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Nutrition Literacy: Foundations and Development of an Instrument for Assessment

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NUTRITION LITERACY: FOUNDATIONS
AND DEVELOPMENT OF AN INSTRUMENT FOR ASSESSMENT

BY

HEATHER DIANE GIBBS

DISSERTATION

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Food Science and Human Nutrition
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Abstract

Health literacy has emerged as an area of increasing research focus in the medical literature, yet it has received little attention in the nutrition literature. Registered dietitians (RDs) should be concerned about low health literacy considering its associations with decreased knowledge of disease and management, increased hospitalizations, decreased use of preventive care services, and increased cost of health care. Thus, this research attempts to apply the concept of health literacy into the context of nutrition.

Investigation into whether RDs screen for health literacy and/or adjust teaching methods for different level learners revealed that 79.2% (n=99) of RDs surveyed (n=125) did not use a health literacy assessment instrument. This lack of instrument use may be explained by the lack of health literacy instruments for use in nutrition education settings. Identification instruments, such as the Rapid Estimate of Adult Literacy in Medicine (REALM), the Test of Functional Health Literacy in Adults (TOFHLA), and the Newest Vital Sign (NVS) can provide the RD with an understanding of an individual's print literacy and/or numeracy, but do not provide an understanding of additional knowledge or skills specific to nutrition.

We sought the help of RDs to determine what skills and/or knowledge are necessary for effective nutrition education in order to incorporate these ideas into an instrument specific to nutrition. Our study involved targeted interviews (n=8) that indicated that the skills required for nutrition education are dependent upon the type of diet instruction. Conceptual skills for macronutrients were important for diabetes (n=5), as well as basic math (n=4 yes; 2=depends) and portion sizes (n=4 yes; 2=depends). Knowledge of MyPyramid/food groups yielded mixed

results (n=3 yes; 2=depends, 2=no; 1=no response). In addition, four indicated that all prompted components (macronutrient knowledge, food group knowledge, basic math skills, and competency with household measurements) were important. Unprompted comments indicated that diet and disease/health concepts were important (n=4) as well as knowledge of food composition/ingredients (n=3).

Consequently, we developed the Nutrition Literacy Assessment Instrument (NLAI), an original instrument containing an algorithm to direct the RD to assess only the skills or knowledge areas that the client requires education, and items intending to measure an individual's skill or knowledge in the areas aforementioned. Items included in the NLAI were based on literature review and our targeted interviews. The NLAI was pilot-tested against the REALM with RDs and their clients and was critiqued separately by a group of RDs online.

Preliminary data from the pilot study (n=21) indicated that print literacy and nutrition literacy are different constructs, where 91% scored in the highest range of the REALM (at or above 9th grade reading) but only 62% achieved adequate nutrition literacy in all scored areas of the NLAI. The pilot also indicates 38% agreement between subjective and objective RD (n=3) measures of nutrition literacy, suggesting discrepancy between the perception of the RD and the client's tested abilities. Significant research barriers were encountered for RDs to participate in research as a part of this pilot study, but proposed changes by the Department of Health and Human Services to the "Common Rule" may lessen this barrier in the future.

Content and face validity were established for the NLAI via a second survey of RDs when compared with the following scale: "average agreement at or above 70% is necessary,

above 80% is adequate, and above 90% is good,” (House, House & Campbell, 1981).

Agreement for inclusion of all sections of the instrument was reached including the Algorithm (81.8%), “Nutrition and Health” (80.9%), “Macronutrients” (87.1%), “Household Food Measurement” (94.5%), and “Food Groups” (90.7%). Additionally, a majority (79.9%) preferred the NLAI over the REALM as a measure of nutrition literacy. Future research efforts will seek to establish construct validity and reliability for the NLAI.

For Emilia, Audra, and Eleanor,

May you grow to be women of integrity, compassion, and strength.

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Chapter 1: Literature Review

Health Literacy

Introduction

The United States (US) Department of Health and Human Services (2000) and the Institute of Medicine (2004) have defined *health literacy* as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” (Nielsen-Bohlman, 2004). The term encompasses all of the skills a person needs in order to make positive health choices, and clearly involves more than literacy alone. In the National Assessment of Adult Literacy (NAAL), the US Department of Education measured health literacy (2003), grouping tasks into three domains including:

- The *clinical* domain encompasses those activities associated with the health care provider-patient interaction, clinical encounters, diagnosis and treatment of illness, and medication.
- The *prevention* domain encompasses those activities associated with maintaining and improving health, preventing disease, intervening early in emerging health problems, and engaging in self-care and self-management of illness.
- The *navigation* of the health care system domain encompasses those activities related to understanding how the health care system works and individual rights and responsibilities (2006).

In 2004, the Institute of Medicine (IOM) brought the issue to national attention in its report, *Health Literacy: A Prescription to End Confusion*. This report states that “people with

reduced health literacy have less knowledge of disease management and of health-promoting behaviors, report poorer health status, and are less likely to use preventive services” (Neilson-Bolhman, 2004). Further, it is considered a patient’s right to understand his/her healthcare options and plan of care. The Joint Commission on Health Care Accreditation measures compliance of healthcare facilities on several issues including patient safety. Poor health literacy among patients makes compliance with these standards difficult because these patients have limited understanding of their health care (Murphy-Knowll, 2007).

Results of the NAAL showed that only 12% of those surveyed had *proficient* health literacy, which means the majority of Americans exhibit some level of difficulty in managing their health care. The study identified 14% of participants who had *below basic* health literacy skills, defined as “no more than the most simple and concrete literacy skills,” and 22% of participants had *basic* health literacy skills, defined as “skills necessary to perform simple and everyday literacy activities.” The remaining 53% demonstrated *intermediate* health literacy, or “skills necessary to perform moderately challenging literacy activities (US Department of Education, 2006). The IOM estimated nearly half of Americans have difficulty understanding and making choices for their health care (Neilson-Bohlman, 2004).

Some demographics have been identified in order to better understand the population subgroups that may experience a higher rate of limited health literacy. In terms of ethnicities, the NAAL reported that Hispanic adults had lower average health literacy compared to any other racial/ethnic group, while White and Asian/Pacific Islander adults had higher average health literacy. Adults living at or below the poverty level averaged health literacy scores at or below basic levels. Adults over the age of 65 years had lower average health literacy scores compared

with younger age groups. In this age group, 29% were found to have below basic skills and 30% were identified having basic skills (US Department of Education, 2006). This last dynamic is particularly striking considering the number of patients who fall into this age category. For all Americans, this population group accounts for 12% of the total population with expected growth to 20% in 2030 (He, et al, 2005; Schwartzberg, et al, 2005), and with hospitalization rates three times that of any other age group (Administration on Aging, 2009).

Consequences of Poor Health Literacy

The consequences of poor health literacy reach beyond the individual, affecting the larger health care environment. The IOM (2004) identified four general relationships between health care and reduced health literacy including decreased knowledge of illness and management, increased hospitalization rates, decreased use of preventive care services, and increased cost of health care.

Williams et al (1998) evaluated patients with hypertension (n=402) or diabetes (n=114), testing for functional health literacy as measured by the TOFHLA (Test of Functional Health Literacy in Adults), and knowledge of disease and management. Significant differences were found in knowledge for each disease category between two groups, inadequate health literacy and adequate health literacy. In regard to questions with relationship to nutrition, for hypertension, 63% of those with inadequate health literacy versus 80.8% with adequate health literacy knew canned vegetables are high in salt. For those with inadequate health literacy, only 40% knew exercise lowers blood pressure versus 68% of those with adequate health literacy.

For diabetes, 38% of those with inadequate health literacy versus 72.6% with adequate health literacy knew how to treat symptoms of low blood glucose.

Another factor associated with poor health literacy is increased hospitalizations. Baker et al (2002) evaluated 3,260 new Medicare managed care enrollees in four US cities for health literacy (by TOFHLA) and the number of hospitalizations for an 18-24 month period. Results indicated a significant difference in hospitalization rates between those with inadequate and marginal health literacy and adequate health literacy ($p < 0.001$). Of the 29.5% who were hospitalized, 34.9% had inadequate health literacy, 33.9% had marginal health literacy, and 26.7% had adequate health literacy.

A third factor associated with poor health literacy concerns preventive care services, an area where we would often place nutrition care. White et al (2008) evaluated the relationship between health literacy and self-reported preventive care in the US Department of Education's sample from their National Assessment of Adult Literacy ($n = 18,000$). Preventive services measured included: self-reported dental check-up, vision checkup, osteoporosis screening, colon cancer screening, pneumonia shot (for those over 65 years only), flu shot, pap smear (females under 65 years only), mammogram (in women), and prostate cancer screening (in men). Low health literacy was associated with a decrease in pap smear and vision check-up in ages 16-39 years, decreased dental care and prostate cancer screening in ages 40-64 years, and a decrease in all preventive measures for those over 65 years. Again, this last age group is a particular concern.

With the other factors in mind, it only makes sense that those with low health literacy incur greater expenses for health care. Eichler et al (2009) conducted a review of ten studies evaluating the economic costs of reduced health literacy. In terms of health care spending in the US, Vernon et al (2007) estimate that costs due to limited health literacy account for 3-5% of total spending. The individual with limited health literacy can expect to spend \$143 to \$7,798 more per year than those with adequate health literacy.

Identification Techniques

Assessments to measure health literacy are available but have their limitations. In a study conducted by the Joint Commission on the Accreditation of Health Care Administration, Wilson-Stronks (2007) reported that of hospitals studied, 20% collected information about patients' literacy levels. Often, patients are asked to report the last level of school attainment, which many assume would indicate level of literacy. However, trends in studies indicate the health literacy level is frequently 3-4 years below the highest grade completed in school (Cutilli, 2007). Moreover, the NAAL (US Department of Education, 2006) reports that of those adult participants with a 4-year college degree, 3% had *below basic* health literacy (defined above), which further illustrate the potential for inaccurate assumptions if a clinician considers educational attainment without specific assessment of health literacy. In fact, Schillinger et al (2006) identify health literacy as a mediator between education level attained and health outcomes, suggesting health literacy, not education level is a more important consideration for health educators.

The IOM recognized two assessment tools: the *Test of Functional Health Literacy in Adults (TOFHLA)* and the *Rapid Estimate of Adult Health Literacy in Medicine (REALM)* (Neilson-Bohlman, 2004). Both of these tools identify print literacy in the context of health care. The REALM (Davis et al, 1993) was the first literacy instrument developed for a health care setting. This test consists of three columns of 22 words (totaling 66 words) in order of number of syllables and difficulty. Patients are asked to read the words aloud, with notations made by the assessor for correct or incorrect pronunciations or words not attempted. Importantly, correct pronunciations do not indicate understanding, only familiarity with words. Although the REALM is quick, it has its limitations since it is only a predictor of reading ability.

In addition to assessment of print literacy, one of the TOFHLA's strengths is that it also assesses numeracy, another recognized component of health literacy (Parker et al, 1995). The reading comprehension section of the TOFHLA consists of a 50-item test involving a method for reading comprehension measurement known as the cloze procedure (Taylor, 1957). In this method, a series of passages is read by the individual and are followed by a series of questions over the passages where every fifth to seventh word is replaced by a blank. The subject must then choose the most appropriate word to fill in the blank from a list of four words. In the TOFHLA, passages are drawn from actual medical literature for patients including instructions for preparation for an exam, the patient rights and responsibilities section of a Medicaid application form, and an informed consent form. The 17-item numeracy section is similar in format and includes questions over hospital forms and prescription bottles. Unfortunately, the TOFHLA takes up to 22 minutes to administer, which limits its use to research settings. A shortened version, known as the S-TOFHLA (Baker et al, 1998), was later developed, reducing

the time estimate for assessment to 12 minutes. Both the TOFHLA and the S-TOFHLA are available in English and Spanish versions.

The *Newest Vital Sign* (NVS) (Weiss et al, 2005) is a newer instrument that also measures both literacy and numeracy, requires only three minutes for administration, and consists of a nutrition label with six accompanying questions. It is available in both English and Spanish versions.

Standard Methods for Reliability and Validity Testing

Rapid Estimate of Adult Literacy in Medicine

The REALM, shortened from its original format, was tested in 203 patients (mean age = 43 years; 82% female; 76% African-American; 47% completed high school) from four university hospital clinics (obstetrics & gynecology, internal medicine, family practice, and ambulatory care) that target low-income individuals. Content and face validity for the REALM were based on its use of words commonly used in patient education materials and forms. Criterion validity was established for the REALM through correlations between scores for the REALM and for three standardized reading tests that also measure an individual's ability to pronounce words in order of difficulty, including the Slosson Oral Reading Test-Revised (SORT-R), Peabody Individual Achievement Test Revised (PIAT-R) and the Wide Range Achievement Test-Revised (WRAT-R). Pearson correlation coefficients were determined to establish correlation between the standardized tests and the REALM ($p < 0.0001$). Test-retest reliability was established at 0.99 ($p < 0.001$) (Davis et al, 1993).

Test of Functional Health Literacy in Adults and the Shortened-Test of Functional Health Literacy in Adults

The TOFHLA was tested in 200 English-speaking (mean age = 40, 51% female, 91% African-American, 41% < high school education, 44% receive public assistance) and 203 Spanish-speaking (mean age = 42 years, 68% female, 99% Hispanic; 76% < high school education, 20% receive public assistance) individuals at two public teaching hospitals. Parker et al (1995) report content and face validity for the TOFHLA through their use of hospital literature in both the reading comprehension and numeracy sections. Construct validity was established for reading comprehension through Spearman's rank correlation between the TOFHLA and the standardized literacy assessment instrument known as the Wide Range Assessment Technique, revised (WRAT-R) (0.74; $p < 0.001$) and the REALM (0.84; $p < 0.001$) for the English version only (neither the REALM or WRAT-R are available in Spanish). Reliability was significant with internal consistency measured by Cronbach's alpha at 0.98 for both English and Spanish versions. Test-retest reliability measured by the Spearman-Brown coefficient was also significant for English (0.92) and Spanish (0.84) versions. Similarly, the S-TOFHLA was also validated against the REALM with significant correlations ($p < 0.001$) (Baker et al, 1999).

Newest Vital Sign

The NVS was tested in 250 English-speaking (mean age = 41.3 years; 43% Hispanic, mean years completed in school = 12.7; 27% received public assistance) and 250 Spanish-speaking (mean age = 40.8 years, 100% Hispanic, mean years completed in school = 10.7, 32% receive public assistance) individuals from three primary care practices (two faculty practices,

one publicly funded) affiliated with the University of Arizona College of Medicine. Reliability was established for the NVS (Weiss et al, 2005) by Cronbach's alpha of 0.76 (English) and 0.69 (Spanish). Criterion validity was established against the TOFHLA by Pearson's correlation for English ($r = 0.59$, $p < 0.001$) and Spanish ($r = 0.49$, $p < 0.001$).

Scoring and Application to Health/Nutrition Education

Rapid Estimate of Adult Literacy in Medicine

Linear regression analysis was performed to compare raw scores on the REALM to the SORT-R to determine grade range estimates of reading. However, the authors caution: "patient scores on the REALM must be interpreted as estimates of literacy not grade equivalents.

Clinicians and researchers can use the grade ranges to identify patients who may have difficulty reading materials given to them in medical settings, provide a numerical estimate of how severe their reading difficulty is, and select or create materials written at the appropriate level." The following table provides scoring interpretation (Davis et al, 1993, Table 1, p.394):

Raw Score	Grade Range Estimates
0-18	Third Grade and Below May not be able to read most low-literacy materials. May need repeated oral instructions, materials composed primarily of illustrations, or audio- or video-tapes
19-44	Fourth to Sixth Grade May need low-literacy materials; may not be able to read prescription labels
45-60	Seventh to Eighth Grade May struggle with most currently available patient education materials
61-66	Ninth Grade and Above Should be able to read most patient education materials

Test of Functional Health Literacy in Adults and the Shortened-Test of Functional Health Literacy in Adults

These instruments do not assign grade ranges of reading level as the REALM does but rather provide one of three classifications of functional health literacy. For the TOFHLA (Parker et al, 1995), the raw score is converted into a scaled score out of 100 with 59 and below considered “inadequate” functional health literacy, scores of 60-74 are considered “marginal” functional health literacy and scores of 75 and above are considered “adequate” functional health literacy. The S-TOFHLA (Baker et al, 1999) is scored out of 36 as inadequate health literacy (0-16), marginal health literacy (17-22) or adequate health literacy (23 and above).

Newest Vital Sign

Scoring for the NVS is based on a total possible score of six, where “0-1 suggests high likelihood (50% or more) of limited literacy, 2-3 indicates the possibility of limited literacy, and 4-6 almost always indicates adequate literacy” (Pfizer, 2006).

APPLICATION TO NUTRITION EDUCATION

While each of these instruments can reliably identify individuals with limited health literacy skills, none of them are specific to nutrition. This distinction is important because as Parker et al (1995) write, “functional literacy is situation-specific: someone’s reading skills may be perfectly adequate in one setting and marginal or inadequate in another.” Using these assessments in a nutrition education setting may assist the nutrition professional in determining appropriate reading levels of materials, but they cannot provide information as to the individual’s nutrition proficiency.

Health Literacy in Diabetes

More than other chronic diseases, relationships between health literacy and diabetes have been reported in literature. Low health literacy is common among those with diabetes, with estimates between 51-63% of the diabetes population (Williams, et al, 1998; Schillinger et al, 2002; Rothman et al, 2002) and low literacy is particularly common among those with poor glycemic control (Rothman et al, 2004). Diabetes requires extensive self-care in many cases, making it a logical target for health literacy research, and because nutrition education plays an important role in this self-care, a brief review of health literacy research in diabetes is valuable here.

Consequences of Poor Health Literacy

Schillinger et al (2002) were among the first to report that low health literacy negatively impacts outcomes in those with diabetes. Participants (n=408) in this study were evaluated for health literacy by S-TOFHLA and glycemic control by hemoglobin A_{1c}. Glycemic control was categorized as tight (HbA_{1c} of 7.2%, or 25thile cut point for study population) or poor (HbA_{1c} of 9.5%, or 75thile cut point for study population). In those with inadequate health literacy, 30% had poor glycemic control compared with only 20% of those with adequate health literacy (p=0.02). They also found that “for each one point decrement of the S-TOFHLA, HbA_{1c} increased by 0.02 (p=0.02)” indicating a direct relationship between the two measures.

Maintaining good glycemic control is important for those with diabetes, but it requires significant self-care, including multiple daily tests of blood glucose, correct interpretation of glucose tests and corrective action when necessary, oral medication and/or insulin

administration, a carbohydrate-controlled and low fat diet, physical activity, and foot care (American Diabetes Association, 2011). Evidence is mounting that those with diabetes and low health literacy are less well equipped for self-care. These individuals have diabetes-related knowledge deficits (Williams et al, 1998; DeWalt et al, 2007; Powell et al, 2007), where direct increases in diabetes knowledge are seen with increases in health literacy (Mancuso, 2010). They are also less likely to participate in health care decisions (DeWalt, 2007), less likely to keep records of personal glucose testing (Mbaezue et al, 2010), and experience hypoglycemia more often (Sarkar et al, 2010). What is more, research suggests that health literacy (as measured by s-TOFHLA), not race, is a predictor of glycemic control (Sarkar et al, 2006; Osborn et al, 2009), an important finding because of the disproportionate prevalence of type 2 diabetes among minority populations.

Interventions/Educational Approaches

With the apparent negative relationship between health literacy and diabetes outcomes, attention must turn to educational approaches that can overcome this obstacle for patients. Successful educational techniques for low health literate populations have been incorporated into the Diabetes Literacy and Numeracy Education Toolkit (DLNET), developed by researchers at Vanderbilt University. These techniques include (Rothman et al, 2004; Wolff et al, 2009):

- Focus on selected critical behaviors
- Reduced complexity of health information
- Concrete examples
- Limited number of topics per educational session

- Avoid jargon
- Employ the “teach-back” method (Educator teaches a concept or skill through explanation or demonstration. The client is then asked to teach the educator the same concept.)
- Print information at 4th to 6th grade reading level
- Picture-based information
- Shared goal setting

Interestingly, Kandula et al (2009) found that their multi-media, computer-based intervention designed for low-literacy populations increased knowledge across health literacy levels ($p < 0.001$), but those with inadequate health literacy learned less than others (standard error=0.70). While the intervention incorporated some of the techniques listed above, no direct provider contact was given, which appears to be an important component for educating low health literacy populations. Furthermore, it is likely that those with low health literacy require frequent follow up (Tang et al, 2007). Rothman et al (2004) found that use of these techniques improved HgbA_{1c} values independent of health literacy levels of participants (n=111) with poorly controlled diabetes, but patients received contact by educators every two to four weeks for six months. In a shorter study, lasting 12 to 16 weeks, Wallace et al (2009) report improvements in participants' (n=250) self-care and diabetes-related knowledge regardless of health literacy levels, again providing brief patient contact three times over the course of the study.

Health Literacy in a Nutrition Context

Discussion of health literacy is sparse among nutrition literature, so the concept of health literacy must be translated into a nutrition context. To define “nutrition literacy,” Zoellner et al (2009) replaced the word “health” with “nutrition” in the IOM’s definition of health literacy as follows: “the degree to which individuals have the capacity to obtain, process, and understand *nutrition* information and skills needed in order to make appropriate *nutrition* decisions.”

Literacy and Nutrition Education

Print literacy is only one component of health literacy, but because it has been longer recognized as an educational obstacle, it has received more attention in nutrition education literature.

Individuals with poor literacy struggle to comprehend individual words, so when words are grouped together into sentences, the analysis and synthesis required to derive meaning is lost upon them (Contento, 2007). For this reason, nutrition education efforts that target low-literacy populations should capitalize on alternative communication channels that involve minimal text. Some suggested strategies (Contento, 2007) appropriate for this audience include limiting the number of educational objectives for any one intervention, focusing on nutritional behaviors rather than on facts, building upon the individual’s current knowledge base, actively involving individuals in the learning process, and keeping messages simple and reviewing them often. When written materials are necessary, applying the concept of “plain language” is important. Plain language is generally identified as writing that allows readers to “find what they need, understand what they find; and use what they find to meet their needs” (Federal Plain Language

Guidelines, 2010).

In her review of literature to determine recommendations for selecting appropriate patient nutrition education materials for those with low literacy levels, Clayton identified seven criteria that were consistently discussed (2010). First, the *content* of the information should be current, accurate, and presented in a clear way with the most important information presented first.

