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Development and test-retest reliability of the Food Photograph Scale for Brazilian adults

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Abstract

The study of food practices in Brazil faces important problems because of the nonexistence of properly tested methods and lack of a gold-standard instrument. Furthermore, only one instrument is capable of measuring food choice or knowledge in this specific population. In the present study we sought to develop a rapid assessment tool for food choice, consumption, and knowledge about healthy foods and test the reliability of the assessment tool in young adults as an initial step in the validation process. The scale was composed of 22 photographs of foods that were ready to consume, divided into "healthy" and "unhealthy" groups typically eaten as an afternoon snack in our region. To test the reliability of the instrument, 101 college students (51 males) were asked to select three items in response to three questions: "What would you like to eat as an afternoon snack?" "What do you consider healthy?" "What do you usually eat?" The procedure was repeated in the same subjects 1 month after the first application of the instrument. Results indicated a perfect reliability ($\kappa = 1.0$) among men when asked to select what they would like to eat, and perfect reliability was found among men and women when asked to select foods that they considered healthy. Excellent reliability ($\kappa > .75$) was found among women and the total sample for foods they would like to eat and among men and women for what they usually eat. As an initial step in validating the instrument, the results suggested that it was properly developed and had reliability in the present context for studies that involve eating behavior.
Keywords: reproducibility of results, food habits, food choice, knowledge, scale, photographs, food.

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Introduction

Food practices are framed by a multilayer process that includes several biological, socio-cultural, and anthropological determinants, and they are shaped by individual situations (Gedrich, 2003; Jomori, Proença, & Calvo, 2008). They also include both observed practices and subjective aspects such as norms, opinions, values, symbolic representations, and food choices in specific situations (Garcia, 1997; Poulan & Proença, 2003). Food choices are influenced by the degree of freedom that each person has (Grunert, 1993); therefore, the choice that an individual makes at a certain moment or in a specific situation does not necessarily correspond to his/her habitual behavior.

A metaphoric framework—the food-choice kaleidoscope—was recently proposed by Jaeger, Bava, Worch, Dawson, & Marshall (2011) as an approach to study food choices that conceptualize individual food choice events (i.e., occasions for eating) as being shaped by three main factors: product, person, and place. Therefore, as such a complex process, the study of food practices faces some critical problems. An important consideration is what investigators want to study so that they select the most appropriate instrument for each objective by considering the nature of the data (e.g., what individuals really do, what they say they do,

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and their opinions, attitudes, values, preferences, and knowledge; Poulan & Proença, 2003).

Food liking is one aspect of food practices and eating behavior that has been recently investigated. One way to assess it is by using a technique that analyzes taste reactivity patterns and involves the careful assessment of hedonic and aversive behavioral reactions that are thought to be universal affective expressions and often correspond to human subjective ratings of palatability (Finlayson, King, & Blundell, 2007). According to these authors, although easy to conduct, these types of tests are considerably different from free-living eating situations. Subjective liking may also be evaluated using analog scales (e.g., the Labeled Affective Magnitude [LAM] scale) in which participants are instructed to mark a line that corresponds to their level of liking after tasting a food (Havermans, Janssen, Giesen, Roefs, & Jansen, 2009; Dressler & Smith, 2013). Nevertheless, the limitations of this methodology include the number of foods presented and tasted, which may lead to sensory fatigue and influence the participant's appetite and rating of liking (Dressler & Smith, 2013). Importantly, ratings of liking alone only provide evidence of food preference and cannot predict subsequent intake.

Several instruments and methodologies have been used to study food intake. The best-known of these include food records, 24-h dietary recall, and food frequency questionnaires, each with its own advantages and disadvantages. Food records consist of documenting all of the foods and drinks ingested and their respective quantities during a certain period of time, usually 3 to 7 days. This has been historically considered to be a very precise method that does not depend on memory but requires tremendous commitment and comprehension by the individual. Food records also take substantial time and can lead people to change their eating patterns (Johnson, 2002). Twenty-four-hour dietary recall is a snapshot of what an individual ate the day before. It is a relatively short interview that does not require as much literacy or motivation as the dietary record (Rockett, Berkey, & Colditz, 2003). However, 24-h dietary recall does not provide an accurate picture of habitual food practices. It may assess an atypical day in an individual's life and depends on memory. Food frequency questionnaires comprise a list of food, and respondents report the frequency of ingesting each item (i.e., the number of times per day, week, or month; Cade, Thompson, Burley, & Warm, 2002). It is a relatively quick and low-cost method, but it depends on memory. Additionally, some of the questionnaires are excessively long and may not contain some types of food (Salvo & Gimeno, 2002; Ribeiro, Sávio, Rodrigues, Costa, & Schmitz, 2006).

