered NO to the first question.

This episode, along with the example given in Anecdote #1, outlined clearly the importance of reminding the

children not to speak during questionnaire completion; that their answers were "a secret", i.e., confidential, between themselves and the interviewer.