Literacy is a second criterion with consideration for both grade level appropriateness and use of the active voice. Third, low literacy materials should incorporate *graphics* to illustrate text and ideally, reduce the amount of text necessary. *Layout and typography* comprise a fourth criterion, where adequate “white space” balances text and graphics to reduce clutter, where black print on white non-glare paper enhances readability, and where color is optionally used for key information. Fifth, she terms *motivating principles* which describes an attempt to involve the reader in the content of the reading such as through review quizzes or games. *Cultural relevance* includes both primary cultural factors (“race, ethnicity, language, nationality, and religion”) and secondary cultural factors (“age, gender, sexual orientation, education, income level, and acculturation”), where the educational material reflects health beliefs, attitudes, etcetera, of the target population. Finally, consideration should be given for *feasibility*, in that the cost of using the materials must be reasonable in light of available resources.

Macario et al interviewed literacy experts, physicians, nurses, nutritionists, and adults from basic education programs regarding the effectiveness of nutrition education among the low literacy population (1998). Health care providers (physicians and nurses) ranked nutrition high on their list of patient education topics but felt they have too little time to provide in-depth information. They agree that nutrition professionals are best skilled to provide in-depth nutrition

counseling. However, health professionals, including nutritionists, indicated that they look for certain clues as to reading problems rather than conducting assessments as such assessments were not available at the time of this study. Some of these include arriving for a medical appointment without having completed the necessary forms, are accompanied by a family member who reads for them, signing their name with an “X”, or complaints in difficulty with eyesight (Macario, et.al., 1998). Unfortunately, it is difficult to identify individuals with low-literacy simply through conversation because many have learned to compensate for and hide illiteracy through other routes of communication (Contento, 2007).

Nutrition education for low literacy audiences has been successful in improving diet behaviors and outcomes, but Clement et al (2009) suggest that complex interventions are necessary. Four studies included in their review on education for low-literacy audiences involved nutrition education and are briefly reviewed here. Fries et al (2005) delivered nutrition education to minority low-literacy (not measured, educational level reported) participants (n=754) through brief, individualized telephone counseling at one, six, and 12 months and through five low-literacy educational booklets sent by mail over four weeks and saw significantly improved fat and fiber intake ($p < 0.05$) in the intervention group. Hartman et al (1997) found improvements in adherence to a low fat diet after their nutrition education intervention for low-literacy (assessed by the reading comprehension exam, Adult Basic Learning Examination, Level II; Karlson, 1986), low-income participants (n=204) that involved ten different in-person delivered single-message education sessions over ten weeks. Howard-Pitney et al (1997) found significant improvements in dietary outcomes for the intervention group in their low-literacy population (assessed by WRAT-R), which received nutrition

education through six activity-based sessions, three follow-up telephone calls addressing diet-related goals and three follow-up targeted mailings. In their study of African American adults with elevated blood pressure or cholesterol, Kumanyika et al (1999) provided targeted, low-literacy materials in self-help and full instruction formats in the form of food picture guides, nutrition guide, video, audio-tape, four nutrition group sessions, and brief counseling at three follow-up visits and saw improvements in both groups of low-literacy (measured by word recognition; Ten Have, 1997) participants for total cholesterol and blood pressure. In sum, the interventions provided in the studies were multi-faceted in nature, requiring many contacts with nutrition professionals and involving various low-literacy targeted materials.

The U.S. Department of Agriculture (USDA) attempts to provide basic nutrition information for the public at large. As such, a conceivably large number of basic nutrition literature pieces are based upon their food guide's recommendations and structure. MyPyramid was released in 2006 and remains in use today, though it was recently replaced with MyPlate in June, 2011. MyPyramid's graphic was designed to be very basic, providing little written information so as to direct interested persons to the website. Unfortunately, this assumes the consumer has internet access, and while the internet has been identified as a source of nutrition information by 40% of consumers, use of the internet varies by age with only 15% over the age of 65 years turning to the web for nutrition information (American Dietetic Association, 2011). In the Food and Drug Administration's (FDA) Diet and Health Survey, 74% of participants reported they never use US government websites for nutrition information (2008), so use of the internet for nutrition information may be increasing. Neuhauser, Rothschild, and Rodriguez analyzed the readability of the MyPyramid website using four different readability tests (2007).

The average scores reported a range of 8.8 – 10.8 grade reading levels, which is above the target of 7-8th grade reading levels (Haven et al, 2006). The plate method, the inspiration for MyPlate, is used to provide basic nutrition education for those with low health literacy in the DLNET program (Wolff et al, 2009), so MyPlate may show better success with low literacy audiences in future research.

Zoellner et al (2009) conducted an exploratory study of nutrition literacy of adults in the Lower Mississippi Delta, a region with known health disparities. The primary purposes of the research were to measure health/nutrition literacy levels of the population and to investigate their “nutrition information seeking behaviors.” Health/nutrition literacy was measured by NVS, in which they identified 48% with adequate health/nutrition literacy, while 24% and 28% had a high likelihood and a high possibility of limited nutrition literacy, respectively. Additionally, it was learned that the most popular sources of nutrition information included television (57%) and newspapers or magazines (50%), with only 20% accessing information online, a source also identified by participants as least trustworthy. Overall, a strong relationship was reported between information-seeking behaviors and nutrition literacy. This study was the first to quantify health literacy within a nutrition context in any US population group and underscores the importance of identifying sources of information used by consumers for accessing nutrition information. As previously noted, while the internet may be a primary source for delivering nutrition information used by the US government, it may not be adequate for all population groups.

Nutrition Knowledge

Given the continued rise in overweight and obesity, their subsequent chronic conditions, and the role diet can play in modifying these conditions, attention should be given to the motivation for individual's behaviors that concern diet and health. The Health Belief Model (Hochbaum, 1956) asserts that individuals make changes in their health behaviors when they believe they are susceptible to a disease, that the disease presents a serious threat to their health, and that they can take action to reduce that threat. In a nutrition context, for example, a person may become concerned about his risk for heart disease when chest pains present and a doctor's visit indicate warning signs. He seeks out information on what he can do to prevent the condition from worsening and learns that a low fat diet is one effective approach to lowering cholesterol levels, thereby reducing his heart disease risk. He then implements a low fat diet into his daily routine. Within each step of this sequence lie the important modifying factors of knowledge and attitude, among others. An individual must have knowledge of a disease in order to perceive a threat to health and must possess or gain knowledge of effective treatment methods before behaviors are modified. Likewise, attitudes toward health are "evaluative summary judgments that guide behavior" (Crites & Aikman, 2005), and whether positive or negative can determine whether an individual will act upon the knowledge he/she has. In the previous scenario, a negative attitude toward the effectiveness or pleasure with a low fat diet may predict avoidance of a low fat diet.

Research has shown that knowledge can make a significant impact on food behaviors. Maternal knowledge of nutrition and health results in improved diets of preschoolers (Blaylock, Veriyam, & Lin, 1999) and the dissemination of scientific information on the effect nutrition has

on health has been found to significantly change consumption patterns of eggs, pork, milk, fruits & vegetables (Veriyam & Golan, 2002).

Crites & Aikman (2005) evaluated the impact that knowledge of nutrition has on food attitudes and food selection in 138 college students. Participants were asked to evaluate 24 foods for attitude, health, flavor, pleasure, familiarity, and experience (frequency of consumption). They also completed a questionnaire assessing physiological and mood status on the day of food evaluations. Two more questionnaires assessed nutrition knowledge and dietary restraint, and, finally, they completed a demographic questionnaire. Using multilevel analysis researchers found a significant ($p < 0.01$) positive interaction between high nutrition knowledge and evaluations of health and experience of test foods with attitude, whereas those with low nutrition knowledge showed significant positive interaction of attitude with experience only. Significant differences were also found between knowledge groups when evaluating attitudes toward different macronutrients where for the high knowledge group, increased carbohydrate content of food was associated with a less positive attitude and health evaluation and increased fat content was associated with less pleasure and health evaluation (the latter not significantly different than the low nutrition knowledge group). Unfortunately, this does not mean that nutrition knowledge always leads to positive diet behaviors because many evaluative bases were not modified by nutrition knowledge, but these data do indicate a stronger relationship between high nutrition knowledge and attitudes toward food as compared with low nutrition knowledge.

Known as the Knowledge-Attitude-Behavior Model (Bettinghaus, 1986), this theory postulates that as people gain knowledge about nutrition, their attitudes toward nutrition and health change, leading to changes in behavior. Consequently, research into nutrition knowledge

often evaluates the combination of nutrition knowledge and attitudes which together shape nutrition behaviors. Arguably, attitudes may influence a person's nutrition literacy because they may shape a person's interest in acquiring nutrition knowledge or skill. However, because nutrition literacy requires understanding, nutrition knowledge may be a more closely related term to consider here.

In 1999 Guthrie, Derby & Levy's chapter in the USDA's *America's Eating Habits: Changes and Consequences*, provided an overview of the public understanding of nutrition at that time, identifying important increases in the general knowledge of nutrition but also identifying significant gaps. They cite Rogers (1983) in dividing nutrition knowledge into three components including "(1) *awareness* (say of diet-disease relationships); (2) *knowledge of principles* (cholesterol is found in animal foods only); and (3) *how to knowledge* (e.g., how to select foods with less fat or how to read a food label.)" In a similar way, investigation into more current research of Americans for these three categories can provide an understanding of how knowledgeable (or nutrition literate) the population is.

Some insight into American's nutrition knowledge can be gained through the International Food Information Council (IFIC) Foundation's 2011 Food & Health Survey: Consumer Attitudes Toward Food Safety, Nutrition & Health (n=1,000); the American Dietetic Association's (ADA) *Nutrition and You, Trends*, 2011 survey (n=754); and the FDA's 2008 Report on the *Health & Diet Survey* (n=2,474) all of which are nationally representative surveys with the intention of identifying trends in and relationships between diet knowledge, attitudes and behaviors among Americans.

An awareness of the relationship between diet and health as well as the preventive role nutrition can play in chronic diseases, such as heart disease, diabetes, some cancers, and hypertension, can be an important motivator for healthful eating behaviors. Weight management appears to be a driving force for many (69%) in their daily diet decisions (IFIC, 2011), while most believe nutrition is a very important (62%) or somewhat important (35%) consideration when grocery shopping (FDA, 2008). Most (95%) believe they know how to make healthy food choices and 85% believe that the amount of food they should eat depends on their calorie requirements (2008). Heart disease continues to be the leading cause of death in Americans, but Wartak et al (2011) found that only half (49%) of the patients in their survey knew this. When asked to identify the relationship between heart disease and seven components related to heart disease (smoking, obesity, exercise, diet, cholesterol, blood pressure, and blood glucose), participants (n=1,702) identified exercise and diets high in fruits and vegetables least often. In regard to cancer, Hawkins, Berkowitz, and Peipins (2010) analyzed data from the *Health Information National Trends Survey* in adults without known cancer (n=5,589) and found that roughly half (50.8%) identified “eat better/better nutrition” as an effective cancer prevention strategy. When asked to provide specific diet strategies, 50.9% identified eating more vegetables, 34.4% eating less fat, 34.6% eating more fruit, and 17.9% eating more fiber. Not surprisingly, considering assertions of the Health Belief Model, better knowledge was found among those undergoing elective genetic testing for colon cancer (Palmquist et al, 2011) where 76% identified diet and cancer relationships. In sum, it appears that many Americans understand that diet affects health, but are Americans able to identify specific relationships between food, nutrients therein, and health?

While weight management may be important to the majority of Americans when making food choices, and 40% are aware that excess calories lead to weight gain, only 9% can correctly estimate how many calories they require (IFIC, 2011). Confusion remains in regard to fat intake, while many (71%) are trying to limit fat overall, and most (66%) know to limit saturated and *trans*-saturated fat, nearly one in five Americans believe no fats are healthful, and consequently limit healthful polyunsaturated and monounsaturated fats (IFIC, 2011). Likewise, the ADA found that 68% of participants reported they had heard a lot about *trans* fat in foods. Unfortunately, less than one percent of Americans are able to correctly identify solid fats, which is a major target of the 2010 *Dietary Guidelines* for reduction in the diet (IFIC, 2011). According to the FDA, almost half of Americans have not heard of the *Dietary Guidelines* nor are they familiar with *MyPyramid*. The 2005 *Dietary Guidelines* increased emphasis on whole grains, and the FDA reports (2008) that when presented with six grain-based foods, 62% of Americans can correctly distinguish between whole grains and refined grains for four of six foods, but only 3% are able to identify all six foods correctly. Despite the whole grain emphasis, 17% of Americans are trying to limit their intake of complex carbohydrates (IFIC, 2011). Little information is collected from surveys in regard to protein intake, but the IFIC does report that 60% of Americans correctly identify animal foods as a source of protein and 47% correctly identify plant foods as a source of protein. Finally, the FDA (2008) indicates consumer confusion in regard to some nutrition issues. For example, 54% say organic fruits and vegetables are healthier than conventional foods, however, research in this area is inconclusive.

Two researched factors that might be considered “how to” knowledge include food label reading and portion sizing. The Nutrition Facts Panel on a food label provides detailed nutrient

information and can, therefore, assist people in making nutritious food choices. Females read food labels more often than males, with an estimated 28% of females almost always reading them (Godwin, Speller-Henderson & Thompson, 2006). Most participants in this study (35.5% strongly agreed; 42.1% agreed) felt they were knowledgeable in reading food labels, though 76.3% wanted to learn more. A review of food label understanding and use by Cowburn and Stockley (2005) reported a general understanding of simple concepts, such as identifying the amount of nutrient supplied by the food, but found people experience more difficulty in making health assessments of foods using information from food labels alone.

Choosing appropriate portion sizes of foods is widely believed to be an important skill for balancing calorie intake with energy expenditure and is consequently often the subject of nutrition education efforts. Recommended portion sizes are established by the USDA through the *Dietary Guidelines for Americans* and MyPlate. Huizinga et al measured portion-size estimation (measured by portioning pasta, pineapple, cooked ground beef, and cranberry juice) and literacy (by REALM) in 164 participants. Though accuracy varied between foods, for combined food items, 62% of participants correctly served a single serving of foods and 65% correctly served a different specified amount. Estimation was poorer in those with low literacy (Huizinga et al, 2009).

Thus, general concepts of nutrition appear to be known by many, but a significant portion of people in each of these categories is less knowledgeable. Furthermore, this data presents an understanding of general nutrition concepts, such as the need to avoid saturated or *trans*-saturated fats, but not practical knowledge, such as the ability to identify foods high in saturated or *trans*-saturated fat. The inability of Americans to identify whole grain foods and solid fats,

suggests a lack of practical knowledge. This is consistent with Cowburn & Stockley's (2005) finding that people can generally read food labels, but can't necessarily use the food label to make better dietary choices.

Health Literacy Instruments with Nutrition Relationship

The NVS (reviewed previously) was used by Zoellner et al (2009) to measure "nutrition literacy" in her population. Although the NVS utilizes a food label in its assessment, it is not described as a measure of nutrition literacy, but rather of health literacy (Weiss et al, 2005). The food label purposes to measure numeracy; no questions seek to identify nutrition knowledge. While use of a nutrition label is an important skill for making healthful dietary choices, the questions used in the NVS could be answered by someone who has both functional literacy and numeracy but no nutrition knowledge.

The only assessment instrument specific to nutrition literacy presented in the literature is the Nutrition Literacy Scale (NLS) (Diamond, 2007). The instrument was designed to follow the cloze method for measuring reading comprehension as was used in the TOFHLA and S-TOFHLA. The 28-item NLS was completed by 341 patients in three family medicine practices and one integrative medicine practice. Participants in three of these groups also completed the S-TOFHLA for control purposes. The Cronbach's alpha coefficient of 0.84 indicates internal consistency for the NLS but Pearson's correlation between the NLS and S-TOFHLA was only 0.61 for the three groups. Although the author states "the NLS covers the major consumer-related topics in nutrition," the instrument itself is not published or available for review. Perhaps questionable methods (targeting of patient groups, lack of exclusion criteria, and variation of

methods between groups) explains the lack of further discussion or use of this instrument in literature.

Conclusion

While focus upon the problem of health literacy has increased within general medical literature, discussion remains minimal within nutrition literature. Its absence is surprising because the Academy of Nutrition and Dietetics, an organization with widespread influence on the nutrition community, has deemed “health literacy and nutrition advancement” a “priority area” for several years. This disconnect raises the question as to whether nutrition professionals are addressing the problem of health literacy within their care.

Another unanswered question is whether there is a difference between health literacy and nutrition literacy. If Parker et al (1995) are correct, that “functional literacy is situation specific,” then techniques for measuring health literacy are likely inadequate to measure nutrition literacy. Yet with no instrument available to nutrition professionals to measure nutrition literacy, how do they know their audiences’ nutrition capability? How can they be sure their nutrition messages are appropriately communicated and correctly understood?

Chapter 2: Preliminary Survey

Attention to Health Literacy among Nutrition Professionals¹

Introduction

Nutrition professionals are one group of health providers who is highly involved in the education of patients, both in the clinical sector as well as in the public health sector. However, little, if any, data is available indicating that nutrition professionals currently assess health literacy. A review of the literature has revealed little information even when assessing nutrition education and the effect of literacy alone.

Searches for information on “nutrition literacy” via the PubMed database provided no results, causing the question to be raised as to whether such a tool is available. A simple inquiry was made via an electronic-mail list-serve, known as “SNEEZE,” to the Society for Nutrition Education and Behavior. This organization is comprised of nutrition professionals (n=528) who specifically work in the area of nutrition education. Members were asked to respond to the email if they were currently involved in health literacy research or have information and/or assessment tools that they recommend.

Ten emails were received via SNEEZE. Five discussed current information on health literacy; two identified their use of the *Newest Vital Sign*; one indicated use of reading ability tests (test not specified); one provided a reference to a historical document on nutrition and literacy; and one indicated interest and enthusiasm for further research on the subject.

¹ Reprinted, with permission, from H. Gibbs and K. Chapman-Novakofski, 2012, “Exploring nutrition literacy: Attention to assessment and the skills clients need.” Health. In press.

The goal of this research is to determine what information, if any, nutrition professionals use to determine their methods of providing nutrition education and what attempts are being made by nutrition professionals to meet the needs of individuals who experience reduced health literacy.

Methods

Because there is little discussion of health literacy among the nutrition literature, the question was raised whether nutrition professionals are assessing health literacy prior to providing nutrition education. With no answer to this question provided in the literature, a survey was created for the purpose of gathering formative data. It was hypothesized that this survey would reveal a low number of nutrition professionals who conduct health literacy assessments with their clients/patients.

All methods were discussed and reviewed by the research advisory committee and Institutional Review Board (IRB) at the University of Illinois. It should be noted that all committee members are nutrition professionals, including three registered dietitians.

The following Dietetic Practice Groups of the ADA were selected as ideal participants in the preliminary survey because the natures of their practice areas involve nutrition education: Nutrition Educators of the Public (NEP), Diabetes Care and Education (DCE), and Sports, Cardiovascular, and Wellness Nutritionists (SCAN). Questions included in the preliminary survey, found in Appendix A, addressed the following objectives:

- a.* Provide an estimate of the number of nutrition professionals who conduct health literacy assessments on their patients/clients.

- b.* Identify health literacy assessment tools currently in use by nutrition professionals.
- c.* Where health literacy assessment is not being conducted, identify what (if any) information is being used by nutrition professionals to guide educators in determining the level of difficulty in materials/instructional methods the educator should utilize (i.e. year completed in school, general literacy assessment information, guidance from another health professional more familiar with the client/patient).
- d.* If health literacy assessments are conducted, do the nutrition professionals make adjustments in their education strategies?
- e.* Identify professional demographics of participants.

For statistical purposes, each potential answer was given a corresponding number, which follows in parentheses in this report. It was approved by the academic adviser prior to submission for IRB approval and subsequent ADA approval.

The online survey software program, Survey Monkey[®], was used to design and collect survey results. The survey was given the title, “Nutrition Educators and Health Literacy” and consisted of a consent to participate question, background summary, and the above questions. Survey Monkey[®] provided a web-link for the survey so that participants were recruited through an email containing the link, which could be selected, directing participants to the survey.

Each of the dietetic practice groups selected maintains a list-serve for members. Participation in the list-serves is voluntary, and not all members of the dietetic practice group subscribe to their respective list-serve. It was determined that distributing the survey through

list-serves would be the most efficient and effective way of recruiting individuals for participation.

The ADA (now Academy of Nutrition and Dietetics[AND]) requires submission and approval of a survey proposal before surveys can be distributed through list-serves. This process was followed, and the survey was given the required approval before distribution. Each of the dietetic practice groups agreed to participation after approval was given. However, the Nutrition Educators of the Public (NEP) chose to distribute to all members by way of an “e-blast.” Where email through list-serves only reaches those members who participate in the list-serve for the DPG, an e-blast is sent to all members of the DPG, in effect providing greater support of the survey than was asked. The message distributed to the NEP can be found in Appendix B. The other DPGs received messages changed slightly in paragraph five and six where NEP was replaced with DCE or SCAN but otherwise the same.

Results

At the time of the survey, the list-serves used reported participation in the following numbers: Nutrition Educators of the Public, 1025 members; Diabetes Care and Education, 1026 members; and Sports, Cardiovascular, and Wellness Nutritionists, 1200 members. Of the total 3251 members in these list-serves, 206 completed the consent statement, which was the first question of the survey. Participation varied between questions as can be seen in **Table 2.1**.

Statistical analysis was conducted using Statistical Analysis System software (SAS software, SAS Institute Inc. 2004. SAS OnlineDoc® 9.1.3. Cary, NC: SAS Institute Inc).

It was theorized that there would be a positive relationship seen between nutrition professionals who spend more time in their job providing nutrition education to clients or patients and the professional's objective assessment of health literacy. An *objective health literacy assessment* was defined as “the use of a standardized form designed to measure health literacy.” This definition was included in the background information provided to survey participants.

Using job time as the independent variable and objective health literacy assessment as the dependent variable, the *univariate* procedure identified the data as non-normal with a kurtosis value of 11.44. This value indicates a strong skew to the right as a result of 99 of the values at 5 (answer chosen by participant when objective literacy assessments are never conducted). The nature of the research would only produce non-normal data, so this is expected.

As such, to test the relationship between job time spent in nutrition education (Question 10) and objective health literacy assessment, the nonparametric *Spearman's* rank order correlation coefficient test was conducted with the following results:

Table 2.1 *Spearman's* Correlation test for the relationship between job time spent in nutrition education and conducting health literacy assessments.

Spearman's Rank Order Correlation Coefficient Test: Simple Statistics

Variable	N	Mean	Std Dev	Median	Minimum	Maximum
Time	127	2.1	0.97	2.0	1.0	4.0
Assess	125	4.7	0.8	5.0	1.0	5.0

***Spearman* Correlation Coefficients; Prob > | r | under Ho: Rho = 0**

	Time (n=127)	Assess (n=124)
Time (n=127)	1.0	-0.027 $p = 0.77$
Assess (n=124)	-0.07 $p = 0.77$	1.0

These data indicate the variables of *time* (job time spent in nutrition education) and *assess* (conducting objective health literacy assessments) are not significantly correlated with a 0.7663 probability of finding a greater r . As such, this data does not support a relationship between job time spent in nutrition education and the practice of conducting objective health literacy assessments.