According to Harrison & Jackson (2009), attitudes about food are commonly based on preoccupations about health, and food is commonly classified as "healthy" (paired with descriptors such as "good") and "unhealthy" (paired with descriptors such as "bad"). Thus, instruments that can identify a person's knowledge about what is healthy and unhealthy are useful. Food knowledge has been related to food practices (Watson, Kwon, Nichols, & Rew, 2009). Some authors have suggested that a person's diet can be inappropriate without sufficient knowledge (Lin, Hang, Yang, & Hung, 2011). Usually, this information is assessed by questionnaires such as the one developed by Parmenter & Wardle (1999), which covers current dietary recommendations, sources of nutrients, everyday food choices, and diet-disease relationships. Another questionnaire developed by Anderson, Bell, Adamson, & Moynihan (2002) assesses knowledge about applied nutrition. Nevertheless, these methods require high literacy and take much time to administer.

Another way to assess food practices, one that is rarely used but has numerous advantages, is the picture-sort food instrument. One of the first such instruments was proposed by Kumanyika, Tell, Fried, Martel, & Chinchilli (1996) and Kumanyika, Tell, Shemanski, Martel, & Chinchilli (1997) to be used in adults. It comprises a set of foods and drinks represented as pictures on cards, and individuals are required to report the consumption frequency and portion size for each food. Jonsson, Gummeson, Conner, & Svensson (1998) and Yaroch, Resnicow, Davis, Davis, Smith, & Khan (2000) subsequently developed and tested similar instruments for children and adolescents, respectively. This method considers cognitive factors, reduces literacy demands, is more pleasant to the respondents, may be applicable to cross-cultural studies, and is quicker to administer than other methodologies (Kumanyika et al., 1996, 1997; Yaroch et al., 2000). Likewise, the photographs may be adapted to various questions (Jonsson et al., 1998).

In research on aspects of food practices, the selection and development of instruments are critical factors in the delineation process (Slater, Philippi, Marchioni, & Fisberg, 2003). The selection of the proper tool for a particular study must consider the motivation, cognitive ability, and literacy level of the participants, size and location of the population to be studied, amount of funding for the study, and details about the nutrients and food (Rockett et al., 2003). Additionally, a successful instrument needs to be relatively short, easily administered, inexpensive, accurate, and usable in a broad range of subpopulations.

The initial steps in the development of an instrument require the definition of the nutrient/food group of interest, choice of appropriate foods that will appear on the instrument, number of food items, portion size, and target population. The method must then be tested and validated. The validity of an instrument must be tested to determine whether the technique measures what it is intended to measure and whether the findings of a study provide a reasonable representation of the true situation (Cade et al., 2002; Slater et al., 2003; Magarey et al., 2011). Among the types of validities that exist, three main categories are usually used: content, construct, and criterion. According to Parmenter & Wardle (2000, p. 273), "Content validity…can be evidenced by a detailed

description and justification of the content; by careful construction of items, response formats and layout; and by independent reviews from a panel of experts on both content and interpretability." Construct validity, also referred to as discriminatory validity, may be assessed by applying the instrument in two different groups and comparing the outcomes, which must present distinct results (Feren, Torheim, & Lillegaard, 2011). Criterion validity indicates whether the construct is significantly and substantively correlated with measures of behavior (Sapp & Jensen, 1997) in which the instrument being tested is often compared with another preexisting method. Several authors agree that the most acceptable approach to determine the criterion validity of tools that are designed to measure energy intake is the Doubly Labeled Water method (Schoeller, Ravussin, Schutz, Acheson, Baertschi, & Jequier, 1986; Hill & Davies, 2001; Johnson, 2002; Raymond, Peterson, Bartholome, Raatz, Jensen, & Levine, 2012). However, because it is expensive, requires a high level of technical and analytical expertise, and is associated with the challenge of collecting daily urine samples from the subjects, this level of evaluation is rare (Collins et al., 2013).

Importantly, not all validation processes can be conducted for some outcomes, but repeatability can be assessed (Parmenter & Wardle, 2000; Wilson, Magarey, & Mastersson, 2008). Scales that are designed to measure abstract attributes such as knowledge and attitudes may have content and construct validity explored but not criterion validity (for review, see Parmenter & Wardle, 2000). The reproducibility or reliability of data consists of applying the instrument in the same group of people at least twice after a specific period of time, often 15 days to 1 month. Despite its importance, the assessment of test-retest reliability was not performed for the picture-sort food instruments mentioned above. The only exception is the instrument developed by Yaroch et al. (2000) that presented low reliability, ranging from 0.28 to 0.36 during a 2-week period. Cade et al. (2002) reviewed studies of the development, validation, and utilization of food-frequency questionnaires and concluded that less than half of the instruments had their reproducibility tested; among those that were tested, correlation coefficients between 0.5 and 0.7 were the most common.

Valid information about food practices and food choices and knowledge about healthy diets are essential bases for nutritional recommendations, public health policies, and epidemiological research on the relationships between food practices and a person's general health (Hill & Davies, 2001). However, exploration of these aspects requires the use of several distinct instruments that are often long and exhaustive and demand high literacy in the target population. Thus, the present study sought to develop a rapid assessment tool—the Food Photographs Scale—that qualifies individuals' food choices, consumption, and knowledge as "healthy" or "less healthy" and tested its reliability in young adults as an initial step in its adaptation process.

Methods

Development of the Food Photographs Scale

The first consideration when developing the scale was the meal that would be represented. After a long discussion among experts in the fields of nutrition and psychology, afternoon snacks were chosen because they are a quick meal that is generally composed of only a few items, which would allow the scale to have less food variability. We then selected the items that would comprise the instrument. This procedure was conducted by two nutritionists and one psychologist who considered foods that are typically consumed as part of this meal in this specific population. Such foods were identified by previous studies (Marcondelli, Costa, & Schmitz, 2008; Monteiro, Andrade, Zanirati, & Silva, 2009). The nutritional content of each item was also considered.

Table 1 presents the nutrient composition of the items selected according to the U.S. Department of Agriculture National Nutrient Database for Standard Reference (U.S. Department of Agriculture, Agricultural Research Service, 2001). The items "natural sandwich," "chicken drumstick," and "fried pastry" were absent in the American database; thus the nutritional content of these foods were described using the Brazilian Table of Food Composition sponsored by the Brazilian Ministry of Health (Center for Studies and Research on Foods, 2011). We considered the amount of energy, fat (i.e., saturated fat, unsaturated fat, and cholesterol), and fiber contained in the food. Twenty-two items were selected and divided into two groups: "healthy" and "less healthy" (11 items each). The "healthy" group consisted of pineapple, apple, natural fruit juice, papaya, orange, banana, ready-to-eat cereal, yogurt, milk, cereal bar, and natural sandwich (i.e., made of whole-wheat bread, lettuce, carrot, and ricotta). Notice that the majority of these items provide few calories and have a low quantity of fat and reasonable fiber content. The ready-to-eat cereal is more caloric but has no fat and has a high fiber content. The cereal bar is highly energetic but provides a good source of unsaturated fat and fiber. Additionally, we included dairy products in this group. Although they presented a high fat content and no fiber, they are considered functional foods that are replete with bioactive peptides, probiotic bacteria, antioxidants, highly absorbable calcium, conjugated linoleic acid, and other biologically active components (Campos, 2013).

The "less healthy" group consisted of soft drink, chocolate ice cream, stuffed cake, hot dog, cheeseburger, chicken drumstick, stuffed biscuits, fried pastry (i.e., made of wheat flour and filled with cheese, meat, or other fillings), chocolate bar, potato chips, and popcorn. All of these items are extremely caloric and have a high amount of fat, especially saturated fat and cholesterol.