Similarly, to determine if there was any correlation between the demographic variables of job time spent in nutrition education (see Appendix A, objective 5, question 10) or job category (question 11) and answers to questions 1-6 and 8-9, the *Spearman's* rank order correlation coefficient test was conducted with no significant correlation seen as can be found below (**Table 2.2**).

Table 2.2. Spearman rank order correlation coefficient test. Questions 1-6 and 8-9 (dependent variables) are represented by columns; questions 10-11 (independent variables) are represented by rows.

Probability of a greater $|r|$ under $H_0: \rho = 0$

Demographic Variables (Independent Variable)	Question 1	Question 2	Question 3	Question 4	Question 5
Job Time Spent in Nutrition Education (Question 10)	-0.031 $p = 0.73$ $n=122$	-0.067 $p=0.47$ $n=121$	0.065 $p=0.48$ $n=118$	-0.002 $p=0.98$ $n=121$	-0.027 $p=0.77$ $n=123$
Job Description (Question 11)	0.045 $p=0.68$ $n=85$	0.13 $p=0.23$ $n=84$	0.14 $p=0.20$ $n=83$	0.13 $p=0.22$ $n=85$	-0.019 $p=0.86$ $n=85$

Demographic Variables (Independent Variable)	Question 6	Question 8	Question 9
Job Time Spent in Nutrition Education (Question 10)	0.11 $p=0.2316$ $n=124$	0.25 $p=0.0062 *$ $n=121$	0.13 $p=0.1675$ $n=123$
Job Description (Question 11)	-0.17 $p=0.12$ $n=86$	-0.30 $p=0.005*$ $n=84$	-0.28 $p=0.008 *$ $n=86$

*Indicates a statistically significant value.

As seen in **Table 2.2**, these data indicate a statistically significant correlation for both independent variables and Question 8 (*Availability of written materials for different levels of understanding*) as well as the independent variable, *Job Description*, and Question 9 (*Adjustment of education methods based on perceived level of understanding*).

For a better understanding of these data, the non-parametric one way ANOVA comparison of means using the classification variable, *Job time spent in nutrition education* (Question 10), there was significant difference found between groups for the dependent variable, *Availability of written materials for different levels of understanding* (Question 8), with a 0.025 level of significance. For this and the following procedures discussed, statistical analysis was completed using the Statistical Package for the Social Sciences (SPSS for Windows, Rel. 11.0.1. 2001. Chicago: SPSS Inc.). Post hoc testing (Kruskal-Wallis) indicated a significant difference between those identifying spending >80% of job time and those spending 50 to 80% of job time in nutrition education more often replied they never, occasionally or sometimes had written material available for different levels whereas those spending 20 to 50% and <20% of job time in nutrition education more often indicated they usually or always had different materials ($p=.035$).

In a one way ANOVA comparison using the classification variable, *Job description* (Question 11), a significant difference was found between groups for two dependent variables including *Availability of written materials for different levels of understanding* (Question 8) ($p=0.005$) and *Adjusts education methods based on perceived understanding* (Question 9) ($p=0.007$). Public health nutritionists had materials more often than outpatient dietitians. A summary of the answers to the survey questions is found in **Table 2.3**.

Table 2.3. Summary of survey responses to selected questions.

Question	Answering Options					Response Count
	Always	Usually	Sometimes	Occasionally	Never	
1. In my practice, an objective health literacy assessment is conducted with clients/patients.	11.5% (16)	14.4% (20)	12.2% (17)	9.4% (13)	52.5% (73)	139
2. In my practice, a subjective health literacy assessment is conducted with clients/patients.	27.0% (37)	24.1% (33)	17.5% (24)	8.0% (11)	23.4% (32)	137
3. I review health literacy assessments conducted on the clients/patients in my practice.	13.4% (18)	17.2% (23)	14.2% (19)	9.0% (12)	46.3% (62)	134
4. I chart/document an assessment of health literacy.	14.7% (20)	19.9% (27)	8.8% (12)	16.2% (22)	40.4% (55)	136
6. I use methods other than health literacy assessment tools to identify levels of understanding in my clients/patients.	21.6% (27)	29.6% (37)	20.0% (25)	12.8% (16)	16.0% (20)	125
8. I have written materials available to meet different levels of understanding.	21.3% (26)	33.6% (41)	25.4% (31)	12.3% (15)	7.4% (9)	122
9. I adjust my education methods based on what I perceive or have assessed the client/patients level of understanding to be.	70.2% (87)	25.8% (32)	3.2% (4)	0.8% (1)	0.0% (0)	124

	REALM*	TOFHLA**	NVS***	Other	None	Response Count
5. Which of the following health literacy assessments do you or your practice use?	2.4% (3)	0.8% (1)	2.4% (3)	15.2% (19)	79.2% (99)	125

	Year completed in school	Notes in medical record	Indicators of reading problems	Other	Response Count
7. Which of the following methods do you use to identify levels of understanding in your clients/patients? (May answer more than one.)	49.1% (54)	38.2% (42)	87.3% (96)	38.2% (42)	110

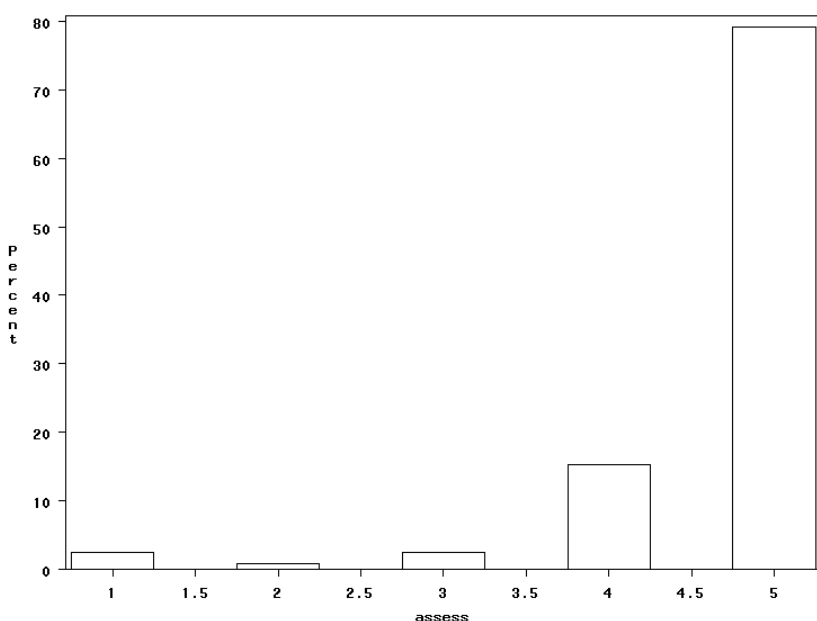
***REALM** = Rapid Estimate of Adult Literacy in Medicine

****TOFHLA**= Test of Functional Health Literacy in Adults

*****NVS**= Newest Vital Sign

Perhaps the most significant piece of information revealed in this study is the mode for question five. A histogram of all data is seen in **Figure 2.1**. Of 125 participants, regardless of time spent in nutrition education, 99 (79.2%) indicated that they do not use validated health literacy assessments when working with their patients/clients.

Figure 2.1 Use of health literacy assessment instruments among participants. Code for assessment instruments (variable on *x* axis): 1 = REALM; 2=TOFHLA; 3=NVS; 4 = Other; 5= None



REALM = Rapid Estimate of Adult Literacy in Medicine

TOFHLA= Test of Functional Health Literacy in Adults

Discussion

For nutrition education to be effective, it must first be understood by the audience. Comprehension of nutrition information is predicted by knowledge (Miller et al, 2010), but how educators assess what clients know has not been adequately explored. Screening individuals for

health literacy is an important step in ensuring the educator chooses educational information appropriate to the individual's level of understanding.

In light of the data presented here and considering the lack of published research on nutrition and health literacy, this preliminary research indicates that many nutrition educators are not conducting health literacy screening. This is similar to a survey of physicians and nurse practitioners (n=333) where 90% rarely or never assessed health literacy in any formal way. Sixty-three percent used their "gut feelings" of whether the patient understood (Schlichting et al, 2007). However, healthcare workers have been reported to overestimate their knowledge of health literacy and benefited by a training intervention (Mackert et al, 2011). It is encouraging to note that while use of objective assessments is low, nutrition professionals identifying themselves as public health nutritionists do adjust their teaching methods based on what they perceive their audience's level of understanding to be.

Survey Response Rate

At first glance, it may be concerning that the number of survey participants was only 6.3% of the total group who received the email invitation. The response rate for electronic surveys is expected to be 39.6%, and in this case where no follow-up email was sent, response rate is expected at 25-30% (Cook, 2000). An inquiry was made to the webmasters of the three DPG list-serves concerning list-serve emails being sent to spam or another explanation for the lower response rate. The following response was received,

It is impossible to know exactly who's [sic] email system categorized the email as spam and who's [sic] didn't. No listserv system has the ability to determine this. At the same time, for our eblasts, we have reports on open rates and click rates, and this information helps us gauge the effectiveness of the eblasts... To put things in perspective, an effective eblast will have an open rate of 25% to 30% typically. And spam is only one component to determining if the eblast is effective... The subject of the eblast is important in determining if the subscriber will open the message or if it is spam. If the topic doesn't interest the subscriber, they won't open it... (personal communication, Melissa, DCE and SCAN webmaster)

To apply the information gathered here, it is expected that 25 – 30% of the email recipients, or 781 to 975 people, would have opened the email invitation. If this number is used as the survey sample, 26% completed the first question of the survey, with varied participation in other questions. As such, participation reached the expectation of 25%.

Implications and Areas of Further Research

With few nutrition professionals found here to be using health literacy assessment instruments, this suggests a need for education of nutrition educators on the role health literacy plays in making health care decisions. Further, it is questionable that the current health literacy tools available clearly identify a person's *nutrition literacy*. As defined by Zoellner et al (2009) "*nutrition literacy* is the degree to which individuals have the capacity to obtain, process, and

understand nutrition information and skills needed in order to make appropriate nutrition decisions.” Further research is needed to determine the adequacy and functionality of health literacy assessment tools currently available for use in nutrition education activities.

Thus, nutrition professionals will be consulted via targeted interviews to obtain their perspectives on what should be included in a nutrition literacy assessment instrument. Based on this input, a nutrition literacy assessment instrument will be created, pilot-tested by nutrition professionals, and compared to other previously established reliable health literacy tools (such as the TOFHLA, the *Newest Vital Sign*, or the REALM).

It should be noted that inquiries were made to include persons with expertise in the area of literacy on the research committee who are from the faculty of the University of Illinois, but these inquiries were either refused or resulted in no response. Thus, experts in the field of health literacy in addition to nutrition professionals will be solicited outside of the University of Illinois faculty to provide feedback on the development of a nutrition health literacy assessment tool.

Chapter 3: Targeted Interviews

What Skills Do People Need to Understand Nutrition Education?²

Introduction

Clearly, nutrition is one important sector of health care where education is needed. In its report of the 2003-2004 National Health and Nutrition Examination Survey results, the Centers for Disease Control estimated 66% of American adults are either overweight or obese. These weight classifications are known to increase the risk of coronary heart disease, type 2 diabetes, some cancers, hypertension, dyslipidemia, stroke, liver and gallbladder disease, sleep apnea and respiratory problems, osteoarthritis, and gynecological problems. Certainly, the increasing prevalence of overweight and obesity is complex in etiology, but these numbers suggest inadequacy in knowledge, motivation, and/or resources among this large percentage of the population. A healthy diet plays an important role in the prevention of overweight and obesity as well as in prevention and treatment of many of these subsequent health conditions. However, understanding what comprises a healthful diet is complex and may require high cognitive skills. For example, in terms of portion sizes, one study identified that individuals with low literacy (identified by REALM) are more likely to inaccurately estimate portion sizes (Huizinga et al, 2009).

Obviously, persons with low health literacy need to be identified. However, validated instruments for assessment, such as the REALM (Davis et al, 1993), TOFHLA (Parker, 1995) and S-TOFHLA (Baker et al, 1999) only evaluate print literacy using words and concepts within

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health care. They do not assess other suggested components of health literacy, such as numeracy, oral literacy, listening ability, use of technology, advocacy, rhetorical skills and complaints (Institute of Medicine, 2004). Nor do they relate specifically to nutrition.

With relationship to nutrition, two instruments have been developed, the Newest Vital Sign (NVS) and the Nutrition Literacy Scale (NLS). The NVS (Weiss et al, 2005), has been validated as assessing both print literacy and numeracy, and because it requires nutrition label reading, some nutrition professionals prefer its use over others (Zoellner, 2009). It should be noted that while the NVS utilizes a food label in its assessment, it does not measure nutrition literacy. The food label purposes to measure numeracy, which is a known skill for reading food labels (Institute of Medicine, 2004) but the NVS does not ask questions which seek to identify nutrition knowledge. Diamond (2007) published validation results of his Nutrition Literacy Scale, which attempts to measure adults' ability to comprehend nutritional information in a similar way to the S-TOFHLA, but the instrument itself was not published, and it is unclear whether this instrument provides any measures beyond print literacy. Further use of this tool has not been described in literature.

As noted in the previous chapter, our preliminary survey of three dietetic practice groups of the American Dietetic Association found that 79% (n=99) of survey participants (n=129) self-reported they did not use available health literacy assessment tools. One explanation could be that current health literacy assessment instruments are inadequate for nutrition professionals because they do not identify a person's *nutrition literacy*, only print literacy using health-related words and phrases. Again, the NVS is the exception due to its focus on numeracy, but it may fall short without focus on additional skills involved in making food choices.

Beyond numeracy, literature review does not establish what specific skills are necessary for understanding nutrition/diet education. A concept with relationship to nutrition literacy is known as “functional literacy”, or “the use of literacy in order to perform a particular task” and builds upon an individual’s cultural understanding of and conceptual framework for health and disease (Neilson-Bohlman, 2004). In the context of nutrition, nutrition knowledge does appear to affect evaluation of and attitudes toward food (Crites & Aikman, 2005), but what knowledge of and experience with nutrition is needed by an individual in order to apply this information in his/her food choices and actions? What skills are necessary, and can we devise an instrument that will attempt to measure these skills?

We conducted a second formative study of nutrition professionals with the purpose of determining what basic skills are needed in order to understand nutrition/diet education. Our hypothesis was that nutrition professionals would identify components of nutrition literacy not included in general health literacy instruments. It was theorized that the involvement of nutrition professionals in the development of a nutrition literacy assessment instrument would be valuable as they are heavily involved in nutrition education and would also be more likely to use an instrument created with consideration for their voice.

Methods

The method chosen for gathering information is described as the “interview guide approach” (Patton, 1990) for *key informant interviews*, which provides a consistent list of questions asked of each respondent. A recruiting email (Appendix C) was distributed to 59 nutrition professionals with related research interests and/or nutrition education experience. Of

these, ten emails were returned undeliverable, three declined interviews, eight agreed to interviews, 20 did not respond, and one agreed to interview, but after interview analysis was complete. Those who agreed to interview were sent a consent document (Appendix D) and interview questions (Appendix E) to review before the scheduled interview. Interviews were conducted by telephone and all individuals consented to audio-recording for the purpose of improved accuracy in transcription of answers. All methods were approved by the IRB at the University of Illinois, and were determined to meet exempt status for human subjects research.

The guided interview contained 10 questions, six focusing on ideas and experience with nutrition literacy and four were demographic in nature (See appendix E). The first question addressed our primary interest in this research: *What basic nutrition principles are needed to understand a diet instruction?* The question was followed by prompts to help guide participant responses, including understanding basic math, competence with household measurements, understanding of food groups, and macronutrient knowledge. Prompts were based on a review of topics covered in introductory nutrition texts, literature review already described in relation to numeracy skills and portion sizing (or household measurements here) and researcher experience with nutrition education.

Data was evaluated using *content analysis* (Patton, 1987), identifying important examples, themes, and patterns in the data. Analysis was first conducted by each researcher independently, with frequency of answers recorded. Where frequencies of answers differed by researchers, the individual answers were reviewed and discussed by both researchers. In this way, researchers came to an agreement on answer frequencies. Resolved content analysis is found in **Table 3.1**.

Table 3.1 Content analysis of key informant interviews. What basic nutrition principles are needed to understand a diet instruction? Answers listed by category.

Respondent	Macronutrients	Basic Math	Portion Sizes	My Pyramid
1	They need to know which foods contain carbs, protein and fat. And then, a relative amount of how much they need to be eating	they need to understand what it means to be high in something or low in something	Yes, I think people should know what a cup is.	Yes, I think they need to know that food is broken up into groups based on the nutrients that are in the foods and that there's a difference in the nutritional composition between vegetables and dairy products, for example.
2	For some people focusing on macronutrients is less meaningful than focusing on the foods themselves. A possible exception to this could be a newly diagnosed diabetic	* No comment specific to math	*No comment specific to portion sizes	* No comment specific to food grouping
3	I certainly don't think it's that important. Again, it's going to depend on what kind of diet instruction you are giving someone. If you are working with a diabetic...	Elements of basic math are needed, but it may not be important to be able to read the entire label.	I do think it is necessary to know what common household measurements are to have some familiarity of what a cup is or a tablespoon is or teaspoon.	I don't think people need to know what food groups are, but it certainly helps.
4	I think it really depends on what the person is being instructed for...But I think you can survive without knowing that.	Some diet instructions, I can see, require some ability to do arithmetic. It would be a great value, whereas in others, I'm not sure that it would.	No comment	If there is food grouping (as a part of the education), then yes, a person needs to be able to comprehend that certain foods help
5	Yes	No comment	I think that is a definite key component in terms of following a healthy diet because we know everything is tied to the portion of food consumed.	This very much ties into the context of the diet instruction or the context of the disease state.
6	**No comment specific to macronutrients	**No comment specific to math	We will try to get around math by comparing to a computer mouse or dice or think of other ways to talk about portions where we don't have to use math.	** No comment specific to macronutrients

Table 3.1 Continued

7	No comment	I guess it's nice if they can add.	If it's just general healthy eating, I say no. If it's more precise, like they're on an insulin pump, and they are carb counting, they've got to be able to estimate portion sizes or at least how their blood sugar is going to respond to that.	No I think a good counselor works with the person where they're at. not everyone categorizes according to MyPyramid, and we just learn to deal with it in that manner and just go with the flow.
8	I can see for some diagnoses they may need to know the difference between carbohydrate, protein, and fat. But in most things, I think it's more important to be able to identify in terms of food.	I think for food labels, maybe, they need some very basic math instruction or background but very simple.	I think it can be done with other things	I think they need to understand food choices that are appropriate, I don't think they need to know grouping
Totals	1 yes, 2 with exceptions	4 basic math (addition; high vs. low); 2 depends; 1 no	3 yes; 2 depends on instruction; 2 no	2 yes; 2 depends on instruction; 3 no

Respondent	Culture	Nutrition Label	Diet/Disease Relationships	Food Composition
1	Even if people know and understand about nutrition, they may not be able to access healthy food.	No comment	I think, first of all, people need to understand food gives them important substances they need to live and to be healthy. Food also, if you consume too much of it, food can contribute to chronic disease.	No comment
2	No comment	No comment	No comment	No comment
3	Some of the cultural aspects, values, attitudes, beliefs about food	Older people in the Hmong community that I work with, we can't use labels at all because the concept of reading numbers, they don't get.	They are certainly going to have to understand the concept that there are certain components of nutrients in foods that are going to affect their blood sugar. So that will be referring to carbohydrate,	No comment
4	No comment	No comment	I think this idea of what we eat and how that influences either our health or our weight...I think that's an important concept to try to pick up.	No comment

Table 3.1 Continued

5	No comment	I absolutely think that food label reading is a critical aspect of really empowering individuals to make long-term decision related to healthy diets.	No comment	To stress this issue that the spectrum of the quality of food across different food groups...
6	For Spanish-speakers, certainly	No comment	No comment	No comment
7	No comment	They don't need to know math. They just need to know that if they are counting carbs, see 30 grams and know what that means		That seems to be the most important
8	No comment	No comment	No comment	people have a better understanding when they already do cook versus someone who eats out most of the time, so I guess it's an understanding of food ingredients and that experience with food
Totals	3 comments without prompts	1 no; 2 yes; comments without prompt	4 comments without prompts	3 comments without prompts

Two comments were not able to be categorized because their content applies to all prompted categories as indicated above:

* “The bottom line is, all of these are important. The extent to which one can get into them is going to depend on your audience.”

** “ I would say it depends on the type of diet instruction it is, but certainly all of the subgroups you have mentioned there could be needed.”

Results

In terms of demographics, participants (n=8) indicated an average of 27 years (range 11-40 years) experience in the field of nutrition; seven were registered dietitians; all had graduate

degrees in nutrition-related fields (Ph.D., n=4); six indicated their jobs involved a combination of nutrition related research, education, and outreach, one indicated nutrition education only, and one indicated education and research.

A significant theme among answers was that the skills required for understanding diet education is dependent on the type of diet instruction provided, with diabetes frequently noted as a disease requiring greater knowledge and skills. Conceptual skills for macronutrients were important with diabetes (n=5), as well as basic math (n=4 yes; 2=depends) and portion sizes (n=4 yes; 2=depends). Knowledge of MyPyramid/food groups yielded mixed results (n=3 yes; 2=depends, 2=no; 1=no response). In addition, four indicated that all prompted components (macronutrient knowledge, food group knowledge, basic math skills, and competency with household measurements) were important. Unprompted comments indicate that diet and disease/health concepts were important (n=4) as well as knowledge of food composition/ingredients (n=3). Specific answers are listed by question in Appendix F.

Participants were also asked if they would use a nutrition literacy assessment instrument if it was available (Question 5). Half of the respondents (n=4) indicated they would readily use the instrument, while the other half (n=4) indicated they would use the instrument if it was related to their intended education. In terms of how much time participants were willing to spend assessing nutrition literacy, most (n=5) felt they could allocate only five minutes or less due to time constraints with clients. However, four participants noted they would allow 10 -15 minutes if the assessment took place on an occasion prior to the nutrition education session.

These results were the basis for our nutrition literacy assessment algorithm (**Figure 3.1**) for determining if clients need macronutrient knowledge; numeracy skills for label reading; household measurement skills for portion sizing; or food group identifications skills.

Figure 3.1: Nutrition Literacy Assessment Algorithm

<p>Will the client need to understand concepts of macronutrients? (Examples: Carbohydrate counting, Low fat diet)</p> <p>Yes <input type="checkbox"/> Check knowledge of macronutrients</p> <p>No <input type="checkbox"/></p>
<p>Will the client need to learn portion sizes? (Examples: carbohydrate counting, renal diet, weight loss)</p> <p>Yes <input type="checkbox"/> Check knowledge of household measurements</p> <p>No <input type="checkbox"/></p>
<p>Will the client need to read labels? (Examples: carbohydrate counting, low fat diet, allergy restrictions)</p> <p>Yes <input type="checkbox"/> Check numeracy</p> <p>No <input type="checkbox"/></p>
<p>Will the client need to be able to group foods? (Examples: carbohydrate counting, low fat diet, renal diet)</p> <p>Yes <input type="checkbox"/> Check knowledge of food groups</p> <p>No <input type="checkbox"/></p>

A nutrition professional can use this algorithm to determine which components of nutrition literacy assessment to evaluate based on the type of diet instruction that is required.