After the definition of the items that would comprise the instrument, the foods were prepared and place on a white plate to be photographed. All of the items are

Table 1. Nutritional content per 100 g of the items on the scale

Item	Energy (kcal)	Protein (g)	Total lipids (fat) (g)	Saturated fatty acids (g)	Unsaturated fatty acids (g)	Cholesterol (mg)	Carbohydrates (g)	Total fiber (g)
Healthy								
Pineapple	48	.54	.12	.01	.06	—	12.63	1.40
Apple	52	.26	.17	.03	.06	—	13.81	2.40
Natural fruit juice	45	.70	.20	.02	.07	—	10.40	.20
Papaya	43	.47	.26	.08	.12	—	10.82	1.70
Orange	63	1.30	.30	.03	.11	—	15.5	4.50
Banana	89	1.09	.33	.11	.10	—	22.84	2.60
Ready-to-eat cereal	357	7.50	.40	.12	.26	—	84.10	3.30
Yogurt	61	3.47	3.25	2.09	.98	13.00	4.66	—
Milk	64	3.28	3.66	2.28	1.19	14.00	4.65	—
Cereal bar	409	9.09	9.09	-	8.62	—	72.73	1.80
Natural sandwich*	159	8.79	4.68	2.05	1.77	24.5	19.29	3.83
Less Healthy								
Soft drink	42	—	—	—	—	—	10.6	—
Chocolate ice cream	216	3.80	11.00	6.80	3.62	34.00	28.20	1.20
Stuffed cake	371	5.66	14.33	9.16	5.16	—	55.00	1.33
Hot dog	247	10.60	14.84	5.21	8.73	45.00	18.4	—
Cheeseburger	313	14.48	14.85	6.34	7.17	49.00	31.13	—
Chicken drumstick*	274	13.41	16.88	2.60	8.10	15.00	16.54	.88
Stuffed biscuits	466	5.33	19.08	3.68	12.89	.00	71.64	2.90
Fried pastry*	388	10.10	20.10	4.80	13.5	25.00	43.80	1.00
Chocolate bar	505	3.90	34.20	20.08	12.21	4.65	59.59	5.5
Potato chips	543	5.60	36.60	12.90	15.90	—	51.20	2.50
Popcorn	583	7.29	43.55	6.82	33.00	—	45.06	8.10

*According to the Brazilian Table of Food Composition.

presented in their final form (i.e., ready to eat). No packaging was shown, and all photographs correspond to one portion of the food, defined according to the parameters proposed by Monteiro & Chiarello (2007). Foods were photographed and passed through image-processing software to improve picture quality. Each item was transformed into a 5.12 × 5.12 inch color photograph and covered by rigid transparent plastic with a blue background (Figure 1).

The instrument should be presented in a random order, and the participants must select three items from the set of photos that they would like to eat as an afternoon snack and three items that they considered healthy. The participants should also select the foods that comprise the meal that they usually eat. The main aim of the scale is to classify answers as "healthy" and "less healthy" to provide qualitative data. Therefore, the choices should be classified according to the majority of the answers (i.e., "healthy" is denoted when two or three items are from this group, and "less healthy" is denoted when two or three foods are from this group). Importantly, the participants are not aware that this response classification will be done. With regard to the third question (i.e., what the participants usually eat), in cases in which no items match their usual snack, the subjects should be oriented toward selecting a similar item.

Test-retest reliability analysis

A convenience sample of 101 college students (51 males and 50 females) from different courses at a private university in a city in the state of São Paulo, Brazil participated in the study. The sample size was based on the review by Cade et al. (2002) and previous studies that used the same methodology. The participants' ages ranged from 19 to 32 years. The inclusion criteria included age >18 years and being enrolled in one of the courses offered by the university. No participant attrition occurred between the two time-points of the study. Participation was completely voluntary and no rewards were given. Anthropometric characteristics of the sample are presented in Table 2.

The study was approved by the Academic and Ethics Committee of the University of Ribeirão Preto (UNAERP) and informed consent was obtained from all

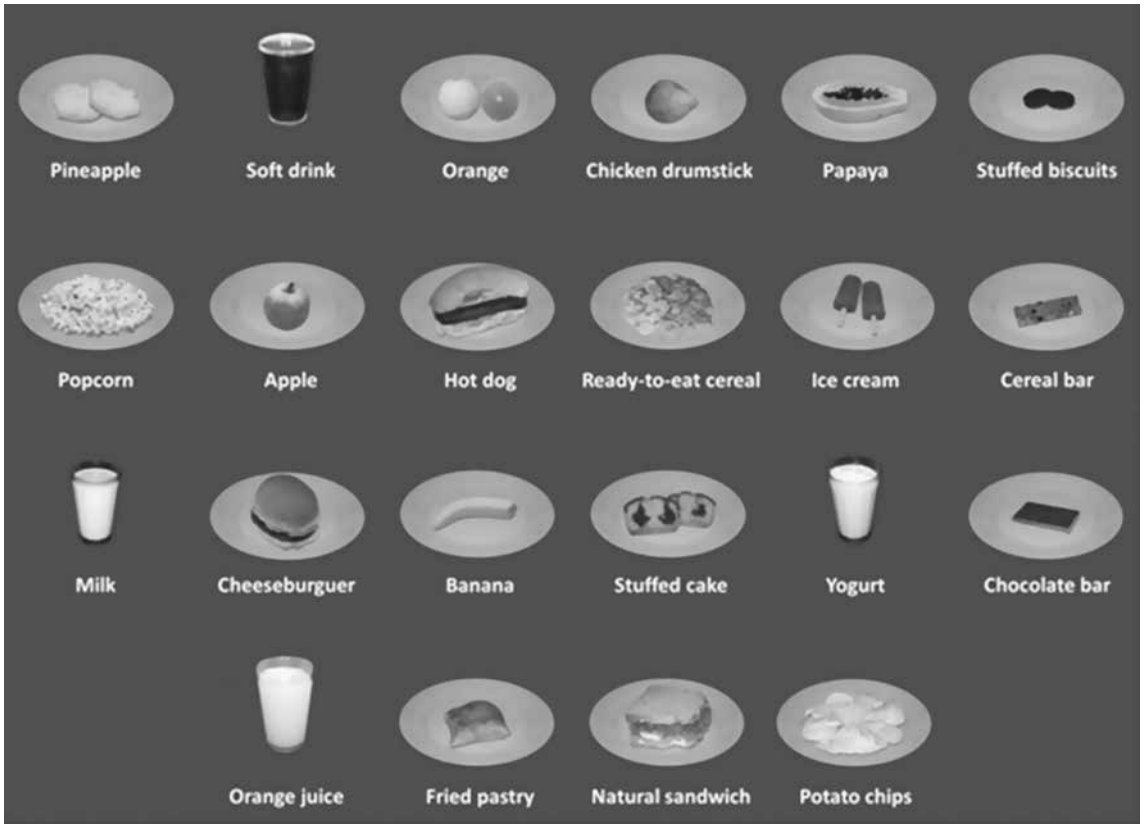

Figure 1. Food Photographs Scale.

Table 2. Descriptive anthropometric characteristics of the sample by gender (n = 101)

Sample	Men	Women	Total
n	**51**	**50**	**101**
Age (years)			
Mean	22.41	22.82	22.61
SEM	.30	.35	.23
95% CI	21.80-23.02	22.11-23.52	22.15-23.07
Range	19.0-30.0	20.0-32.0	19.0-32.0
Weight (kg)			
Mean	77.96	63.42	70.76
SEM	1.25	1.35	1.17
95% CI	75.45-80.46	60.70-66.13	68.44-73.08
Range	62.5-94.0	48.0-88.6	48.0-94.0
Height (m)			
Mean	1.77	1.66	1.72
SEM	.01	.01	.01
95% CI	1.75-1.79	1.63-1.67	1.69-1.73
Range	1.60-1.92	1.54-1.77	1.54-1.92
Body mass index (kg/m^2)			
Mean	24.85	23.17	24.02
SEM	.39	.49	.32
95% CI	24.06-25.62	22.18-24.14	23.37-24.65
Range	19.01-30.69	17.57-31.70	17.57-31.70

CI, confidence interval.

participants. Data were collected in a private room on the campus at two different times by a single researcher. During the first time-point of the study (i.e., test), the students were asked to participate by the researcher. After agreeing to participate, the test was conducted in the room. The participants were introduced to the Food Photographs Scale. After answering all of the questions, the participants' weights and heights were measured.

The second time-point of the study (i.e., re-test) occurred exactly 1 month later. The participants were contacted by the researchers and requested to attend at a specific time and location. The participants were asked to again answer the same three questions.

Statistical analysis

Statistical analyses were performed using SPSS 17.0 software. The Kolmogorov-Smirnov test indicated a normal distribution of the data. Anthropometric characteristics were described as means, standard errors of the mean (SEMs), 95% confidence intervals, and ranges. The foods selected in response to each of the questions were evaluated as absolute frequencies and classified as "healthy" or "less healthy." According to the recommendations of Masson et al. (2003), test-retest reliability was evaluated using the kappa statistic. These authors stated that if categorical data are used, then the percentages should be classified into the same/opposite category, and the weighted kappa may provide a more appropriate performance indicator. Coefficients were classified according to the recommendations of Rosner

(2010): $\kappa = 1.0$ indicates perfect reproducibility, $\kappa > 0.75$ indicates excellent reproducibility, $0.4 \leq \kappa \leq 0.75$ indicates good reproducibility, and $0 \leq \kappa \leq 0.4$ indicates marginal reproducibility.