Discussion

It was clear in our research that participants find a tiered effect of skills needed to understand nutrition education. In general, if a disease with nutrition implication is present, the need for nutrition and food-related skills increase, whereas many felt anyone with interest can learn something about nutrition, however small, with minimal skills.

It is, therefore, not surprising that diabetes was often mentioned by participants as a disease requiring greater knowledge and skill in nutrition. Low health literacy is common in those with diabetes (Williams et al, 1998) and is associated with poorer glycemic control (Schillinger et al, 2002) and increased episodes of hypoglycemia (Sarkar et al, 2010). Certainly, diabetes comprises a large population of clients seeking nutrition care as it is one of few conditions for which nutrition care is reimbursable by Medicare and other third party payers. For effective blood glucose management, diabetes involves a high degree of self-monitoring and care with direct application of nutrition. The American Diabetes Association recommends medical nutrition therapy for those with diabetes to include monitoring of fat and carbohydrate intake, and attention to overall energy intake for those who need to lose weight (2010). In order to follow these recommendations for carbohydrate monitoring alone, those with diabetes must understand the relationship between carbohydrate intake and blood glucose levels, be able to identify sources of carbohydrate in food, and correctly portion carbohydrate containing foods in accordance with their nutrient needs while also meeting goals for blood glucose. Further, because of the likelihood of comorbidities, those with diabetes should often be concerned about other nutrient intakes as well, such as saturated and *trans* fat, sodium, and cholesterol.

Although much attention has been given to diabetes and health literacy, other diseases require nutrition management as well. There are implications for reduced health literacy and hypertension (Pandit et al, 2009) and infant and child feeding practices (Sanders et al, 2009), and, although research is not yet available, there is also growing interest in the chronic kidney disease population (Devraj & Gordon, 2009).

The small number of participants in this research is a noted limitation. However, the participants each speak from years of experience in nutrition education, which strengthens the credibility of the data. Expanding the pool of participants was feared to introduce more participants with less experience in nutrition education.

Implications and Areas of Further Research

Nutrition educators need an instrument for more effectively assessing nutrition literacy. This idea is supported by the guidelines for standardizing nutrition care provided by registered dietitians, known as the Nutrition Care Process (NCP) (Lacey& Pritchett, 2003). In this process, nutrition assessment is the first step outlined for effective nutrition care. Within the assessment, dietitians are expected to “evaluate psychosocial, functional, and behavioral factors related to food access, selection, preparation, physical activity, and understanding of health condition” and “evaluate patient/client/group’s knowledge” (Lacey& Pritchett, 2003). Further in the process, the second step of the NCP is the nutrition diagnosis, and one option as a diagnosis includes a “Food and Nutrition-Related Knowledge Deficit (NB-1.1)” (ADA, 2006). An instrument designed to assess nutrition literacy could provide objective support for such a diagnosis.

To minimize time spent assessing clients for nutrition literacy, our algorithm allows nutrition professionals to choose assessments based on the skill needed for understanding the nutrition education to follow. If, for example, a client is referred for education on a low-sodium diet, the nutrition professional may evaluate numeracy alone if he/she expects to focus largely on food label reading as the topic of education.

Regardless of the disease state, potential exists in any patient or client education encounter for low health literacy. However, without an instrument that specifically addresses nutrition, nutrition professionals are limited to identifying problems with print literacy and numeracy, which may not provide enough information in regard to skills in measuring portion sizes, understanding macronutrients, or food groups. Identifying these skills may more effectively identify functional ability to make healthful food choices.

With no instrument available that meets this description, a new instrument must be created. Following instrument development, the instrument will be pilot-tested by nutrition professionals, and compared to other previously established reliable health literacy tools (such as the TOFHLA, the Newest Vital Sign, or the REALM).

Chapter 4: Pilot Study

Development of a Nutrition Literacy Assessment Instrument

Introduction

In order to provide education that is presented in an understandable way, nutrition professionals must have an instrument they can use to identify where clients/patients possess needed knowledge and skills, and to what degree, and where they are lacking. It is critical that we develop a better understanding of the perception of nutrition professionals in how this instrument impacts their teaching delivery. In our first preliminary study (Chapter 2), 96.0% of participants responded “always” (n=87) or “usually” (n=32) to the statement “I adjust my education methods based on what I perceive or have assessed the client/patient’s level of understanding to be.” Considering that for the same study, 79.2% of participants did not use literacy assessment instruments to assess health literacy, and only 21.3% identified they “always” have written materials available to meet different levels of understanding, perhaps there is a discrepancy between perception and reality. We hypothesized that exposing dietitians to a nutrition literacy instrument would allow dietitians to observe this inadequacy and consequent benefit of using an instrument for assessment.

Methods for developing general health literacy assessment instruments have been reviewed (Weiss et al, 2005; Davis et al, 1993; Baker et al, 1999), and have involved comparisons for reliability and validity against instruments already known to measure health literacy. However, because there were no instruments that measure nutrition literacy, this method was not available. As such, we relied upon information gathered from the key informant interviews (Chapter 3) to determine instrument measures.

Instrument Development

The Nutrition Literacy Assessment Instrument (NLAI) (Appendix G) is comprised of three sections. The first section includes the Nutrition Literacy Assessment Algorithm (**Figure 3.1** and discussed in Chapter 3) in which the nutrition educator is prompted to consider the skills or knowledge present in the client that will be important for the intended educational message. The purpose of the algorithm is to minimize the length of time required to complete the assessment by focusing only on the skills necessary for the nutrition education encounter. Through completion of the algorithm, the nutrition professional will determine what remaining components of the NLAI are necessary for the client to complete.

The second section of the instrument is divided into assessments for the five different knowledge/skill sets identified by key informant interviews as components of nutrition literacy. The first of these four is “Nutrition and Health,” which addresses the “ability to link intake of nutrients with health-related outcomes” (Sapp & Jensen, 1997), and all clients are asked to complete this section because it was strongly emphasized in the key informant interviews as a necessary concept for all nutrition education encounters. This section of the NLAI consists of information provided in prose format. The passage was adapted to a ninth grade reading level from basic nutrition information text found on the Centers for Disease Control website. The six questions that follow utilize the cloze procedure (see Chapter 1), addressing information found in the text. This approach is consistent with the TOFHLA, identifying one’s ability to use text to answer questions.

The second knowledge/skill set assessment addresses “Macronutrient” knowledge and requires prior knowledge of macronutrients on the part of the respondent. Miller and colleagues (2009) found that among adults (n=93), greater nutrition knowledge was positively correlated with motivation ($r=0.44$, $p<0.001$) for following a healthy diet. Similar to other instruments attempting to capture knowledge (Sapp & Jensen, 1997), the macronutrient section of this instrument attempts to identify understanding of foods containing carbohydrate, fat, and protein. This section is completed by the client if prompted by the nutrition educator’s completion of the algorithm to do so. This knowledge may be relevant for clients who must follow a low-fat diet or a carbohydrate controlled diet, for example. The six multiple-choice questions included in this component attempt to measure one’s understanding of the macronutrient content of food. These questions are original to the instrument but follow the format of a typical entry-level nutrition class exam.

The third knowledge/skill assessment addresses “Household Food Measurement” skill. This section is completed by the client if prompted by the nutrition educator’s completion of the algorithm to do so. This skill may be relevant for clients who must be able to measure or estimate portions of food, which might be necessary for a carbohydrate controlled diet or for a weight loss diet, for example. This section includes six gray-scale pictures of food (non - copyrighted photographs Corel Corporation, 2008). Each picture has a corresponding question. The question provides the reader with the portion amount (in cups or ounces) of the food pictured, and the reader must choose from three answer options whether the amount pictured is a recommended portion or not. The inspiration for using food pictures was the “Portion Distortion” quiz (2003) found on the webpage for the National Heart, Lung, and Blood Institute

of the National Institutes of Health, along with evidence that food photographs can assist individuals in estimating food portions (Nelson, Atkinson, & Darbyshire, 1995), however, the question format is original to the instrument.

The fourth knowledge/skill assessment addresses “Food Label and Numeracy” skills. This section is completed by the client if prompted by the nutrition educator’s completion of the algorithm to do so. This skill may be relevant for clients who must be able to find information about nutrients on food labels, which might be necessary for a carbohydrate controlled diet, a low-fat diet, or a sodium-restricted diet, for example. A request to incorporate the NVS (Weiss, 2005) into this component of the NLAI was not approved by Pfizer[®]. Therefore, we utilized the food label graphic from the FDA’s webpage, which is free for public use, and followed the format of the NVS. The resulting assessment component, then, is an adaptation of the NVS.

The fifth knowledge/skill assessment addresses “Food Group” knowledge. This section is completed by the client if prompted by the nutrition educator’s completion of the algorithm to do so. This knowledge may be relevant for clients who must be able to group foods by nutritional category as taught through the USDA food guide (currently known as MyPlate), which might be necessary for a low-fat diet, carbohydrate controlled diet, or a renal diet, for example. For this assessment, the client is given a list of foods and a chart with headings for the different food groups (grains; vegetables; fruits; meat, poultry, fish & beans; dairy; and fats & oils). For each of the food groups, the client must write the foods from the list that corresponds. Foods listed on the exercise are commonly consumed foods as noted in the 2008 report “Dietary Assessment of Major Trends in US Food Consumption, 1970-2005” from the Economic

Research Service (Wells & Buzby). This exercise is original to the instrument and was inspired by the researcher's experience in nutrition education.

The purpose of this pilot study was to determine the adjustment made in the nutrition education provided as a result of the instrument. To attain this objective, we tested the working hypothesis that a strategic assessment of nutrition literacy will lead to more targeted education as perceived by registered dietitians. The objectives of the study include:

- Determine the correlation between the health literacy survey (REALM) and the NLAI.
- Determine the relationship between the dietitian's subjective assessment of nutrition literacy and the REALM and NLAI results.
- Determine the relationship between the Nutrition Literacy Assessment Algorithm, results of REALM, NLAI, and any nutrition education materials given.
- Determine if use of the NLAI we have created results in more targeted education as perceived by nutrition professionals.

Methods

Dietitian Recruitment

Registered dietitians (RDs) were recruited from a list of preceptors for the University of Illinois dietetic internship program (n=9), as well as local contacts of the researchers who are currently engaged in dietetics practice, and members of the South Suburban (Chicago) Dietetic Association and Eastern Illinois Dietetic Association. Approximately 89 dietitians were reached. Of these 13 were interested, however, work schedules, limitations within their facilities, or disinterest with the research approval process limited the number to five. The recruiting email

can be found in Appendix H. Participating RDs were viewed as co-investigators and completed required human subjects training before participation.

Training of Dietitians

Healthcare providers who receive training on health literacy have greater intentions of identifying patients with reduced health literacy and of checking for patient understanding of information provided (Mackert, Ball & Lopez, 2011). Schlichting et al (2007) found that healthcare providers (n=333) with formal training in health literacy used the “teach back” method ($p=0.04$) and used low health literacy designed educational materials ($p < 0.001$) more often than those without training. Thus, given our research indicating lack of attention to health literacy among RDs (Chapter 2), we felt it necessary to train RD co-investigators on health literacy so that they would know how to interpret and act upon the NLAI assessment results. Three educational modules were developed to train the RDs on the concept of health literacy (Module 1), the consequences of health literacy (Module 2) and use of the research instrument (NLAI) (Module 3). These modules were developed based on the review of literature (Chapter 1), previous research results of this project, and requirements for conducting research with humans.

The modules, including PowerPoint and audio files were viewed by RDs online at <http://trainingmaterials.weebly.com>. Two dietitians viewed them in an investigators office while the dissertation candidate spoke to the dietitians via phone conference. Training with the other three dietitians was completed independently, with follow-up by the doctoral candidate. Prior to training, participating dietitians were sent a packet of materials that included: Recruitment Flyer (Appendix I), Prescreening Instrument (Rush only, Appendix J), Consent Form (Appendix K),

Subjective Assessment Form (Appendix L), REALM (Appendix M), and the NLAI (Appendix G).

Locations with RD participation included the Illinois Bariatric Center at Olympian Surgical Suites (2 RDs), Rush Nutrition and Wellness outpatient clinic (1 RD), Ingall's Memorial Hospital Wellness Clinic (1 RD), and Nutradynamics (1 RD). All methods were approved by the University of Illinois and Rush Medical Center Institutional Review Boards (for Rush RD only).

Client Recruitment

Clients were recruited using a convenience sample approach at selected outpatient clinics. Ten completed surveys per participating dietitian were targeted, or lasting one month of recruitment, whichever occurred first. The study was conducted in the dietitians' normal clinic area.

The clinic personnel at the research sites identified adults with clinic appointments for the participating dietitians. The clinic personnel were instructed to give each client a flyer about the study (Appendix I) and ask if they are interested in being in the study. If interested, they were told to give the flyer to the participating dietitian at their appointment. If not interested, they were not to give the flyer to the dietitian. For those interested, the participating dietitian reviewed the consent form with the patient and obtained the signature. If the dietitian determined the client was not suitable due to an inability to read or cognitive impairment, the patient was not consented and did not participate. At Rush, a prescreening instrument (Appendix J) was used to ensure competency for participation.

After consent forms were completed (Appendix K), the dietitian completed the subjective assessment form (Appendix L); read the instruction for the REALM and administered the interview (Appendix M); gave the patient the NLAI to complete, and recorded the time required to complete the NLAI. The dietitian then proceeded with the scheduled nutrition education.

Results

Dietitians at the Bariatric Center were not successful in recruiting 10 clients each in one month's time. The reason they provided for this was summer vacationing for both the RDs and their clients. Because of this and their willingness to continue to recruit, an amendment was submitted to the UI IRB to extend the time period for these two dietitians. This resulted in an additional 5 clients.

At Rush, the RD was not successful in recruiting 10 clients in one month's time, which was explained by lack of interest in the potential clients for the additional time required for assessment. Because of the extended initial IRB review process, and because both IRBs would be involved, the supervising RD at Rush did not want to engage in an amendment process to extend the time for data gathering.

Both Ingall's and Nutradynamics RDs remain in the data gathering process. Preliminary results are provided in **Tables 4.1** and **4.2**.

Table 4.1 Preliminary Client Data

	REALM Score (out of 66)	NLAI Time	NLAI Score % correct	Readability of Materials (grade level)
n	20	15	21	17
Mean	64.2	8 minutes	87.4%	7.5
Range	50-66	4-15 minutes	63.6-100.0%	6.9-7.6
Standard Deviation	3.7	2.7 minutes	8.2	0.2

*Note: Although the total possible score on the NLAI is 40, some clients were not instructed to complete the entire instrument based on the algorithm results.

REALM= Rapid Estimate of Adult Literacy in Medicine

NLAI= Nutrition Literacy Assessment Instrument

Table 4.2 Registered Dietitian Post-Research Survey Responses

Question	Answer Summary (n=3)
1. The time needed to complete the assessment is:	“about right”; n= 3 “too long”; n=0
2. Was the content of the assessment applicable to the needs of the client?	“yes”; n= 3 “no”; n=0
3. Does the instrument adequately separate clients into different levels of understanding?	“yes”; n= 3 “no”; n=0 Comment: “I felt that with the very few clients that I tested that sometimes reading level and understanding don't necessarily coincide. One lady did well on the test but had a more limited reading ability.”
4. Please rank the difficulty experienced by clients in completing the assessment.	“very difficult”; n=0 “difficult”; n=0 “appropriate”; n=2 “too easy”; n=1
5. Do you have any suggestions for improvements?	Comment: “It was perceived that some of the clients did not want to take the time to complete the assessment, and others may have been too intimidated to participate. My only suggestion would be to provide an incentive for participation. Possibly a handout or booklet on improving health literacy.”

Limited data (client n=21 of projected 37; RD n=3 of projected 5) at this time precludes detailed assessment of this data. However, there are a few observations worth noting. First, all but 1 client scored >61 on the REALM (reading level above 9th grade), but of those, 8 clients

scored at “marginal”(n=7) or “inadequate” (n=1) nutrition literacy for at least one area of the NLAI. The client (n=1) who scored 50 on the REALM (reading level of 7-8th grade) achieved an “adequate” score on all areas of the NLAI. While the number of participants is too small to fully evaluate this relationship, it suggests that assessing print literacy and nutrition literacy are, in fact, different constructs. One RD comment (see **Table 4.2**) reflects this same observation.

Second, a comparison between the recorded subjective assessment and the NLAI indicates lack of agreement between the two measures by the RD at a rate of 38% (n=8). This preliminary finding suggests a discrepancy between the RD’s perception of the client’s nutrition knowledge and/or skill and the tested ability.

Third, in the case of the clients who received less than adequate scores on the NLAI (n=8), the RD provided instruction on the deficient knowledge/skill area 88% of the time. This preliminary finding suggests the RD used the NLAI to target her nutrition education topics or would have discussed this anyway.

Limitations

A noteworthy limitation of this research is that we did not identify if RDs had educational materials with different levels of understanding available for educational encounters. It was discovered through data collection that one site uses the same materials for all clients, a finding that makes it difficult to derive relationship between use of the NLAI and adjustment in teaching methods made by the RD as a result of the assessment. Additionally, while written materials are commonly used in nutrition education and were included in data assessment, oral instruction is an important method of education as well and is not investigated here.

Another potential limitation is that we did not gather demographic information from our participants. As such, comparisons with respect to age, socioeconomic status, race, and educational attainment between our sample and those samples used to develop other instruments cannot be made.

Discussion

While it is not prudent to formulate conclusions from the data at this point, it is important to discuss the challenges that researchers faced through the research process of this pilot study, which have significance with respect to IRB review of minimal risk research in the behavioral and social sciences, research involving multiple sites, and the participation of RDs in research, and is therefore worth discussion here. Indeed, the informal process evaluation findings suggest an area of research related to health policy research in general, and nutrition research policy in particular. The Department of Health and Human Services (DHHS) and the Office of Science and Technology Policy (OSTP) posted proposed rule changes to the “Common Rule,” or the set of US regulations governing human subjects’ research, on July 26, 2011 (Federal Register). Proposed changes concern seven areas of the Common Rule, three of which, if modified and followed, would significantly lessen the challenges encountered by researchers of this study.

One goal with significance to this pilot study was to streamline the review process for studies which meet conditions of “exempt” research. The proposal reads (p.44515): “i. Require that researchers file with the IRB a brief form (approximately one page) to register their exempt studies but generally allow the research to commence after the filing; ii. Clarify that routine review by an IRB staff member or some other person *of such minimal risk exempt studies is*

neither required nor even recommended [italics mine]; iii. Expand the current category 2 exemption (45 CFR 46,101(b)(2)) to include all studies involving educational tests, surveys, interviews, and similar procedures so long as the subjects are competent adults, without any further qualifications (but subject to the data security and information protections discussed above)...”

For the present study, we were originally advised by the IRB that the research met conditions of exemption and filed it as such. However, the study was eventually reviewed by a convened IRB nine months after the original submission and required two more months of discussion with multiple requests for additional information from the researchers before approval was given. All the while, the IRB agreed with the study’s status of “minimal risk” research. One consequence of the extensive review was the loss of RD co-investigators who had already agreed to participate in the research. Before the research had gained approval, 3 of 5 who had agreed to participate were no longer able to due to changes in staffing and availability. This consequence for RD participation in research will be discussed further later in this paper.

The reason for the delay in gaining IRB approval is not well understood by the researchers. However, one area of the research that required modification was the consent form and process for obtaining consent, another area with proposed changes to the Common Rule.

The DHHS and OFST propose that studies currently meeting “exempt” status would be assigned a new category of “excused,” meaning they would not be required to undergo IRB review but would be required to submit a brief form to make the institution aware of the research (p.44518-9). Within this proposition, it would be acceptable for studies meeting excused status

to “obtain oral consent without written documentation...for studies involving educational tests, surveys, focus groups, interviews, and similar procedures” for competent adults. Again, such a rule change would allow for studies such as ours to proceed with less delay while the participant still incurs minimal risk for participation.

A third component of the proposed rule changes with potential impact on studies such as ours concerns studies with multiple site involvement. While the Common Rule does require all participating sites to obtain IRB approval, it does not require each separate IRB to conduct a review. However, the DHHS and OFST identify that many IRBs conduct independent investigations of multi-site reviews anyway, potentially resulting in “hundreds of reviews for one study,” because one change made by one IRB requires submission of the revised protocol to all reviewing IRBs, which can further delay research initiation (p.44521-2). In our study, three researchers were allowed to participate under the University of Illinois’ IRB approval because they did not have individual IRBs, but the study was reviewed separately by Rush University Medical Center after it had been approved by the University of Illinois and changes made and approved by Rush then had to also be approved by the University of Illinois. The consequence of this was a further delay of research initiation at Rush by four additional months. At Ingalls, after four months of administrative review, the research was approved by Ingalls to be conducted under the UI IRB. An amendment to the UI protocol was submitted, requiring two months more for additional documentation. The proposed solution is to develop centralized IRBs, such as has been done by the National Cancer Institute and the Department of Veterans Affairs.

A related concern revealed through this study process is the challenge for RDs to participate in research. The AND notes in its 2011 “Priorities for Research” the importance of

dietetics research to the future of the profession and estimates that there are currently only approximately 400 active AND researchers. To put this in perspective, this translates to eight active researchers per state. Efforts have occurred to increase the clinical dietitian's involvement in research but overall estimates of RDs actively engaged in research has remained largely unchanged (Byham-Gray et al, 2006).

Slawson, Clemens, & Bol (2000) conducted a series of nine focus group sessions with RDs (n=53) in three locations (six sessions with clinical managers representing 26 facilities from two cities in Tennessee; and 3 sessions at the 1998 annual meeting of the American Dietetic Association) with the purpose of identifying perceptions of clinical dietitians of research and perceived barriers to participating in research. The top three barriers most commonly identified included lack of administrative support (63 comments), lack of time (46 comments), and perceived inadequacies in the RD's understanding of research (34 comments). In their survey of seven Dietetic Practice Groups (n=258), Byham-Gray & colleagues (2006) identified perceptions, attitudes and knowledge of evidence based practice ($p<0.0005$) and level of education ($p<0.0005$) were the strongest predictors of the RD's level of research participation.