Results

The reliability results of the scale for each question are presented in Table 3. High consistency was found for all of the questions ($\kappa > .70$), indicating good agreement between food choices in the test-retest evaluation. Perfect reliability ($\kappa = 1.0$) was found among men when asked to select what they would like to eat. Perfect reliability was also found among men and women when asked to select foods they considered "healthy." Excellent reliability ($\kappa > .75$) was found among women and the total sample for foods they would like to eat and among men and women for what they usually eat.

Tables 4, 5, and 6 present the number of times each item was chosen by men and women in response to each question in both applications of the instrument. Although some foods were chosen more or fewer times between the two applications of the instrument, the items were generally the same.

Table 3. Absolute frequency on test-retest of food choices and kappa coefficients for the Food Photographs Scale

Sample	Men	Women	Total
n	**51**	**50**	**101**
Would like to eat (test)			
Healthy	12	10	22
Less healthy	39	40	79
Would like to eat (re-test)			
Healthy	12	9	21
Less healthy	39	41	80
Kappa coefficient (κ)	1.0*	.935*	.942*
Considered healthy (test)			
Healthy	51	50	101
Less healthy	—	—	—
Considered healthy (re-test)			
Healthy	51	50	101
Less healthy	—	—	—
Kappa coeficient (κ)	1.0*	1.0*	1.0*
Usually eat (test)			
Healthy	29	36	65
Less healthy	22	14	36
Usually eat (re-test)			
Healthy	34	38	72
Less healthy	17	12	29
Kappa coefficient (κ)	.794*	.896*	.708*

*$p < .00$

Discussion

In the present study we sought to develop a single, rapid assessment tool that qualifies individual food choices, consumption, and knowledge as "healthy" or "less healthy" and test its reliability in young adults. The perfect/excellent test-retest reliability results indicated that the measures remained unchanged 1 month after the first application of the instrument. Therefore, the instrument presented reliable and trustworthy data in the evaluation of food choices and consumption. The scale was also able to assess a person's knowledge about healthy foods.

The relevance of studying food habits is largely known. Using the instrument proposed herein, qualifying individuals' diets is possible, and populations can be identified that are at risk for developing health problems. The evaluation of possible associations between food consumption and health conditions is also possible. Little attention has been given to a person's food choices in specific situations. Such questions are important when considering that people choose food in a context-dependent manner (Falk, Sobal, Bisogni, Connors, & Devine, 2001). Therefore, a measure that allows the qualification of choices under experimental or "real" conditions may be useful for identifying food choices in various situations. For example, within the food-choice kaleidoscope, photographs can be used to evaluate foods and beverages that are consumed (i.e., product), the contextual/environmental influences on choices (i.e., place), and how individuals differ with regard to their consumption (i.e., person; Jaeger et al., 2011). A practical application of the instrument within this perspective is the study by Laus (2013) who evaluated the effect of thin media images on undergraduates' food choices. The author asked men and women to select three items from the set of 22 foods that they would like to eat as an afternoon snack. The participants were then presented with images of individuals who represented the ideal body propagated by the media. The participants were then asked again to select the food that they would like to eat. The results from this study demonstrated that the scale was able to assess students' choices and capture differences between the two times of evaluation.

Evaluating individual's knowledge about healthy and unhealthy foods is also important in which the classification of foods is a critical component of the process of making food choices. Consciousness about what is good or not good for health has been identified as frequently occurring when selecting everyday food (Falk et al., 2001). Harrison & Jackson (2009) discussed what makes a food "healthy." In their study, young participants maintained that healthy foods are natural and nutritious (i.e., the foods have nothing "bad" added and nothing removed). Unlike healthy foods, unhealthy foods were thought to be artificial and unnatural (i.e., foods that are processed or contain artificial ingredients or excessive sugar or fat). All of the participants in our study demonstrated that they knew what is or is

Table 4. Number of times each item was selected at the two time-points of the study by men and women when asked to select the three items they would like to eat

Men				Women			
Test		Re-test		Test		Re-test	
Item	No. choices	Item	No. choices	Item	No. choices	Item	No. choices
Soft drink	19	Soft drink	18	Natural fruit juice	16	Natural fruit juice	18
Cereal bar	14	Natural fruit juice	15	Soft drink	14	Soft drink	16
Natural fruit juice	14	Natural sandwich	14	Stuffed cake	13	Yogurt	13
Potato chips	14	Cheeseburger	13	Yogurt	12	Popcorn	12
Cheeseburger	13	Stuffed biscuits	12	Natural sandwich	10	Natural sandwich	11
Natural sandwich	12	Cereal bar	9	Popcorn	9	Stuffed cake	11
Stuffed cake	10	Chocolate bar	9	Cereal bar	8	Chocolate ice cream	10
Stuffed biscuits	9	Chocolate ice cream	8	Hot dog	8	Hot dog	9
Yogurt	7	Potato chips	8	Chocolate ice cream	8	Chocolate bar	9
Chocolate bar	6	Hot dog	7	Chocolate bar	8	Stuffed biscuits	8
Popcorn	5	Apple	6	Fried pastry	8	Cereal bar	7
Milk	4	Ready-to-eat cereal	6	Cheeseburger	6	Cheeseburger	7
Apple	4	Stuffed cake	6	Pineapple	5	Pineapple	5
Ready-to-eat cereal	4	Banana	5	Chicken drumstick	5	Banana	3
Hot dog	4	Chicken drumstick	4	Potato chips	5	Potato chips	3
Chocolate ice cream	4	Popcorn	4	Banana	4	Milk	2
Chicken drumstick	4	Yogurt	3	Stuffed biscuits	4	Apple	2
Papaya	2	Fried pastry	3	Milk	2	Fried pastry	2
Banana	2	Milk	2	Apple	2	Orange	1
Orange	1	Pineapple	1	Orange	2	Chicken drumstick	1
Fried pastry	1	Orange	—	Papaya	1	Papaya	—
Pineapple	—	Papaya	—	Ready-to-eat cereal	—	Ready-to-eat cereal	—

Table 5. Number of times each item was selected at the two time-points of the study by men and women when asked to select the items they usually eat

Men				Women			
Test		Re-test		Test		Re-test	
Item	No. choices	Item	No. choices	Item	No. choices	Item	No. choices
Cereal bar	28	Natural sandwich	27	Natural sandwich	26	Cereal bar	25
Natural sandwich	23	Cereal bar	22	Natural fruit juice	25	Natural fruit juice	23
Natural fruit juice	21	Natural fruit juice	20	Cereal bar	23	Natural sandwich	20
Banana	19	Stuffed biscuits	17	Banana	12	Banana	18
Milk	16	Soft drink	14	Milk	8	Stuffed biscuits	14
Stuffed biscuits	12	Banana	13	Stuffed biscuits	8	Apple	8
Soft drink	10	Milk	12	Yogurt	7	Stuffed cake	8
Apple	5	Potato chips	4	Stuffed cake	7	Milk	6
Fried pastry	4	Apple	3	Apple	6	Soft drink	6
Chicken drumstick	2	Stuffed cake	3	Soft drink	5	Potato chips	5
Yogurt	1	Fried pastry	2	Potato chips	3	Yogurt	4
Stuffed cake	1	Chicken drumstick	1	Fried pastry	2	Chocolate bar	1
Pineapple	—	Cheeseburger	1	Pineapple	1	Pineapple	—
Orange	—	Chocolate bar	1	Orange	—	Orange	—
Papaya	—	Pineapple	—	Papaya	—	Papaya	—
Ready-to-eat cereal	—	Orange	—	Ready-to-eat cereal	—	Ready-to-eat cereal	—
Hot dog	—	Papaya	—	Hot dog	—	Hot dog	—
Chocolate ice cream	—	Ready-to-eat cereal	—	Chocolate ice cream	—	Chocolate ice cream	—
Cheeseburger	—	Yogurt	—	Chicken drumstick	—	Chicken drumstick	—
Chocolate bar	—	Hot dog	—	Cheeseburger	—	Cheeseburger	—
Popcorn	—	Chocolate ice cream	—	Chocolate bar	—	Fried pastry	—
Potato chips	—	Popcorn	—	Popcorn	—	Popcorn	—