The ANDnotes that "A decrease in number of projects per year per active researcher from 1.7 to 1.4 suggests that active [AND] researchers may be less involved in research now than previously. This decrease occurred in spite of the percentage of active researchers who initiated two or more projects per year," (p 3, para.3, 2011). Although not investigated, the challenges we encountered in our study to involve RDs in research raises the question as to whether an additional barrier for RD participation and/or execution and completion of research includes the previously described challenges encountered with human subjects' research. In our case, while

13 RDs initially agreed to participate in the research, 8 (61.5%) had to withdraw due to lack of administrative support, time, or extensive review required.

Chapter 5: Survey of Registered Dietitians

Establishing Content Validity for the Nutrition Literacy Assessment Instrument (NLAI)

Introduction

Because of their experience with nutrition education, RDs are the appropriate individuals to consult for determining what items should be included in a nutrition literacy instrument and how best to test for nutrition-related skills and knowledge in clients. Further, involving RDs in the development process is needed to establish face and content validity for the NLAI and is theorized to improve its acceptance within the profession.

Content validity is defined as “the degree to which elements of an assessment instrument are relevant to and representative of the targeted construct for a particular assessment purpose,” (Haynes, Richard, & Kubany, 1995) and is important for identifying “abstract concepts” through “observable and measurable” methods (Wynd, Schmidt, & Schaefer, 2003). It is appropriate to use a combination of methods for determining content validity rather than assuming it through literature review or expert review alone (Yaghmaie, 2003). Establishing content validity begins with literature review of the content area, followed by development of instrument items that are associated with the intended content domain, and finally, the instrument items are reviewed by an expert panel (Wynd, Schmidt & Schaefer, 2003; DeVellis, 2012).

The first two steps of attaining content validity for the NLAI are previously described in Chapter 4. While the pilot study (Chapter 4) did incorporate RDs, the small number included was considered a limitation. More RD input was desired to provide a larger scope perspective on the content and measurement approaches of the NLAI. Consequently, a survey was developed to

gauge the RDs perception of the NLAI and thus determine content and face validity. The hypothesis for this study was that the NLAI would have both content and face validity. This hypothesis was tested for the NLAI in its entirety as well as each component.

Methods

The 35-item survey (Appendix N) was developed in consultation with the research committee. Questions were designed to assess whether the NLAI had content validity in each of the five topic areas, as well as the acceptability of the algorithm and attitudes concerning nutrition literacy.

1. Do RDs find the nutrition literacy assessment algorithm useful and understandable?
2. For each topic area, is the skill/knowledge area measured in the NLAI the appropriate skill/knowledge area to assess before nutrition education?
3. For each topic area, is the method of assessment for measuring the skill/knowledge area appropriate?
4. Do RDs feel nutrition literacy is important and worth the time required for an assessment?
5. Do RDs prefer use of the NLAI over the REALM for use in assessing nutrition literacy?

Participants were asked in each section whether the instrument accomplished its purpose in that area (see questions 6, 7, 11, 15, 19, and 23 from **Tables 5.1 – 5.6**); if the questions were appropriate in difficulty (see questions 9, 12, 16, 20, and 24); and if anything important had been left out of the respective section (see questions 14, 18, 22, and 26 in **Tables 5.1 – 5.6**). For the “Nutrition and Health” section, a question of appropriateness in length (see question 8 in **Table**

5.2) replaced a question of whether anything was left out. For each section of the instrument, participants were asked whether each respective section was important to include in the instrument (see questions 10, 13, 17, 21, and 25 from **Tables 5.1 – 5.7**).

All methods were approved by the University of Illinois IRB. Two Dietetic Practice Groups of the ADA were selected as ideal participants in the survey because the natures of their practice areas involve nutrition education: These included the Diabetes Care and Education (DCE), and Sports, Cardiovascular, and Wellness Nutritionists (SCAN) which have approximately 6,400 each. After IRB approval, methods were approved by the individual DPGs and the ADA.

The online survey software program, Survey Gizmo[®], was used to design and collect survey results. The survey was given the title, “Critique of Nutrition Literacy Assessment Instrument (NLAI)” and was distributed by email containing a web-link for the survey. Members of SCAN were recruited through the three electronic mailing lists (n=2,682) maintained by the DPG, while members of DCE (n=6,332) were recruited through an e-blast. The recruiting email is included in Appendix O. The SCAN members were given access to the survey for three weeks, while DCE members had access for two weeks. This difference reflects different approaches to the distribution of the recruiting email between DPGs as determined by their respective research committees. SCAN required the researcher to post the email directly to its electronic mailing lists, while DCE communicated to members by way of an e-blast. Additionally, the e-blast from DCE included the DPG’s logo and design, whereas the email to SCAN participants did not. Data were automatically saved as an Excel spreadsheet.

Statistical analysis was completed using the Statistical Package for the Social Sciences (SPSS for Windows, PASW Statistics 18, release 18.0.). To evaluate the degree of agreement with the NLAI by survey participants, we compared our data with the following scale where “average agreement at or above 70% is necessary, above 80% is adequate, and above 90% is good,” (House, House & Campbell, 1981, p.46).

Additionally, comments were analyzed using qualitative methods. Specifically, the comments were analyzed using content analysis, which involves identifying coherent and important examples, themes and patterns in the data (Patton, 1987). Two researchers analyzed the comments separately to develop a list of keywords and codes. Then each reviewed the results of the other, and discussed until consensus was reached. Overarching themes were developed from the codes with the highest frequency of similar response.

Results

Of 385 participants, 377 (98%) consented to the survey. A total of 144 participants (37%) completed the entire survey, while 241 partially completed the survey, therefore answers have varying numbers of participants. Data is represented in the following tables. Results from the reconciled content analysis for comments can be found in Appendix P. For sections of the instrument, agreement between researchers for assigning categories of comments before reconciled analysis was high with overall agreement at 96% (363 comments out of 377). This represents 94% (78 of 83 comments) agreement for the algorithm, 96% (68 of 71 comments) agreement for “Nutrition and Health,” 96% (54 of 56 comments) agreement for “Macronutrients,” 96% (90 of 94 comments) agreement for “Household Food Measurement,”

100% (48 of 48 comments) agreement for “Food Label and Numeracy,” and 100% (25 of 25 comments) agreement for “Food Groups.”

Table 5.1 Answers to Questions Regarding Nutrition Literacy Assessment Algorithm

Question	n	Yes	No	Neither
2. Does the algorithm accomplish its purpose?	178	85.9%* (n=153)	8.9% (n=16)	5.0% (n=9)
3. Is the algorithm easy to understand and follow?	176	93.1%** (n=164)	5.1% (n=9)	1.7% (n=3)
4. Is this section important to include?	166	83.1%* (n=138)	13.2% (n=22)	3.6% (n=6)
5. Are there decisions that are missing?	163	29.5% (n=48)	68.10% (n=111)	2.5% (n=6)

*Indicates answers achieving “adequate” agreement

**Indicates answers achieving “good” agreement

Table 5.2 Answers to Questions Regarding “Nutrition and Health” section of Nutrition Literacy Assessment Instrument (NLAI)

Question	n	Yes	No	Neither
6. Does this section accomplish the purpose of measuring reading comprehension?	157	83.4%* (n=131)	14.0% (n=22)	2.6% (n=4)
7. Does this section accomplish the purpose of identifying client’s understanding of relationship between nutrition and health?	157	84.7%* (n=133)	10.2% (n=16)	5.1% (n=8)
10. Is this section important to include in the instrument?	157	80.9%* (n=127)	14.7% (n=23)	4.5% (n=7)

Question	n	Yes	No, it’s too short	No, it’s too long
8. Is the passage appropriate in length?	157	66.9% (n=105)	1.9% (n=3)	31.2% (n=49)

Question	n	Yes	No, they are too easy	No, they are too hard
9. Are the questions appropriate in difficulty?	155	70.3% (n=109)	9.7% (n=15)	20.0% (n=31)

*Indicates answers achieving “adequate” agreement

Table 5.3 Answers to Questions Regarding “Macronutrients” section of NLAI

Question	n	Yes	No	Neither
11. Does this section accomplish the purpose of identifying knowledge of macronutrients?	149	89.3%* (n=133)	9.4% (n=14)	1.3% (n=2)
13. Is this section important to include in the instrument?	147	87.1%* (n=128)	11.6% (n=17)	1.4% (n=2)
14. Has anything been left out of this section that you feel is important?	148	21.6% (n=32)	77.0% (n=114)	1.4% (n=2)

Question	n	Yes	No, they are too easy	No, they are too hard
12. Are the questions appropriate in difficulty?	146	69.2% (n=101)	0.7% (n=1)	30.1% (n=44)

*Indicates answers achieving “adequate” agreement

Table 5.4 Answers to Questions Regarding “Household Food Measurement” section of NLAI

Question	n	Yes	No	Neither
15. Does this section accomplish the purpose of identifying ability to estimate portion size	145	84.1%* (n=122)	15.2% (n=22)	0.7% (n=1)
17. Is this section important to include in the instrument?	147	95.2%** (n=140)	4.1% (n=6)	0.7% (n=1)
18. Has anything been left out of this section that you feel is important?	148	40.5% (n=60)	59.5% (n=88)	N/A

Question	n	Yes	No, they are too easy	No, they are too hard
16. Are the questions appropriate in difficulty?	147	97.3%** (n=143)	0% (n=0)	2.8% (n=4)

*Indicates answers achieving “adequate” agreement

**Indicates answers achieving “good” agreement

Table 5.5 Answers to Questions Regarding “Food Label and Numeracy” section of NLAI

Question	n	Yes	No	Neither
19. Does this section accomplish the purpose of identifying skill with use of food labels?	146	95.2% ** (n=139)	4.1% (n=6)	0.7% (n=1)
21. Is this section important to include in the instrument?	145	94.5% ** (n=137)	5.5% (n=8)	0% (n=0)
22. Has anything been left out of this section that you feel is important?	142	18.3% (n=26)	72.5% (n=103)	9.2% (n=13)

Question	n	Yes	No, they are too easy	No, they are too hard
20. Are the questions appropriate in difficulty?	146	73.3% (n=107)	0% (n=0)	26.7% (n=39)

**Indicates answers achieving “good” agreement

Table 5.6 Answers to Questions Regarding “Food Groups” section of NLAI

Question	n	Yes	No	Neither
23. Does this section accomplish the purpose of identifying ability to group foods?	141	98.6% ** (n=139)	1.4% (n=2)	0% (n=0)
24. Is this activity appropriate in difficulty?	139	97.1% ** (n=135)	2.9% (n=4)	0% (n=0)
25. Is this section important to include in the instrument?	140	90.7% ** (n=127)	9.3% (n=13)	0% (n=0)
26. Has anything been left out of this section that you feel is important?	139	16.6% (n=23)	80.6% * (n=112)	2.9% (n=4)

**Indicates answers achieving “good” agreement

Table 5.7 Additional Questions Regarding Health/Nutrition Literacy

Question	n	Yes	No	Neither
27. Would you prefer to use the REALM instead of the NLAI to assess nutrition literacy?	139	14.4% (n=20)	79.9% (n=111)	5.8% (n=8)
28. Are there any sections of the REALM that you feel would be beneficial to include on a new assessment tool?	134	25.4% (n=34)	73.1% (n=98)	1.5% (n=2)
29. Do you use an instrument to assess health literacy in your clients?	140	7.1% (n=10)	92.9% (n=130)	N/A
33. Would you use an instrument if there was one available?	134	72.1% (n=98)	20.9% (n=28)	6.0% (n=8)
34. Is health literacy an issue that you feel is important?	138	96.4% (n=133)	3.6% (n=5)	N/A
35. Is an assessment of nutrition literacy important enough to nutrition education to take the time for an assessment?	139	80.6% (n=112)	18.0% (n=25)	1.4% (n=2)

REALM= Rapid Estimate of Adult Literacy in Medicine

Our first research question asked whether RDs found the algorithm of the instrument useful and understandable. Combining the answers indicating agreement with questions three through five (see Table 5.1), where agreement is determined by “yes” for questions three (93%; n=164) and four (83%; n=138) and “no” for question five (68%; n=111), the combined score of 82% indicates the algorithm achieved “adequate” agreement. When asked if any decisions had been left out of the algorithm (question five), 29% (n=48) answered “yes,” where “language/cognitive barriers” was the most common theme (n=14) and “readiness to learn” (n=5) and “ability to purchase and prepare food” (n=4) were noted by a few.

Sections achieving “adequate” agreement, indicated by a “yes” answer to these questions, included “Nutrition and Health” (81%; n=127) and “Macronutrients” (87%; n=128), while

sections achieving “good” agreement included “Household Food Measurement” (95%; n=140), “Food Label and Numeracy” (94%; n=137), and “Food Groups” (91%; n=127). Combining these scores, the sections of the NLAI achieved “good” agreement with an overall score of 90%,.

Combining “yes” answers to whether the section accomplished its purpose(s), “yes” answers to whether it was appropriate in difficulty or in length (for “Nutrition and Health” only), and “no” answers to whether anything had been left out (not for “Nutrition and Health”), each section achieved agreement. “Nutrition and Health” (76%) and “Macronutrients” (79%) sections achieved the minimum required for agreement; “Household Food Measurement” (80%) and “Food Label and Numeracy” (80%) sections achieved “adequate” agreement; and “Food Groups” (92%) achieved “good” agreement.

Another research question addressed in this survey is whether RDs would prefer to use the NLAI over the REALM (Appendix M). Consequently, after survey participants viewed and answered questions specifically addressing the NLAI, they then viewed the REALM and answered questions 27 and 28 (see **Table 5.7**). As can be seen by the “no” response by 80% (n=111), meaning the majority chose the NLAI over the REALM, again, the NLAI receives “adequate” agreement. Some (n=12) felt the NLAI could be improved by following the approach of the REALM in providing a list of words to read aloud, but that these words should be comprised of “nutrition-related” (n=5), “medical-related” (n=5) or “food-related” (n=2) words.

Table 5.8 Frequencies of Answers for Survey Items that were significantly different ($p<0.05$) by categories of Job Time Spent in Nutrition Education

Topic	% time in Job					p Value
	80	50-80	20-50	<20	No response	
Food Label Purpose; “yes”	97.1% (n=43)	100% (n=46)	93.5% (n=29)	86.7% (n=13)	88.9% (n=8)	0.013
Include items from REALM; “no”	65.1% (n=28)	88.1% (n=37)	79.3% (n=23)	46.7% (n=7)	1.2% (n=3)	0.003
Is Health Literacy Important; “yes”	88.4% (n=38)	100% (n=46)	100% (n=31)	100% (n=15)	1.2% (n=3)	0.012

Table 5.9 Frequencies of Answers for Survey Items that were significantly different ($p<0.05$) by categories of Job Description

Topic	Job Description							p-Value
	Public Health Nutrition	Outpatient Counseling	Private Practice Counseling	Research and/or Academia	Inpatient	Other	No Response	
Algorithm Easy; “yes”	100% (n=7)	93.8% (n=61)	87.5% (n=7)	75% (n=9)	96% (n=24)	95.2% (n=20)	14.3% (n=36)	0.049
Food Label Purpose; “yes”	85.7% (n=6)	96.9% (n=63)	100% (n=8)	66.7% (n=8)	100% (n=25)	95.2% (n=20)	3.6% (n=9)	<0.001

To determine if there was any relationship between “Job Time Spent in Nutrition Education” (Question 31) or “Job Description” (Question 32) and answers to survey questions, the non-parametric Kruskal-Wallis test was conducted with items reaching significance ($p<0.005$) reported in **Tables 5.8 and 5.9**. Topics not listed in the table were non-significant. There was significant difference seen between groups for whether the “Food Label” section accomplished its purpose, both when grouped by “Job Time” ($p=0.013$) and “Job Description,” ($p<0.001$) where those spending more time in nutrition education agreed that it accomplished its purpose more often and those with job descriptions including outpatient counseling, private practice counseling, inpatient, or “other,” agreed that it accomplished its purpose more often than those in public health nutrition or research/academia. In both cases, these differences may reflect

differences in job responsibilities of educating clients about nutrition, where those with more responsibility in their job for educating clients more often agreeing that the food label section accomplished its purpose, although having only 15 responses in the <20 hours per week make interpretation of this findings difficult.

Significant difference ($p=0.003$) was also seen between “Job Time” groups for whether items from the REALM should be included in the NLAI (Question 28) where those spending between 20-50% or 50-80% of job time in nutrition education more often answering that items from the REALM should not be included in the NLAI, although there was a majority for “no” in this category for 80% time as well. Those spending less time (<20%) may feel that more is better without discrimination among questions or types of questions. However, this is hypothetical and would require more in depth examination. Although there was a statistically significant difference, with those in the 80% time being the only “no” in responding to is health literacy important, again this was only 5 people so the practical implication is less clear.

Finally, significant difference ($p=0.049$) was seen between participants when grouped by job descriptions where those in Research & Academia agreed that the algorithm was easy to understand and interpret less often than other groups. However, this group was comprised of only 11 people and the majority ($n=7$) answered “yes” to the algorithm’s purpose.

Discussion

We were interested if participants felt the skills and/or knowledge areas identified in the NLAI are appropriate for assessing nutrition literacy for nutrition education encounters. As identified by Sapp and Jensen (1997) “dimensionality...the number of theoretically and

empirically distinct subcomponents of the broader construct” is important to the design of nutrition instruments, because gaining an understanding of one’s nutrition knowledge is dependent upon the complex interplay with knowledge of related subtopics as is reflected in the NLAI.

While the overall agreement with the NLAI was positive, it is valuable here to consider common themes of comments for those who disagree or responded “No”(see all comments by question and category in Appendix P) by section of the instrument to determine potential areas for improvement of the instrument. For the “Nutrition and Health” section (Questions six through ten), some (n=15) felt the “reading level is too high,” some (n=13) felt it was “too long or wordy,” and some (n=9) felt the “concepts were too advanced.”

Our approach with the “Nutrition and Health” section follows the cloze method (described in Chapters 1 and 4), consistent with other health literacy instruments, including the TOFHLA and s-TOFHLA. Other instruments that have attempted to measure knowledge of relationships between nutrition and health include the 27-item Diet-Health Awareness (DHA) Test (Sapp & Jensen, 1997) and the 2003 National Assessment of Adult Literacy (NAAL) (Department of Education, 2006). The DHA was based upon responses to the 1989-1991 Diet and Health Knowledge Survey (DHKS) and consisted of multiple choice-style questions where participants are asked to determine a disease or condition associated with intake or lack of intake of a particular nutrient. This approach is somewhat similar in that questions are asked in multiple-choice format, however, no prose text is offered for the participant to reference, so answers relate to prior knowledge rather than an ability to use text to answer nutrition questions. The NAAL included three nutrition-related tasks, but only one, “list 3 health risks associated

with being overweight or obese,” relates to knowledge of diet-health relationships. As is the case for our instrument, for this task of the NAAL, participants were given prose text to answer the question. The responses to NLAI using the cloze method for the Nutrition and Health section indicated that it accomplished its purpose, but may be too long and difficult. While others have used more simple and shorter assessment techniques (Sapp & Jensen, 1997), these techniques may not capture the essence of the questions’ rationale. Diet and health is complex, and requires a higher order of integrated conceptualization than perhaps multiple response items can divulge. However, the cloze procedure has been used in assessing other health-related understanding, such as prostate cancer (Friedman et al, 2009), understanding pharmacy instructions (Miller et al, 2009), and cardiovascular disease risk (Martin et al, 2010). Therefore, while the cloze technique is being used in health arenas other than dietetics, dietitians may be unfamiliar, uncomfortable, or lack knowledge about the applicability of this technique.

For the section on “Macronutrients” (Questions 11-14), some (n=10) felt it was “too difficult or encourages guessing.” Our approach with this section is similar to the 23-item Nutrition Knowledge (NK) test (Sapp & Jensen, 1997), which is comprised of questions from the 1989-1991 DHKS, and asks participants to identify the nutrient content of foods. Ideally, an instrument should stratify participants into different categories of nutrition literacy, requiring questions with varying levels of difficulty. Deciphering which questions to include or exclude relating to difficulty will be necessary and is determined by measures of construct validity. Parmenter & Wardle (1999) established construct validity for their 50-item nutrition knowledge questionnaire with college students where, for all sections of the instrument, dietetics students (n=74) scored higher ($p<0.001$) than computer science students (n=94). Similarly, Feren,

Torheim, & Lillegaard (2011) established construct validity for their 91-item nutrition knowledge questionnaire with college students where public health nutrition students (n=16) scored significantly better ($p < 0.001$) on all section of the instrument than construction students (n=18). For both of these instruments, researchers rejected items for the final instruments when “over 90% or under 30% of respondents answered them correctly.” Since this section has not been widely evaluated with clients, this range or appropriate foods cannot be determined at this time.

For the section on “Household Food Measurement” (Questions 15-18) some (n=19) felt “visual references in pictures are needed for better size estimation,” some (n=11) noted different “issues with the use of the word ‘portions’,” some (n=8) suggested to “modify the milk image,” and suggestions were made to include different foods including “vegetables” (n=11), “other beverages” (n=8), “fats/oils” (n=7), “different fruit” (n=5), “sweets” (n=4), “cereal” (n=2), and “fast foods” (n=2). Food photographs are a useful aid for estimating food portions (Ovaskainen et al, 2008) and have been studied with varying success for use of portion size reporting for various food consumption studies (Nelson & Jaraldsdottir, 1998; Keyzer et al, 2011; Foster et al, 2006). It is not known, however, if food photographs with common household measurement labels (such as with the NLAI) improve accuracy of estimation (Subar et al, 2010). It is important to note that our questions do not ask participants to estimate the amount seen in photographs since the amounts are given in the questions. Rather, participants are asked to identify if the stated amount for a given food is the “right” portion. In this case, the photographs serve as a visual cue for proportionality, but may not be necessary if knowledge of common food measurements is strong. Nonetheless, it makes sense that RDs would suggest a visual reference

for the milk photograph because it is simply a glass of milk and could conceivably be any volume.

An alternative approach to this section could follow the USDA Food Model Booklet (McBride, 2001), where two-dimensional photographs of various food containers, spoons, grids, wedges, and thickness blocks are used to guide estimation of food portions, an approach currently used in the Continuous National Health And Nutrition Examination Survey (NHANES, 2002) as a part of the five step Automated Multiple-Pass Method (AMPM) for obtaining dietary recall information. Although the AMPM has shown success in food recall accuracies (Conway, 2004), it is unclear what impact the food booklet alone has on this data. In addition, using such a booklet might help in identifying what a client ate, but not whether what they ate was the recommended portion.

The “Food Label and Numeracy” (Questions 19-22) section scored very high with respect to importance and accomplishing its purpose. However, results were not as strong for “was anything left out” and “difficulty.” Some (n=15) felt “question #3 (requires computation of percentages) is too hard”, and some (n=8) felt the section overall is “too difficult.” This section is an adaptation of the Newest Vital Sign (NVS), an instrument that is both reliable (Cronbach’s alpha of 0.76 for English, 0.69 for Spanish) and valid (against the TOFHLA by Pearson’s correlation for English with $r = 0.59$, $p < 0.001$, and Spanish with $r = 0.49$, $p < 0.001$) as a measure of health literacy. Because it uses a nutrition label as the text reference, on its own it is not a measure of nutrition literacy, but rather a measure of the ability to read food labels. This is an area the public has struggled with, to the point that front-of package labeling or healthfulness scoring has been suggested (Schor et al 2010).

Finally, for the section on “Food Groups” (Questions 23-26), most felt it was important, achieved its purpose and nothing was left out. A few (n=6) felt an “others” category was needed and a few (n=4) felt a “combination food” should be added. Currently, the USDA’s MyPlate food guidance graphic does not incorporate combination foods, nor did previous food guides, including MyPyramid, The Food Guide Pyramid, or the Basic Four Food Groups. Consequently, it is questionable whether the concept that some foods can be classified into a combination of food groups is recognized by the general public. In addition, the concept of food group may be different for the client than for the professional. For instance, a study with African American women found the names of food groups may differ from those of professionals, as well as foods attributed to them (Lynch, Holmes, 2011).

Almost all participants (96%, n=133) agreed that health literacy is important (Question 34) and most (81%, n=112) agreed that an assessment of nutrition literacy is worth the time it would require for assessment (Question 35). The majority (72%, n=98) indicated they would use an instrument if one was available (Question 33), though included in that number, 10 indicated “yes, if time.” Of the dissent’s, a few (n=5) indicated “not enough time” and a few (n=4) “prefer an interactive approach.” One comment, “rely on physician to notify of illiteracy on order,” is alarming considering the average primary care visit lasts only 17 minutes (Woodwell & Cherry, 2004), and the shortest health literacy instrument to complete is the NVS at 2.9 minutes (95% confidence limit, 2.6-3.1 minutes) (Johnson & Weiss, 2008).

Limitations

The number of participants who completed this survey (39%, n=139) is a noted limitation. While the survey was tested prior to releasing it for participant access independently by the researchers in different web browsers, including Mozilla Firefox version 9, Microsoft Internet Explorer version 9, and Google Chrome, and there were no problems identified, the researchers received a few emails from participants who had consented to the research but were then unable to view the survey questions on their browser. The researchers contacted SurveyGizmo customer support who indicated that some versions of Microsoft Internet Explorer were not displaying surveys correctly. Additionally, customer support manipulated the settings of the survey to allow for greater visibility of the survey on each page. Because the greatest drop-off in answering occurred after the consent question (54%, n=211), it is believed by the researchers that these unforeseen technical problems with the survey upon initial launch explain a significant portion of the unanswered survey questions. Another limitation is that results for each DPG could not be analyzed separately or compared, as no question asked participants to acknowledge to which DPG they belonged.

Conclusion

Clearly, survey participants found the NLAI to be content valid as a measure of nutrition literacy. Although a number of suggestions were given by participants for instrument improvement, the reader should exercise caution in overemphasizing any of these categories of suggestions in light of the majority of participants who agreed with the approach and methodologies of the NLAI. According to DeVellis (2012) the researcher must consider all

comments made by experts, but the decision to accept or reject their advice is up to the instrument developer. Because there were no sections of the instrument in which a lack of agreement was found by participants, little improvement is indicated here.

A concern raised by the researchers is the number of participant comments which indicate a lack of nutrition knowledge and/or professionalism on the part of the participant. As a group, registered dietitians are required to be well educated in order to achieve registration. According the Academy of Nutrition and Dietetics (AND) “Become an RD Fact Sheet,” dietitians must have “completed a minimum of a bachelor’s degree from a US regionally accredited university or college and course work accredited or approved by the Accreditation Council for Education in Nutrition and Dietetics (ACEND) of the AND; have completed an ACEND-accredited supervised practice program at a health-care facility, community agency, or a foodservice corporation or combined with undergraduate or graduate studies; and passed a national examination administered by the Commission on Dietetic Registration.” Further, in order to maintain registration, RDs are required to complete continuing professional education requirements (AND, RD Fact Sheet, 2012). While a few participants assert the idea that only novice RDs require such assessment tools, and despite education and professional requirements of RDs, the inaccuracies reflected in some of the comments further support the need for assessment instruments, such as the NLAI, which provide algorithms for decisions related to client or patient care.

More and more, decisions for health care are based upon the use of algorithms, such as with treatment of myocardial infarction (Tsien, 1998), adverse drug reactions (Jones, 2001), chronic wound care (Letourneau, 1998), breastfeeding (Babic, 2000) and obesity (NHLBI,

1998). And again, as discussed in Chapter 3, the need for standardization of nutrition care is supported by AND through its Nutrition Care Process.

Chapter 6

Conclusions and Future Directions

Conclusions

Our research continues to demonstrate that few RDs are using health literacy assessment instruments in their practice. In our 2011 survey (Chapter 5) 93% (n=130) indicated they do not use health literacy assessment instruments with clients while 79% (n=99) in our 2008 survey (Chapter 2) did not. Rather than considering this difference as fewer RDs using instruments now compared with three years ago, differences in these numbers may reflect a difference in survey groups, where the DPG, Nutrition Educators of the Public, were included in the 2008 survey sample and not the 2011 survey sample due to the NLAI's focus in clinical nutrition education. Regardless, data from both surveys suggest the majority of RDs are not using health literacy assessment instruments.

If an instrument specific to nutrition literacy was available, 72% (n=98) agreed in the 2011 survey, that they would use it in their practice. Although the NVS has received some attention in nutrition literature (Zoellner et al, 2009; Carbone & Zoellner, 2012) as an instrument that can reliably and quickly assess health literacy, and with its use of the nutrition label may be preferable to other health literacy instruments for nutrition practice, our survey indicates that RDs feel nutrition literacy requires skill and/or knowledge in other key areas beyond an ability to read food labels. Additionally, testing of the NVS in an elderly African American population indicates its practicality may be limited (Patel et al, 2011).

Our pilot study, a study originally estimated to take four months for review, training, and data gathering, remains unfinished after 21 months since the initial IRB research proposal was submitted. While AND strongly encourages RD participation in research, our multiple site study demonstrates that the lengthy process required may be a barrier for execution and completion of RD research. Proposed changes to regulations governing human subjects' research may allow for easier RD participation.

Areas for Future Research

With face and content validity established for the NLAI, the next step is to test for construct validity. Construct validity refers to the ability of the instrument to capture the intended measure (DeVellis, 2012). While we have established that each section of the NLAI included should remain, the construct of each section should be evaluated and refined through the following measures:

1. Researchers should expand the item pool for each section by 2 to 4 times to better ensure internal consistency in the final instrument (DeVellis, 2012).
2. A panel of experts should review the expanded item pool and remove items that are unclear, exceptionally lengthy, or of high reading difficulty and rate the relevance of each item to the construct (DeVellis, 2012).
3. The reduced item pool should be tested by non-experts with items answered correctly by >90% or <30% of participants discarded (Parmenter and Wardle, 1998; Feren et al, 2011).
4. The remaining items should be tested with two groups with known nutrition knowledge skill differences. Similar to Parmenter and Wardle (1998) and Feren et al

(2011), this could be done with nutrition (or related) majors and non-nutrition related majors on a college campus. Construct validity is established if the nutrition majors score significantly higher in each section of the NLAI than non-nutrition related majors.

Secondly, the NLAI should be tested for reliability, or its predictability and consistency. Reliability should be tested in the same groups as #4 for establishing construct validity. Internal reliability will be measured by Cronbach's alpha, with at least four items in each section achieving an acceptable value of >0.70 . Test-retest reliability will also be conducted to determine if questions are answered the same after a 1 month interval by the same people. It is not our intention to test this instrument against measures of health literacy because the constructs are not the same.

While initial testing for validity and reliability of nutrition instruments among college students has been effective (Parmenter & Wardle, 1998; Feren et al, 2011) and may produce more timely data, the resulting instrument should again be field tested for reliability (internal consistency and test-retest reliability) with clients of RD nutrition educators. Given challenges encountered in our pilot for retaining RD co-investigators and client participants, incentives are likely necessary for adequate participation.

To improve participation, we will first focus recruitment on supervisors, providing incentives to hospitals, and include a draft of institutional agreement up front. Additionally, we will seek support from the AND Research in Dietetics Practice Group to lend professional credibility. In addition to providing small incentives to the potential participants, in our consent

documents, we will be careful to describe the purpose of the research as one that seeks to improve educational delivery of nutrition information, rather than of identifying what people do and do not know. This language in our pilot consent form may have unintentionally discouraged people from participating.

Other research questions that remain include: “Do RDs have educational materials with varying levels of difficulty available for nutrition education encounters?”; and “Does use of the NLAI in nutrition education result in improved knowledge or skill of the client?”

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Appendix A Preliminary Survey

Informed Consent:

This educational research is being conducted by Dr. Karen Chapman-Novakofski of the Department of Food Science and Human Nutrition at the University of Illinois, Urbana-Champaign. With your help, we hope to gather a baseline estimate of the use of health literacy assessment tools in outpatient and public health nutrition settings. Participants in this research must be at least 18 years of age and must provide consent. We remind you that your participation in this survey, which will take approximately 10 minutes to complete is strictly voluntary and you may refuse to participate or discontinue participation at any time during the project without penalty. You may skip any questions you don't wish to answer. Data gathered from the entire project will be summarized in the aggregate, excluding references to any individual responses. The aggregated results of our analysis will be shared with other professionals interested in providing nutrition information with sensitivity to health literacy. Again, your input is very important to us and any information we receive from you will be kept secure and confidential. Email and IP addresses will not be linked to your response. After consenting to the survey, you will continue to a page describing the term "health literacy," followed by the 10 question survey. You are welcome to contact our office at any time if you have questions about the survey (217.244.2852) or hgibbs@olivet.edu. You may also contact the UIUC IRB Office (217.333.2670; irb@uiuc.edu) with your questions about research participants' rights.

Risks of participation in this study are not greater than those encountered in daily life. By clicking the "I consent" box and answering the questions, you are consenting to us collecting your responses. You are encouraged to print a copy of this statement for your records.

After consenting to this study, you will be taken to the short survey.

Background Information

Objective i:

1. In my practice, an objective health literacy assessment is conducted with clients/patients.
 - Always (5)
 - Usually (4)
 - Sometimes (3)
 - Occasionally (2)
 - Never (1)
2. In my practice, a subjective health literacy assessment is conducted with clients/patients.
 - Always (5)
 - Usually (4)
 - Sometimes (3)
 - Occasionally (2)
 - Never (1)

3. I review health literacy assessments conducted on the clients/patients in my practice.

- Always (5)
- Usually (4)
- Sometimes (3)
- Occasionally (2)
- Never (1)

4. I chart/document an assessment of health literacy.

- Always (5)
- Usually (4)
- Sometimes (3)
- Occasionally (2)
- Never (1)

Objective ii:

5. Which of the following health literacy assessments do you or your practice use?

- REALM [Rapid Estimate of Adult Literacy in Medicine] (1)
- TOFHLA [Test of Functional Health Literacy in Adults] (2)
- The Newest Vital Sign (3)
- Other (4) _____
- None are used (5)

Objective iii:

6. I use methods other than health literacy assessment tools to identify levels of understanding in my clients/patients.

- Always (5)
- Usually (4)
- Sometimes (3)
- Occasionally (2)
- Never (1)

7. Which of the following methods do you use to identify levels of understanding in your clients/patients?

- Year completed in school (1)
- Nursing/social worker notes in medical record (2)
- Indicators of reading problems (i.e. arriving without forms completed, difficulty signing name, accompanied by a family member who is a surrogate reader, claims of forgetting reading glasses) (3)
- Other _____

Objective iv:

8. I have written materials available to meet different levels of understanding.
 - Always (5)
 - Usually (4)
 - Sometimes (3)
 - Occasionally (2)
 - Never (1)
9. I adjust my education methods based on what I perceive or have assessed the client/patient's level of understanding to be.
 - Always (5)
 - Usually (4)
 - Sometimes (3)
 - Occasionally (2)
 - Never (1)

Objective v:

10. How much of your job do you estimate is spent in nutrition education (including preparation for and documentation of nutrition education)?
 - 80% or more [almost all](1)
 - 50- 80% [majority](2)
 - 20 to 50% [some](3)
 - less than 20% [minimal](4)
11. Which of the following best describes your job?
 - Public health nutrition(1)
 - Outpatient nutrition counseling(2)
 - Other _____(3)

Appendix B

Example of Email Message Sent to List-Serves

You have been selected to participate in a preliminary survey for graduate dissertation research in the University of Illinois's Food Science and Human Nutrition doctoral program. As a doctoral student in the program, I am conducting a survey to identify attention to health literacy by nutrition professionals.

There is no risk to you in completing this survey. All data will be treated confidentially, and no email or IP addresses will be available to the researchers. It is anticipated that this survey will take you approximately 10 minutes to complete. Please complete this survey by October 30, 2008. Please click here for the link to the survey:

http://www.surveymonkey.com/s.aspx?sm=iG0Gua_2fz1Tc9l9EhF0oFag_3d_3d
<http://www.surveymonkey.com/s.aspx?sm=iG0Gua_2fz1Tc9l9EhF0oFag_3d_3d>

Participation is voluntary and there will be no penalty if you choose not to participate. Your completion of this survey acknowledges that you have voluntarily agreed to participate in this research study and give permission to use your responses in aggregate form for research purposes.

This study is being conducted under the approvals of both the University of Illinois Institutional Review Board and the NEP DPG. Study results will be shared with the entire NEP DPG via newsletter upon completion of this study.

The NEP DPG has approved this email message requesting your participation to facilitate this research. If you have any questions regarding this survey please feel free to contact myself (hgibbs2@illinois.edu) or Karen Chapman-Novakofski, PhD, RD, my advisor (kmc@illinois.edu).

Sincerely,

Heather Gibbs, MS, RD, LD
PhD Candidate
University of Illinois
Food Science and Human Nutrition

Appendix C
Recruiting Email (Interviews)

Subject: Nutrition Literacy Tool Research.

We're requesting your thoughts.

This educational research is being conducted by Dr. Karen Chapman-Novakofski of the Department of Food Science and Human Nutrition at the University of Illinois, Urbana-Champaign, and myself, Heather Gibbs, a graduate student working with Dr. Chapman-Novakofski. The purpose of this research is to obtain the perspectives of various nutrition professionals, providing input on what they want in a nutrition literacy assessment instrument.

Participants in this research study must be at least 18 years of age and must provide consent. Your participation in this interview is strictly voluntary and you may refuse to participate or discontinue participation at any time during the project without penalty. Risks of participation in this study are not greater than those encountered in daily life. You may skip any questions you don't wish to answer. Data gathered from the entire project will be summarized in the aggregate, excluding references to any individual responses. The aggregated results of our analysis will be shared with other professionals interested in providing nutrition information with sensitivity to health literacy.

If you consent to the interview, you will be asked for your permission to audio-record the interview. Audio-recording will be used for the purpose of efficient recording of your answers. Audio-recordings will be destroyed once they are transcribed. You may refuse audio-recording, and the interviewer will record your answers in writing. After the consent and audio-recording questions, you will be asked the ten interview questions. You are welcome to contact our office at any time if you have questions about the interview (217.244.2852) or hgibbs2@illinois.edu. You may also contact the University of Illinois IRB Office (217.333.2670; irb@uiuc.edu) with your questions about research participants' rights.

May we send you a consent form, the interview questions, and set up a time to talk?

Thank you so much!

Appendix D
Consent Document (Interviews)

Nutrition Literacy Assessment Tool Research

This educational research is being conducted by Dr. Karen Chapman-Novakofski of the Department of Food Science and Human Nutrition at the University of Illinois, Urbana-Champaign, and me, Heather Gibbs, a graduate student working with Dr. Chapman-Novakofski. The purpose of this research is to obtain the perspectives of various nutrition professionals, providing input on what they want in a nutrition literacy assessment instrument.

Your participation in this research study indicates that you are at least 18 years of age and are providing consent. Your participation in this interview is strictly voluntary and you may refuse to participate or discontinue participation at any time during the project without penalty. Risks of participation in this study are not greater than those encountered in daily life. You may skip any questions you don't wish to answer. Data gathered from the entire project will be summarized in the aggregate, excluding references to any individual responses. The aggregated results of our analysis will be shared with other professionals interested in providing nutrition information with sensitivity to health literacy.

You are receiving this document because you have consented to the interview. At the beginning of the interview, you will be asked for your permission to audio-record the interview. Audio-recording will be used for the purpose of efficient recording of your answers. Audio-recordings will be destroyed once they are transcribed. You may refuse audio-recording, and the interviewer will record your answers in writing. After the audio-recording question, you will be asked the ten interview questions. You are welcome to contact our office at any time if you have questions about the interview (217.244.2852) or hgibbs2@illinois.edu. You may also contact the University of Illinois IRB Office (217.333.2670; irb@uiuc.edu) with your questions about research participants' rights.

Appendix E
Nutrition Literacy Assessment Tool
Targeted Interview Questions

1. What basic nutrition principles are needed to understand a diet instruction?
 - a. Is it necessary to understand basic math in a diet instruction? (I.e. food label reading, grams vs. milligrams, etc.)
 - b. Is competence with household measurements important?
 - c. Do people need to understand food groups and foods found in each?
 - d. Should people know the difference between carbohydrate vs. protein vs. fat?
 2. Have you used a health or nutrition literacy survey? Which one? What did you like or not like about it?
 3. Do you use methods other than health literacy assessment tools to identify levels of understanding? If yes, what are those? What do you like or least like about those methods?
 4. How much time would you be willing to spend assessing nutrition literacy?
 5. If a nutrition literacy assessment instrument was available, would you use it or advocate its use? Why or why not?
 6. Is there anything else you'd like to add about nutrition literacy assessment?
- I'd like to ask a few demographic questions. If you'd prefer not to answer, just say "pass".
1. How many years have you been working in the area of nutrition?
 2. Is your current role more education, research, or outreach?
 3. Are you a registered dietitian? Do you have any other certifications such as a certified diabetes educator?
 4. What is the highest academic degree you've earned?

Appendix F
Key Informant Interviews
Answers by Question

Question 1: What basic nutrition principles are needed to understand a diet instruction?

- (R1) “People need to understand food gives them important substances they need to live and to be healthy. Food also, if you consume too much of it, food can contribute to chronic disease.”
- (R2) “I think to some extent all of these [prompts] are important for people to understand instructions about their diet...as far as knowing the difference between a carb, a protein, and a fat, for some people focusing on macronutrients is less meaningful than focusing on the foods themselves. A possible exception to this could be a newly diagnosed diabetic who has to understand more about macronutrients than the general public. That said, people are seeing these words on food labels, and in order to make some assessments about what they should be eating, that is part of the process as well. So I would say, overall, that all of these are components of healthful diet instruction. The degree to which one delves into them depends on the nature of the individual receiving the instruction.”
- (R6) “I would say it depends on the type of diet instruction it is, but certainly all of the subgroups you have mentioned there could be needed.... If someone came in and just found out they had diabetes, then we’d use carb counting. In which case, we would use math, and food grouping, and you have the example of discussing carbohydrate, protein, and fat as well. So, I think it depends on what information you are giving them... Yes, in the best case scenario, yes they would have all of this (laughing), but I don’t think you

can say you have to have all of this to learn something about nutrition. You can learn a lot of things about nutrition without this background, but you can get more in depth with all of these competencies.”

Prompt a: Is it necessary to understand basic math in a diet instruction? (i.e. food label reading, grams vs. milligrams, etc.)

- (R1) “It’s possible that it would. If it was, for example, for a diabetic diet, the person needs to understand grams of carbohydrate and read labels for that. You know, sugars, carbohydrate, things like that...For other people, I think they need to understand what it means to be high in something or low in something. So, they may not need to be able to do the actual math, but they need to recognize when they look at a label, if something says 400 mg of sodium and another thing says 1000 mg of sodium, they need to know which one is higher.”
- (R3) “Elements of basic math are needed, but it may not be important to be able to read the entire label...Others should be able to identify what is “more” or “less.” The idea of what is “high,” you know if it’s greater than 20% of the Daily Value, for example, or what is considered low. That is another step up. Of if they can tell the difference between grams and milligrams, that type of interpretation would be another step up. I mean, health literacy is like anything else, it’s on a continuum of understanding. Basic math skills, basic reading skills...”
- (R4) “Depending on the topic, if in fact label reading or calculating out carbohydrates, if that is involved, then yes, you do need to know arithmetic.”

- (R5) “I absolutely think that food label reading is a critical aspect of really empowering individuals to make long-term decision related to healthy diets. I think that some of these issues of recognizing good foods versus bad foods or which foods fit into which groups, while that is also important, I think that without having a person really be able to decipher and choose that on a food label, they are really somewhat limited in their ability to make healthy food decisions.”
- (R7) “They don’t need to know math. They just need to know that if they are counting carbs, see 30 grams and know what that means or see 15 grams and know what that means. If you are focusing on the %DV part, then you need to say, if you’re trying to get less fat and you are comparing 2 TV dinners or whatever, you pick the one that has a lower %DV.... I guess it’s nice if they can add. So, if they are allowed 65 grams of fat a day or 45 grams of carb per meal, they’ve got to know how to add. Beyond that, I think we’re asking too much.”
- (R8) “I think for food labels, maybe, they need some very basic math instruction or background but very simple.”

Prompt b: Is competence with household measurements important?

- (R1) “Yes, I think people should know what a cup is. Basic cups, teaspoons, tablespoons, things like that. A lot of folks don’t have those implements in their kitchens, but when we do education, we show them what a cup of something looks like. And it gives them an idea of serving sizes.”

- (R3) “I do think it is necessary to know what common household measurements are to have some familiarity of what a cup is or a tablespoon is or teaspoon. They may not have to know the difference between a liquid measuring cup and a dry measuring cup but at least have some of that basic understanding.”
- (R4) “If you’re going to provide guidance in what would be a serving, then some knowledge of household measurements would be indeed useful.”
- (R5) “Yes, I think so...this kind of alludes to this issue of portion size. I think that is a definite key component in terms of following a healthy diet because we know everything is tied to the portion of food consumed. In the right portions, everything can be healthy and without the right portion, we can run into some problems across all foods and food groups. So, I guess I’ve never really thought of it in terms of household measurements specifically, but in the context of your questions, I guess my answer would be yes, it is important for them to understand issues that relate to portion size. If that is in the context of a household measurement, then that is an important key of diet instruction.”
- (R7) “It depends upon what it is you’re trying to get them to do, I guess. If it’s just general healthy eating, I say no. If it’s more precise, like they’re on an insulin pump, and they are carb counting, they’ve got to be able to estimate portion sizes or at least how their blood sugar is going to respond to that.”
- (R8) “Um, for portion sizes, I think it can be done with other things, so no, I don’t think you need to do that. There are plenty of examples out there that you can use, like a ½ cup

is like the size of a baseball and things like that. No, I think we can get around that with diet instruction.”