Table 6. Number of times each item was selected at the two time-points of the study by men and women when asked to select the three items considered healthy

Men				Women			
Test		Re-test		Test		Re-test	
Item	No. choices	Item	No. choices	Item	No. choices	Item	No. choices
Natural sandwich	25	Papaya	23	Yogurt	20	Apple	20
Ready-to-eat cereal	24	Natural sandwich	22	Pineapple	18	Natural fruit juice	17
Natural fruit juice	19	Milk	19	Cereal bar	18	Pineapple	16
Papaya	18	Ready-to-eat cereal	18	Natural sandwich	17	Milk	16
Orange	14	Banana	16	Apple	16	Banana	15
Yogurt	13	Natural fruit juice	14	Milk	14	Natural sandwich	14
Banana	12	Pineapple	12	Papaya	12	Papaya	14
Milk	11	Orange	12	Natural fruit juice	11	Cereal bar	12
Pineapple	8	Cereal bar	7	Banana	10	Orange	12
Cereal bar	5	Apple	7	Orange	9	Yogurt	11
Apple	4	Yogurt	3	Ready-to-eat cereal	5	Ready-to-eat cereal	3
Hot dog	—	Hot dog	—	Hot dog	—	Hot dog	—
Chocolate ice cream	—	Chocolate ice cream	—	Chocolate ice cream	—	Chocolate ice cream	—
Stuffed cake	—	Stuffed cake	—	Stuffed cake	—	Stuffed cake	—
Chicken drumstick	—	Chicken drumstick	—	Chicken drumstick	—	Chicken drumstick	—
Cheeseburger	—	Cheeseburger	—	Cheeseburger	—	Cheeseburger	—
Stuffed biscuits	—	Stuffed biscuits	—	Stuffed biscuits	—	Stuffed biscuits	—
Chocolate bar	—	Chocolate bar	—	Chocolate bar	—	Chocolate bar	—
Fried pastry	—	Fried pastry	—	Fried pastry	—	Fried pastry	—
Soft drink	—	Soft drink	—	Soft drink	—	Soft drink	—
Popcorn	—	Popcorn	—	Popcorn	—	Popcorn	—
Potato chips	—	Potato chips	—	Potato chips	—	Potato chips	—

not healthy. However, when asked about the food they would like to eat, the majority of the participants (n = 79) selected less healthy items. Moreover, more than a third of the participants reported that they usually eat this kind of food.

Such information is extremely useful in the area of public health because knowledge is not necessarily related to healthy eating habits, leading to the necessity of reevaluating campaigns to improve people's diets through nutritional education alone. Actual programs may be too focused on prevention via information. As suggested by Harrison & Jackson (2009), focus should be placed on motivation, meaning, values, and attitudes toward dietary habits as a means of understanding these behaviors.

The proposed method has several limitations. It depends on the individual's memory when used to qualify usual consumption. It also does not quantify people's intake and has a limited number of food items. Incomplete data related to the validity of the scale is also a limitation. Although testing criterion validity is not possible in measures that assess nutritional knowledge and food choices, content and construct validity can be investigated. Thus, studies of this nature should be conducted with the present scale. Finally, test-retest reliability assessed in the present study cannot detect the existence of systematic error. One problem with using the identical test for test-retest reliability is that individuals may learn from the first administration and carry such learning over to the next session (Talmage & Rasher, 1981).

Conclusion

Despite its limitations, the Food Photographs Scale can provide information about whether subjects usually consume "healthy" foods and classify this trait with regard to foods that individuals choose in specific situations. The scale also provides information about a person's knowledge about healthy foods. Importantly, the Food Photographs Scale is not an instrument that is intended to explain the responses to these questions but rather describe them. As cited elsewhere, methodologies that utilize food photographs have numerous advantages. They require a lower literacy level and engage the participant. They can be used for different subpopulations and different ages, and the time necessary for administration is less than or equal to the time required for other instruments. Moreover, the scale proposed herein may be adapted to several situations, conditions, and populations. Researchers interested in using this methodology may increase the number of items including country/location-specific foods or adapt it for use with different ranges of ages.

Thus, the initial phase of the adaptation of the Food Photographs Scale for young adults suggested that the instrument was developed appropriately and

had reliability in the present context for investigations that involve food choice and consumption and people's knowledge about healthy foods.

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