Prompt c: Do people need to understand food groups and foods found in each?

- (R1) “Yes, I think they need to know that food is broken up into groups based on the nutrients that are in the foods and that there’s a difference in the nutritional composition between vegetables and dairy products, for example. You know, that they aren’t all created equal, and you need a balance and variety from the food groups.”
- (R3) “I don’t think people need to know what food groups are, but it certainly helps. I think if people know what similar foods are...to me, it’s not that critical if someone says a tomato is in the fruit group or the vegetable group because they get confused with that. A general understanding of what vegetables are, what fruits are, what meats are, that is important but I don’t think they need to know specific to the food groups as much. That could be a higher level.”
- (R4) “If there is food grouping (as a part of the education), then yes, a person needs to be able to comprehend that certain foods help with either limiting potassium or sodium, for example, or carbohydrate, and that’s quite higher level.”
- (R5) “Again, for me, this very much ties into the context of the diet instruction or the context of the disease state. For some individuals, specifically diabetes, that would be very important, whereas others, in the context of weight loss, or something that may be

more generic in terms of overall healthy eating, that may or may not play as critical of a role.”

- (R7) “I’m going to say no to c. I think a good counselor works with the person where they’re at. If you can figure out what they’re typical [diet] is and work with them that way. Because in the few years I’ve been up here, not everyone categorizes according to MyPyramid, and we just learn to deal with it in that manner and just go with the flow. A lot of people can just regurgitate the MyPyramid foods and the food groups, but then when you start probing in what they’re doing, there is some confusion and some differences across people. I say, nah, you can work with not using the MyPyramid food groups.”
- (R8) “No, I don’t think so. I think they need to understand food choices that are appropriate, I don’t think they need to know grouping.”

Prompt d: Should people know the difference between carbohydrate vs. protein vs. fat?

- (R1) “What I think they need to know is those are nutrients we need to eat to give us calories and energy. I don’t think they need to know the biochemistry of it, but they need to know which foods contain carbs, protein and fat. And then, a relative amount of how much they need to be eating for a health weight, general good nutrition...even though that’s a little controversial, they need to know a little about that.”
- (R3) “I certainly don’t think it’s that important for people to know the difference between a carbohydrate, protein, or fat. Again it’s going to depend on what kind of diet instruction

you are giving someone. If you are working with a diabetic, you may not have to use the word “carbohydrate,” you could use “starch” or “sugars” or something that is maybe a simpler term, but they are certainly going to have to understand the concept that there are certain components of nutrients in foods that are going to affect their blood sugar. So that will be referring to carbohydrate, but how much they have to actually understand about carbohydrate...again, that is kind of on that continuum.”

- (R4) “I think it really depends on what a person is being instructed for. A person being seen for diabetes needs to have a really good sense of carbohydrate, and then secondary, a real nice sense of fat. Someone coming in for instruction on MyPyramid, I don’t know if it’s that critical. Knowing the difference between them is fairly complex even though it’s right there on the nutrition label. But I think you can survive without knowing that.”
- (R5) “I guess, bottom-line, my thoughts would be yes, I guess, you know there’s this debate that goes round and round that people eat in terms of food, not in terms of macronutrients or micronutrients, but with that being said, I often think that if people understood them as a satiating factor of these macronutrients and understood how to balance those a little bit more, that could provide them with extra ammunition to make appropriate food choices.”
- (R8) “I think people need to know the food and what foods they can eat. Although, I can see for some diagnoses they may need to know the difference between carbohydrate, protein, and fat. But in most things, I think it’s more important to be able to identify in terms of food.”

Question 2: Have you used a health or nutrition literacy survey? Which one? What did you like or not like about it?

- (R1) “Not like that. We’ve used diet assessments, 24 hour recalls, food frequencies. I have used pre- post- knowledge assessment when we were doing some special projects on, say, diet and cancer, but I have not used, generally, a nutrition literacy survey.”
- (R2) “So the only instrument that I am aware of that is specifically a nutrition literacy survey was developed by Diamond... Of any of the surveys, I’ve used the short version of the TOFHLA in English and then the Spanish version of the short TOFHLA. In using these, I’ve dealt with audiences with limited literacy skills, and they had real trouble getting through these. You know, the irony was not lost, they really struggled. So, with any tool like that, it’s very difficult to convince the individual that they are not being tested as a right and wrong, and that there is a value to what the outcomes are. I used them, I followed the instructions, and they worked okay. My biggest complaint with any measure of health literacy is that it’s not comprehensive. It’s either just focusing on numeracy or readability. It doesn’t address the more comprehensive issue of oral literacy, cultural context. All of the different constructs of the overall concept of literacy, and that is one of the challenges of the field of health literacy right now.”
- (R3) “No I haven’t. It would be nice if there were one out there that would be easy to use, but I’m not familiar with any.”
- (R4) “...I haven’t used a survey, but I am familiar with the work and have followed it, and assisted a colleague of mind and developed a module for our students going through

dietetics on health literacy, but not nutrition. But I've not done any survey, we've just covered this more as a topic. But I think it's a really important subject. It's critical. When I was working, half of the people I saw couldn't read, but they were still able to comprehend a lot."

- (R5) "Yes, in the context of the research I do, I've used the Newest Vital Sign. And I've also used the S-TOFLHA as well. In terms of the Newest Vital sign, I do like that it is nutrition specific, in terms of using the food label, so I like that aspect. I like the numeracy aspect, which I feel the other health or nutrition literacy surveys are not getting at. I'm very much concerned that I don't feel it is a comprehensive approach at assessing the person's nutrition literacy status. I think about the definition of the health literacy or nutrition literacy and think about the person's ability to obtain and process and understand information, that tool isn't getting at how people go about getting or searching for nutrition information on their own. So, while I like the NVS in some aspects related to it being more nutrition specific and focusing on numeracy skills, in the context of food and our profession, I think there is a lot that is missing."
- (R6) "We use an acculturation survey, so no, not that... We adapt the surveys to get what we want out of them, so I can't say there's [sic] really things we don't like about them. It just helps, instead of basically picking out of the sky some nutrition education material that a nutrition educator might think is useful, they help you determine that the audience would, in fact, find the material useful and see what the audience really needs. And the same thing with testing our materials in the audience. We do testing to make sure they

really do, for instance, you asked about math or if they know about carbohydrate, fats, and protein.”

- (R7) “No, I’ve never used one, but I’ve been doing some reading in the literature...”
- (R8) “No, I haven’t. I’m not even familiar with what a nutrition literacy survey is.”

Appendix G

Nutrition Literacy Assessment Instrument (NLAI)

Note to Reader: This instrument has been modified to fit margin guidelines for the dissertation, resulting in smaller graphics and font.

This instrument is designed to help you evaluate your client's skills that are needed for understanding nutrition education.

Instructions: All clients should complete page one and two of the instrument (see Nutrition and Health). The following algorithm will assist you in determining whether clients should complete subsequent pages. This algorithm should be completed during the assessment phase of nutrition education, **before** any education is provided. Please record the amount of time taken by your client to complete the assessment in the space provided at the bottom of this page.

Nutrition Literacy Assessment Algorithm

Will the client need to understand concepts of macronutrients? (Examples: Carbohydrate counting, Low fat diet)

Yes ☐ Check knowledge of macronutrients (p. 3)

No ☐

Will the client need to learn portion sizes? (Examples: carbohydrate counting, renal diet, weight loss)

Yes ☐ Check knowledge of household measurements (p. 4-5)

No ☐

Will the client need to read labels? (Examples: carbohydrate counting, low fat diet, allergy restrictions)

Yes ☐ Check numeracy (p. 6)

No ☐

Will the client need to be able to group foods? (Examples: carbohydrate counting, low fat diet, renal diet)

Yes ☐ Check knowledge of food groups (p. 7)

No ☐

Time to complete assessment: _____ minutes

Nutrition and Health

Code: _____

Directions: Please read the text below and answer the questions that follow.

Eating well and staying fit are important to health. Good nutrition allows healthy growth and development for children and teens. A healthy diet may prevent long-term diseases such as heart disease, high blood pressure, type 2 diabetes, some cancers, malnutrition, osteoporosis, and others. It may also increase your chances for a longer life.

Good nutrition can also help maintain a healthy weight. When we eat food and drink beverages, we consume calories along with other nutrients. Calories are a vital source of energy for the body, but it is important to take in the right amount. Taking in too few can lead to weight loss, while taking in too many may lead to weight gain.

Some foods are high in calories and low in other nutrients. These foods are considered *energy-dense*. You could eat a few energy dense foods and meet your calorie needs, but not get enough vitamins, minerals, and other important nutrients. A better idea would be to eat a variety of foods that are *nutrient-dense*, or foods that provide many vitamins, minerals, and other needed nutrients, but are low in calories, such as fruits and vegetables.

According to the 2005 *Dietary Guidelines for Americans* a healthy diet emphasizes fruits, vegetables, whole grains, low-fat dairy products, lean meats, poultry, fish, beans, eggs, and nuts. A healthy diet is also low in some nutrients, such as saturated fat, *trans* fat, cholesterol, sodium, and added sugars.

1. To lose _____, a person may need to eat fewer calories.
 - A. weight
 - B. cancer
 - C. fruits
 - D. fitness

2. Good _____ may prevent chronic diseases like high blood pressure.
 - A. eggs
 - B. diabetes
 - C. nutrition
 - D. chicken

3. A person who eats too few nutrients may develop _____.
A. fat
B. malnutrition
C. suicide
D. vitamins
4. Some nutrients, like _____ should be limited in a healthy diet.
A. fruits
B. vegetables
C. niacin
D. cholesterol
5. An example of an energy-dense food is _____.
A. chocolate ice cream (290 calories per 1 cup)
B. air-popped popcorn (15 calories per 1 cup)
C. sliced fresh strawberries (50 calories per 1 cup)
D. raw carrot sticks (50 calories per 1 cup)
6. Nutrient-dense foods such as _____ should be consumed most often.
A. chocolate ice cream (290 calories per 1 cup)
B. French fries (152 calories per 1 cup)
C. sliced fresh strawberries (50 calories per 1 cup)
D. root beer (100 calories per 1 cup)

Macronutrients**Code:**_____

1. The starch in a slice of bread is a type of _____.
 - A. fat
 - B. vitamin
 - C. carbohydrate
 - D. protein
2. Foods like oil and butter are often a source of _____.
 - A. vitamin C
 - B. carbohydrate
 - C. iron
 - D. fat
3. The _____ found in orange juice is a type of carbohydrate.
 - A. sugar
 - B. calcium
 - C. protein
 - D. folate
4. A good source of _____ is found in foods like eggs, chicken and fish.
 - A. starch
 - B. protein
 - C. fiber
 - D. sugar
5. Butter, lard, and cheddar cheese all provide high amounts of _____ fat.
 - A. polyunsaturated
 - B. saturated
 - C. monounsaturated
 - D. *trans* saturated
6. Because they are a good source of _____, vegetarians might eat kidney beans.
 - A. vitamin D
 - B. vitamin B-12
 - C. fat
 - D. protein

Household Food Measurement**Code:** _____

Sometimes we eat food in the right amounts and sometimes we choose smaller or larger portions. For each food pictured, choose what you think is the right portion size.



1. Pictured is an 8 (eight) ounce glass of milk. Is this
 - a. More than one (1) portion?
 - b. Less than one (1) portion?
 - c. About right for one (1) portion?



2. Pictured is a 6 (six) ounce hamburger. Is this
 - a. More than one (1) portion?
 - b. less than one (1) portion?
 - c. about right for one (1) portion?



3. There is $\frac{1}{2}$ cup of rice on this plate, pictured at left. Is this
 - a. more than one (1) portion?
 - b. less than one (1) portion?
 - c. about right for one (1) portion?



4. Pictured is one (1) grapefruit. Is this
- a. more than one (1) portion?
 - b. less than one (1) portion?
 - c. about right for one (1) portion?



5. There are 2 (two) cups of spaghetti on the plate at left. Is this
- a. more than one (1) portion?
 - b. less than one (1) portion?
 - c. about right for one (1) portion?



6. Pictured is 8 (eight) ounces of steak on the plate at left. Is this
- a. more than one (1) portion?
 - b. less than one (1) portion?
 - c. about right for one (1) portion?

Food Label and Numeracy

Code: _____

Nutrition Facts	
Serving Size 1 cup (228g)	
Servings Per Container 2	
Amount Per Serving	
Calories 250	Calories from Fat 110
% Daily Value*	
Total Fat 12g	18%
Saturated Fat 3g	15%
Trans Fat 1.5g	
Cholesterol 30mg	10%
Sodium 470mg	20%
Total Carbohydrate 31g	10%
Dietary Fiber 0g	0%
Sugars 5g	
Protein 5g	
Vitamin A	4%
Vitamin C	2%
Calcium	20%
Iron	4%
* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs:	
	Calories: 2,000 2,500
Total Fat	Less than 65g 80g
Sat Fat	Less than 20g 25g
Cholesterol	Less than 300mg 300mg
Sodium	Less than 2,400mg 2,400mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g

The food label at left is taken from the back of a container of macaroni and cheese.

- How many calories will you eat if you eat the whole container?
 - 250 calories
 - 500 calories
 - 700 calories
 - 750 calories
- If you are trying to eat fewer than 500 mg of sodium per meal, how many cups of this macaroni and cheese can you eat if you eat nothing else?
 - 1 cup
 - 2 cups
 - 3 cups
 - 4 cups
- If your doctor has asked you to limit your fat intake to 60 grams per day, what percentage of your day's intake have you eaten in one serving of macaroni and cheese?
 - 10%
 - 20%
 - 30%
 - 40%
- How many grams of carbohydrate would you eat in 2 cups of macaroni and cheese?
 - 31 grams
 - 45 grams
 - 62 grams
 - 75 grams
- Which of the following nutrients is not found on this food label?
 - total fat
 - sodium
 - thiamin
 - sugars
- If you are advised to increase your fiber intake, is this food a good choice?
 - yes
 - no

Food groups**Code:** _____

This is a list of foods. Using the chart below, write the name of each food in the food group in which it belongs.

apple	cheese	pork chop	tomato
milk	potato	onions	banana
noodles	bread	butter	rice
orange juice	chicken	hamburger patty	salad dressing



Grains	Vegetables	Fruits	Meat, Poultry, Fish and Beans	Dairy	Fats & Oils

Nutrition and Health

Number correct: _____

0—1 suggests high likelihood of inadequate nutrition literacy

2—3 suggests marginal nutrition literacy

4—6 suggests adequate nutrition literacy

Macronutrients

Number correct: _____

0—1 suggests high likelihood of inadequate nutrition literacy

2—3 suggests marginal nutrition literacy

4—6 suggests adequate nutrition literacy

Food Portions

Number correct: _____

0—1 suggests high likelihood of inadequate nutrition literacy

2—3 suggests marginal nutrition literacy

4—6 suggests adequate nutrition literacy

Label Reading

Number correct: _____

0—1 suggests high likelihood of limited literacy

2—3 indicates the possibility of limited literacy

4—6 almost always indicates adequate literacy

Food Groups

Number correct: _____

0—5 suggests high likelihood of inadequate nutrition literacy

6—10 suggests marginal nutrition literacy

11—16 suggests adequate nutrition literacy

Appendix H

Recruiting Email (Pilot Study)

Dear Dietetic Internship Preceptor,

We are looking for collaborators in a pilot study for graduate dissertation research in the University of Illinois's Food Science and Human Nutrition doctoral program. As a doctoral student in the program, I am conducting a pilot study to test the usability, reliability, and validity of a nutrition literacy assessment instrument.

Should you agree to participate, you would be asked to use the instrument and a control instrument with at least 10 clients as a component of the assessment phase of nutrition education. At the end of the study period, you will be asked to complete a short online survey (5 questions), which will provide the researchers with your feedback on use of the instrument.

There is no risk to you in participating in this research. At this point, the project is unfunded, but we anticipate at least small compensation in the form of a gift card for RD participants. Participation is voluntary and there will be no penalty if you choose not to participate. All data will be treated confidentially. The aggregated results of our analysis will be shared with other nutrition professionals who are interested in providing nutrition education with sensitivity to nutrition literacy.

This study is being conducted under the approval of the University of Illinois Institutional Review Board (IRB). If you agree to participate, you will need to receive approval from your director as well as your IRB if you have one. A sample IRB can be provided. Individuals at institutions without an IRB can participate under the IRB approval by the University of Illinois.

If you are interested and would like to learn more about this research, please contact me (hgibbs2@illinois.edu) or Karen Chapman-Novakofski, PhD, RD, my advisor (kmc@illinois.edu). We would like to arrange a conference call to discuss study procedures with those who are interested in participation.

Sincerely,

Heather Gibbs, MS, RD, LD
PhD Candidate
University of Illinois
Food Science and Human Nutrition

Appendix I
Client Recruitment Flyer

Would You Like to be in a Nutrition Study?

Rush University is collaborating with University of Illinois on a nutrition study about what people already know about nutrition.

If you would like to participate in this short study (10- 15 minutes) below is what you will be doing:

- Read aloud some words, to get an idea of which words are familiar and which may be new words (5 minutes).
- Answer a second set of questions about nutrition (10 minutes).
- The educational material that the dietitian uses will be sent to University of Illinois researchers. Your name will **not** be on this material.

Would you like to participate in this study?

_____ No. Okay.

Thank you for your time.

_____ Maybe, I'm not sure.

Your participation will help dietitians in nutrition counseling. But, you do not have to participate. Do you have any questions? When you go into to see the dietitian, you can also look at the questions and consent form and decide.

_____ Yes.

Okay. Give this flyer to the dietitian at your nutrition counseling session.

Appendix J
Screening Tool
Nutrition Literacy Study

Name: _____

Date: _____

Cognitive Evaluation:

1. What is the day of the week?
2. Do you know where you are? (correct answers: either Chicago, Rush clinic, Rush)
3. What is your name?

If person **does not know** the answer to any of the questions, thank them for their time and tell them they are not eligible.

Inclusion criteria:

1. Are you 18 years old and older?
2. Do you have an appointment today with the RD for nutrition counseling?

If person responds **no** to any questions above, thank them for their time and tell them they are not eligible.

Exclusion criteria:

1. Are you blind?
2. Can you read?

If person responds **yes** to any questions above, thank them for their time and tell them they are not eligible.

- ☐ **Patient is eligible to participate in study**
☐ **Patient is ineligible to participate in study**

Appendix K

Client Consent for Pilot Study

This research is led by Dr. Karen Chapman-Novakofski of the Department of Food Science and Human Nutrition at the University of Illinois, Urbana-Champaign, and Heather Gibbs, a graduate student working with Dr. Chapman-Novakofski. The purpose of this research is to find out if using a form to measure nutrition literacy helps the registered dietitian in matching what you need to know with what she is planning to teach.

You must be 18 years old to take part in this study. You do not have to take part in this study. You may refuse to be in the study or stop at any time. If you want to stop there will be no penalty to you. The choice to participate, decline, or withdraw from the study will have no effect on your future relations with the University of Illinois. You will not be paid or receive a gift for participating. Risks of being in this study are not greater than those you may have in daily life.

If you choose to participate, you will complete two tasks as a part of your nutrition appointment. In the first task, your dietitian will ask you to read aloud some words. If you know how to say them, you can just say them. If you do not know how to say them, you can guess, or just say “pass”. In the second task, you will fill out a survey. The survey has 12 general nutrition questions, 6 questions on portion sizes, 6 questions on food labels, and a list of 16 foods to match with food groups. Both tasks will help the dietitian to learn what is familiar to you and what may be new. These tasks should take less than fifteen (15) minutes to complete. At the end of your education session, the dietitian will give records of your tasks and copies of the materials she uses to educate you to researchers at the University of Illinois. They want to see if what the surveys show you already know and what you may need to know relate to the materials the dietitian gave you.

Our results will be shared with other nutrition professionals interested in education. No names or other information that could identify you will be shared in the results. Only the researchers will have access to the information you provide.

You are welcome to contact our office at any time if you have questions about the research (217.244.2852; hgibbs2@illinois.edu). You may also contact the University of Illinois Institutional Review Board Office (217.333.2670; irb@uiuc.edu) with your questions about

research participants' rights. Collect calls will be accepted if you identify yourself as a research participant.

You will be given a copy of this consent form for your records.

I have read and understand the above consent form and voluntarily agree to participate in this study.

Signature

Date

Appendix L
Subjective Literacy Assessment Instrument
Subjective Nutrition Literacy Assessment

Terminology:

Objective: Finding based on completion of an instrument designed to assess the client.

Subjective: Finding based on general observations of the client through interaction.

Before completing an *objective* health/nutrition literacy assessment, rank your client's nutrition literacy using your *subjective* clinical judgment by placing an X in the blank before your selection.

_____ **Inadequate nutrition literacy.** The client has very little understanding of nutrition, is illiterate, or is non-literate in English.

_____ **Marginal nutrition literacy.** The client has some understanding of nutrition, can perform simple literacy tasks.

_____ **Adequate nutrition literacy.** The client has a good understanding of nutrition, possesses strong literacy skills.

In one or two sentences, please explain your assessment:

Appendix M
Rapid Estimate of Adult Literacy in Medicine (REALM)

REALM© used with permission

Davis, TC, Long, SW, Jackson, RH, Mayeaux, EJ, George, RB, Murphy, PW, Crouch, MA. Rapid estimate of adult literacy in medicine: A shortened screening instrument. Fam Med. 1993;25:391-5.

REALM©

Instructions and Recording Form for Registered Dietitians

Subject # _____ Date _____ Examiner _____

Instructions:

1. Give the patient a copy of the REALM word list.
2. Say: "It would be helpful for me to get an idea of what medical words you are familiar with. What I need you to do is look at this list of words, beginning here [point to the first word]. Say all of the words you know. If you come to a word you don't know, you can sound it out or just skip it and go on." If the patient stops, say, "Look down this list [point] and say the other words you know." **Special Note: Do not use the words "read" and "test" when introducing and administering the REALM. These words may make patients feel uncomfortable and unwilling to participate.
3. If the patient takes more than 5 seconds on a word, encourage the patient to move along by saying, "Let's try the next word." If the patient begins to miss every word or appears to be struggling or frustrated, tell the patient, "Just look down the list and say the words you know."
4. Count an error any word that is not attempted or is mispronounced.
5. Scoring: Place a check mark in the box next to each word the patient pronounces correctly. Count as correct any self-corrected word.
6. Count the number of correct words in each list and record the number in the blank. Total the numbers and record the total score in the "raw score" blank.

List 1	List 2	List 3
fat	fatigue	allergic
flu	pelvic	menstrual
pill	jaundice	testicle
dose	infection	colitis
eye	exercise	emergency
stress	behavior	medication
smear	prescription	occupation
nerves	notify	sexually
germs	gallbladder	alcoholism
meals	calories	irritation
disease	depression	constipation
cancer	miscarriage	gonorrhea
caffeine	pregnancy	inflammatory
attack	arthritis	diabetes
kidney	nutrition	hepatitis
hormones	menopause	antibiotics
herpes	appendix	diagnosis
seizure	abnormal	potassium
bowel	syphilis	anemia
asthma	hemorrhoids	obesity
rectal	nausea	osteoporosis
incest	directed	impetigo

SCORE
List 1
List 2
List 3
Raw Score

*REALM used for clients (Adapted for dissertation to accommodate 1" margin, resulting in reduced font size)

List 1	List 2	List 3
fat	fatigue	allergic
flu	pelvic	menstrual
pill	jaundice	testicle
dose	infection	colitis
eye	exercise	emergency
stress	behavior	medication
smear	prescription	occupation
nerves	notify	sexually
germs	gallbladder	alcoholism
meals	calories	irritation
disease	depression	constipation
cancer	miscarriage	gonorrhea
caffeine	pregnancy	inflammatory
attack	arthritis	diabetes
kidney	nutrition	hepatitis
hormones	menopause	antibiotics
herpes	appendix	diagnosis
seizure	abnormal	potassium
bowel	syphilis	anemia
asthma	hemorrhoids	obesity
rectal	nausea	osteoporosis
incest	directed	impetigo

Appendix N

RD Critique of NLAI

Consent

This educational research is being conducted by Dr. Karen Chapman-Novakofski and Heather Gibbs, doctoral student, of the Department of Food Science and Human Nutrition at the University of Illinois, Urbana-Champaign. We are interested in your thoughts about an instrument we have created to help nutrition professionals identify nutrition literacy in their clients.

Participants in this research must be at least 18 years of age and must provide consent. We remind you that your participation in this survey, which will take approximately 15 minutes to complete, is strictly voluntary and you may refuse to participate or discontinue participation at any time during the project without penalty. You may skip any questions you don't wish to answer.

Data gathered from the entire project will be summarized in the aggregate, excluding references to any individual responses. The aggregated results of our analysis will be shared with other professionals interested in providing nutrition information with sensitivity to nutrition literacy. Again, your input is very important to us and any information we receive from you will be kept secure and confidential. Email and IP addresses will not be linked to your response.

After consenting to the survey, you will continue to the 25 question survey. You are welcome to contact our office at any time if you have questions about the survey (217.244.2852) or kmc@illinois.edu, hgibbs2@illinois.edu. You may also contact the UIUC IRB Office (217.333.2670; irb@illinois.edu) with your questions about research participants' rights.

Risks of participation in this study are not greater than those encountered in daily life. By clicking the "I consent" box and answering the questions, you are consenting to us collecting your responses. You are encouraged to print a copy of this statement for your records.

After consenting to this study, you will be taken to the short survey.

1. Do you consent to this research?

Yes, I consent

No, I do not consent (If this option is chosen, the survey will end)

(Next page text) This survey will present the Nutrition Literacy Assessment Instrument (NLAI) in a section by section format with questions after each section. Please review each section of the instrument and answer the questions that follow.

Algorithm

(Algorithm displayed)

2. The purpose of the algorithm is to minimize the length of time required to complete the NLAI by focusing only on the client's skills necessary for the nutrition education encounter. It is completed by the nutrition educator and determines which of the NLAI sections the client will complete. Does the algorithm accomplish its purpose?
 - a. Yes
 - b. No. If no, please explain.
3. Is the algorithm easy for nutrition educators to understand and follow?
 - a. Yes
 - b. No. If no, please explain.
4. Is this section important to include in the NLAI?
 - a. Yes
 - b. No. If no, please explain.
5. Are there decisions that are missing from this algorithm?
 - a. Yes. If yes, please explain.
 - b. No

Nutrition and Health

All clients will complete this section, regardless of the algorithm results.

(Nutrition and Health, pages 1 and 2 of instrument, displayed)

6. One purpose of this section is to identify the client's reading comprehension, or the ability to answer questions based on the content of the passage. Does this section accomplish this purpose?
 - a. Yes
 - b. No. If no, please explain
7. Another purpose of this section is to identify the client's understanding of general relationships between nutrition and health. Does this section accomplish this purpose?
 - a. Yes
 - b. No. If no, please explain
8. Is the passage appropriate in length
 - a. Yes
 - b. No, it's too short
 - c. No, it's too long
9. Are the questions appropriate in difficulty?
 - a. Yes
 - b. No, they are too easy
 - c. No, they are too hard
 - d. Other
10. Is this section important to include in the NLAI?
 - a. Yes
 - b. No. If no, please explain

Macronutrients

Page 3 addresses the client's knowledge of macronutrients. This section would only be completed by the client if decided upon by the nutrition educator via the nutrition literacy assessment algorithm.

(Macronutrients, page 3, displayed)

11. The purpose of this section is to identify the client's knowledge of macronutrients. Does this section accomplish its purpose?
 - a. Yes
 - b. No. If no, please explain.
12. Are the questions appropriate in difficulty?
 - a. Yes
 - b. No, they are too easy
 - c. No, they are too hard
 - d. Other
13. Is this section important to include in the NLAI?
 - a. Yes
 - b. No. If no, please explain.
14. Has anything been left out of this section that you feel is important?
 - a. Yes. If yes, please explain.
 - b. No

Portion Size

Pages 4 and 5 addresses the client's knowledge and estimation of portion sizes. This section would only be completed by the client if decided upon by the nutrition educator via the nutrition literacy assessment algorithm.

(Portion Size, page 4 and 5, displayed)

15. The purpose of this section is to identify the client's knowledge and estimation of recommended portion sizes of commonly consumed foods. Does this section accomplish its purpose?
 - a. Yes
 - b. No. If no, please explain.
16. Are the questions appropriate in difficulty?
 - a. Yes
 - b. No, they are too easy
 - c. No, they are too hard
 - d. Other
17. Is this section important to include in the NLAI?
 - a. Yes
 - b. No. If no, please explain.
18. Has anything been left out of this section that you feel is important?
 - a. Yes. If yes, please explain
 - b. No

Food Label Reading

Page 6 addresses the client's ability to read food labels. It is an adaptation of the general health literacy instrument, the Newest Vital Sign (Weiss, 2005). This section would only be completed by the client if decided upon by the nutrition educator via the nutrition literacy assessment algorithm.

(Food Label, page 6, displayed)

19. The purpose of this section is to identify the client's ability to understand information (both text and numbers) provided on a food label. Does this section accomplish its purpose?
 - a. Yes
 - b. No. If no, please explain.
20. Are the questions appropriate in difficulty?
 - a. Yes
 - b. No, they are too easy
 - c. No, they are too hard.
 - d. Other
21. Is this section important to include in the NLAI?
 - a. Yes
 - b. No. If no, please explain.
22. Has anything been left out of this section that you feel is important?
 - a. Yes. If yes, please explain
 - b. No

Food Groups

Page 7 addresses the client's ability to group foods. Please note that a few foods (i.e. cheese, tomatoes, and potatoes) can be answered correctly in different categories. For example, cheese can be correctly placed in the dairy group or the meat group because of differences between MyPlate groupings and the Exchange System groupings. This section would only be completed by the client if decided upon by the nutrition educator via the nutrition literacy assessment algorithm.

(Food Groups, page 7, displayed)

23. The purpose of this section is to identify the client's ability to put similar foods in groups. Does this section accomplish its purpose?
 - a. Yes
 - b. No. If no, please explain
24. Is this activity appropriate in difficulty?
 - a. Yes
 - b. No. If no, please explain
25. Is this section important to include in the NLAI?
 - a. Yes
 - b. No. If no, please explain.
26. Has anything been left out of this section that you feel is important?
 - a. Yes. If yes, please explain
 - b. No

REALM

This instrument is currently used to identify health literacy. Please review the instrument below and answer the question that follows. REALM used with permission from TC Davis.

27. Would you prefer to use the REALM instead of the NLAI to assess nutrition literacy in clients?
 - a. Yes. If yes, why?
 - b. No.
28. Are there any sections of the REALM that you feel would be beneficial to include on a new assessment tool?
 - a. Yes. If yes, please explain
 - b. No.

General and Demographic Questions

29. Do you use an instrument to assess health literacy in your clients?
 - a. Yes.
 - b. No
30. If you answered “yes” to the previous question, which instrument do you use to assess health literacy in your clients? If you answered “no” to the previous question, please skip this question.
 - a. REALM
 - b. NVS
 - c. TOFHLA
 - d. S-TOFHLA
 - e. Other (please specify)
31. How much of your job do you estimate is spent in nutrition education (including preparation for and documentation of nutrition education)?
 - a. 80% or more [almost all](1)
 - b. 50- 80% [majority](2)
 - c. 20 to 50% [some](3)
 - d. less than 20% [minimal](4)
32. Which of the following best describes your job?
 - a. Public health nutrition(1)
 - b. Outpatient nutrition counseling(2)
 - c. Research (3)
 - d. Other _____(4)
33. Would you use an instrument if there was one available?
 - a. Yes
 - b. No. If no, please explain
34. Is health literacy an issue that you feel is important?
 - a. Yes
 - b. No
35. Is an assessment of nutrition literacy important enough to nutrition education to take the time for an assessment?
 - a. Yes
 - b. No. If no, please explain.

Appendix O

RD Critique of NLAI Recruiting Email

Please participate in a 15-20 minute student-based online survey for RDs!

This is a link <http://www.surveymoz.com/s3/725314/Critique-of-Nutrition-Literacy-Assessment-Instrument-NLAI> to an online survey for registered dietitians regarding a nutrition literacy instrument and your responses will provide important data for a University of Illinois student dissertation project. We are interested in your thoughts about an instrument we have created to help nutrition professionals identify nutrition literacy in their clients as a process to determine nutrition education needs.

This survey was approved by the American Dietetic Association's Sports, Cardiovascular, and Wellness Nutrition and the Diabetes Care and Education Dietetic Practice Group. If you are a member of multiple practice groups, please complete the survey only once. The results of this survey will be shared with these DPGs.

Participants in this research must be at least 18 years of age and must provide consent. Participating in this research will benefit you by contributing to the research process. Risks of participation in this study are not greater than those encountered in daily life. Participation is strictly voluntary and you may refuse to participate or discontinue participation at any time during the project without penalty. You may skip any questions you don't wish to answer. Data gathered from the entire project will be summarized in the aggregate, excluding references to any individual responses. The aggregated results of our analysis will be shared with other professionals interested in providing nutrition information with sensitivity to nutrition literacy. Again, your input is very important to us and any information we receive from you will be kept secure and confidential. Email and IP addresses will not be linked to your response.

After consenting to the survey, you will continue to the 34-question survey. You are welcome to contact our office at any time if you have questions about the survey (217.244.2852) or kmc@illinois.edu or hgibbs2@illinois.edu. You may also contact the UIUC IRB Office (217.333.2670; irb@illinois.edu) with your questions about research participants' rights.

Thank you in advance for your time. Please respond within 1 week of receiving this e-mail. Your participation is very much appreciated!

Appendix P

RD Critique of NLAI Comments Grouped by Question and Content

Algorithm

2. **The purpose of this page of the instrument (the algorithm) is to minimize the length of time required to complete the assessment by focusing only on the skills necessary for the nutrition education encounter. Does the algorithm accomplish its purpose?**

“Suggested Additions/Modifications” (4)

- There are no personal questions about food preferences in the questions.
- I think you could add something about source of their knowledge e.g. diet books and also Intuitive Eating Principles
- Q 1 in parenthesis should be "Does client understand role of carb, protein, fat on BG management
- macronutrients is not the same as carbohydrate counting.

“Doesn’t minimize time because all are needed” (3)

- it will not minimize length of time as well as you will almost answer yes to all patients
- Because I provide diabetic education to my pts and my pts must understand topics mentioned in your assessment
- Most of my assessments involve each of these elements. Taking the extra time to complete an assessment form is a waste of my time.

“Unclear/Confusing” (2)

- it is confusing
- This is so oddly worded, I'm not sure who is filling this out, the PCP, the client, the RD? Also, you really need to drill down to see what the client knows and doesn't know.

“Doesn’t focus” (2)

- Does not assess skill level of client, more defines dietitian's counseling goals.
- not individually focused

“Survey Issues/Difficulty Viewing” (3)

- where is the algorithm?
- I don't see the algorithm
- unclear as how to use this page

“Redundant” (2)

- The examples given are frequently the same (e.g. carbohydrate counting) so this could be potential difficult to distinguish one need from another. It would be helpful if the "yes" answers took you directly to the pages indicated and then asked those questions.
- It seems redundant. Could you recategorize - list type of diet (ie carb counting) then list potential pages. I'm 'dizzy' trying to track what is needed for carb counting. Please lay out clearly so one does not need to read each question and write down a key for which pages to use.

Miscellaneous (4)

- I have not seen the pt survey yet
- may limit ed time, but still have to assess what to provide ed on
- I can't know before I see the client if they will "need to know" particular concepts. It depends on their baseline diet.

3. Is the algorithm easy for the nutrition educator to understand and follow?**“Needs Explanation” (4)**

- It is difficult to determine without seeing the pages referred to in the alogorithm
- It is easy for educator to understand but not easy to follow.
- are we filling this out or the client? instructions say "client" but so do questions. ???
- not enough explanation

“Suggestions” (2)

- low fat throws me off. Who benefits from a "low fat" diet? Wouldn't it be better to say, "reduced saturated/trans fat"?
- the examples listed are all the same and not really applicable to the questions.

“Survey Issues” (1)

- this is not making sense, i'm sorry would like to help but cannot

4. Is this section important to include in the instrument?**“Unnecessary” (7)**

- I automatically have assessed this depending on the diet required
- It would not be a necessary step for me.
- Just busy work
- I think that as long as the instructions in the instrument are clear that you can skip parts, a nutrition professional wouldn't need the algorithm.
- It seems the RD would already know this. Unless this is necessary to connects to another part of this instrument.
- This algorithm does not measure a clients skill or level of comprehension.
- cause it does not serve its purpose

“Not Sure” (5)

- I can't say until I see the rest of the tool
- I'm not sure what this question is asking.
- Need to see the pt survey first to answer this questions
- at this point in the survey I do not know.
- I think it could be imporatan and useful but i don't know enough about the instrument here to feel comfortable saying "yes."

“All are needed” (3)

- Again, my pts need the information provided by your assessment tool
- i think all of these topics are interrelated and must all be covered to some degree

- no matter what diet instruction, pt will need to have be instructed on something using food groups-e.g. high kcal diet, use food groups and provide suggestions for high kcal with each group

“Suggestions/Corrections” (1)

- Seems like most nutrition ed would have these components. Will need to see what questions are addressed for the different sections. Maybe you could reverse -- with this type of nut ed skip these pages otherwise complete all for all patients.

Miscellaneous

- Only if the educator is a novice.
- Unless it is background before using instrument.

5. Are there decisions that are missing from this algorithm?

“Language/Cognitive Barriers” (14)

- Can the client read and write. At what level.
- Primary language of Pt? Methods of preferred learning?
- definitely language.
- do we know if pt can read yet to answer their survey?
- may need to include language barrier or inability to read
- reading level
- reading level, vision,language barriers
- spoken language; are materials available, is translator needed?
- what about education level? Primary language? etc?
- Can the patient read/write? The answer to this will influence HOW information is presented and what patient education materials aer used.
- will the pt need to be able to read-this will impact how you instruct, can the pt speak english, etc.
- need questions about language pref and literacy. Should materials be written or hands on or other format?
- I believe including what limitations that individual may have to learning. Cognitive? Auditory? Denial?
- basic math?

“ Miscellaneous Topics to Include” (9).

- perhaps micronutrients for renal
- personal questions that the client would have
- understanding of food allergies
- what is considered whole food vs. processed foods.
- does the client need to understand how their medication works with their diet, i.e.: insulin to carb ratios
- The need to meet nutritional needs in spite of other limitations. Perhaps not included because it should always be checked. In other words, the focus should be just the goal of making changes that limit, but the goal of what to include for better health. (A diet of beer and pretzels is very low in cholesterol, but it's low in everything!! Thanks.

- Will the client understand items that contribute to fluid overload and micro nutrients like K, P, and NA?
- are you training an adult or child or both
- eating out info

“Readiness to Learn” (5)

- The client's goals should be identified before deciding what he/she may need to learn
- Is the client ready to make dietary changes?
- TTM--is the client ready to change
- motivation for change?
- readiness to learn

“Purchase/Prepare Food” (4)

- Does the client do there own grocery shopping and cooking?
- does my client hve the resources to purchaseand perpare food
- purchase and prepare food, like what if living in group home
- will the client need to cook/afford food or is the client responsible for providing food

“Format suggestions for algorithm” (4)

- More specific questions
- Use the same examples in a 3 questions.
- What is they don't need all the sections at this time? So they will need it but not necessarily today? Is there a provision for that?
- Maybe a two branch decision tree that enables the educator to proceed to an alternative teaching method/goal if the client lacks ability to comprehend concepts being taught.

“Unsure” (3)

- I can't say until I see the rest of the tool
- need to see more of the instrument to answer this
- seems like there are; could you highlight the point of each questions - make it bold or have as a lead-in to the question

Nutrition and Health

- 6. One purpose of this section is to identify the client’s reading comprehension, or the ability to answer questions based on the content of the passage. Does this section accomplish this purpose?**

“Reading level too high” (12)

- Definitely tests comprehension, but definitely written at a higher reading level.
- I can tell you it is above many of my patients' literacy level.
- The information seems too technical- maybe too high reading level required
- is greater than 6th grade comprehension
- people with low reading skills wold probably just guess the answer
- reading level seems too high

- this feels like a pretty high reading level
- what is the literacy level this is written for?
- Most of my clients would struggle with this reading literacy level. No pictures to cue those with limited literacy. The concepts would be foreign to most of my patients.
- What is the readability of this document? You might overwhelm some clients with some of the higher level terms and concepts.
- Reading level is too high. Literate patients with a low reading level would not be able to complete this. In addition, their knowledge about specific nutrition terminology is not necessary for making healthy lifestyle changes.
- But some of my patients who not be able to understand all the questions w/out a lot of explanation

“Terminology Issues” (5)

- question #6 does not address the nutrient density just the caloric content
- terms need to be better defined in the text to apply in the questions below
- Because the answers don't grammatically match the questions, the questions could be correctly answered without comprehending the passage.
- use common terms like bone disease vs osteoporosis, use high calorie instead of energy dense; i suggest to divide it up and why does it talk about children and teens then go on to weight?
- The average consumer has a positive image of 'energy' and a negative image of 'calories'. I would suggest adding some comment like 'energy as measured by calories'. Secondly, the paragraph speaks of energy density and the questions speak of caloric density as if it is known that the 2 are the same. Use the informational paragraph to inform people that they are the same.

“Wordy” (3)

- This is so lengthy and wordy I would be concerned that very few would read it at all.
- Misc comments - is the first paragraph all about children and teens? Do you really need such a lengthy introduction? What is the point? Seems like you are lecturing and setting the stage for lecture-based nutrition education.
- sometimes when literature is too wordy, clients skip over it. That does not mean they did not understand.

“Questions/Concepts too Difficult” (2)

- difficult questions
- some of the concepts are more high level. I have a feeling people will not get the difference between energy dense and nutrient dense

“Bad Wrong Answers” (2)

- Most of the "wrong" answers are so poor that they really don't reflect comprehension because most people could get it correct without reading anything. It is insulting unless they can't read at all.

- The first three questions are rather insulting...too easy...you could pick right answer without reading. Too much text. Is someone really going to read that in their counselling session...need bullets, lines, make it interesting to read.

Miscellaneous

- It is out of my expertise to know if this assesses reading comprehension.
- questions asked with no specific content in preceding paragraphs

7. Another purpose of this section is to identify the client's understanding of general relationships between nutrition and health. Does this section accomplish this purpose?

“Concepts too advanced” (6)

- concepts too advanced
- not sure if everyone would get the concept just from words
- too much dietitian-speak
- I think these questions are more in-depth and a higher level of understanding than I would expect most patients to have
- Unsure of the readability. Some clients may understand the relationships between nutrition and health with different terms or explanations.
- It is too dense with content. Is this how we want clients to learn? There are more simple ways to 'test' understanding.

“Question/text suggestions” (3)

- Q. 3 - wording; develop fat, suicide, vitamins does not make sense
- many people do not recognize cholesterol as a nutrient, using fat may be better
- nutrient deficiencies appear over time, which is not addressed here

“Bad/Wrong Answers” (3)

- answers are not appropriate to the questions, the correct answer is easy to pick out
- use of the term "malnutrition" as an answer option. it is defined in the reading. Perhaps using "low vitamin or mineral intake" is better. Also, answer choices for "energy dense" and "nutrient dense" only give calories, not nutrient levels so it may confuse the reader. For example, you might give lettuce as a choice and provide the calorie information so a client may choose this answer simply based on energy because you don't provide the fact that there are few nutrients.
- maybe...text is okay though too much text. questions not hitting the mark...esp. Q 1-3. Also, but if simple assessment, decrease or dress up text with bullets and pick different answers to first three Qs and it could be okay. You'd know if they knew nothing about nutrition.

“Reading level too high” (3)

- concern with literacy level-
- reading level too high
- some words beyond 4th grad reading level perhaps

“Unnecessary” (2)

- But these concepts are not what my client with diabetes care about.

- Again, I question the usefulness of this. Studies have shown that nutrition literacy does not necessarily translate into adoption of healthy lifestyle changes. Finally, it would need updated to reflect 2010 Dietary guidelines, not 2005.

“Unsure” (1)

- maybe

10. Is this section important to include in the instrument?

“Too long” (10)

- BRIEFER WOULD BE BETTER
- Include something like this but this is too long and complicated.
- Yes if they were shorter/easier.
- not necessarily-we have only 1 hr for diet instructions
- not sure of practicality - foresee patients taking 30 minutes to read & answer questions
- too long, ok for handout
- would take too long for my patients to read & complete
- i would not give that to my patients because it is too long. If they have problems reading they will not read that passage.
- This is WAY too complicated and long. I'm afraid clients with poor health literacy would be intimidated and "shut down" if given this. It is too much like school.
- Way too long and complicated, who has time? The pt doesn't need to feel like he is back in school again.

“Unsure” (6)

- Really can't say without seeing the whole instrument
- if you could make the language more simple it may work
- not sure what the context of this section is, childhood/teen nutrition or adult weight issues
- unsure
- Need to see the rest of the survey. this is high reading level & requires high comprehension skills
- I think some of these concepts should be used in teaching, not simply put in a passage and read. It is hard for someone, especially someone who knows nothing about nutrition, to absorb multiple concepts in just a few minutes. Unless they can use the passage to answer the questions, then I might change my answer.

“Potential for client frustration/intimidation” (3)

- Clients will not care about this unless their doctor has told them they are malnourished....typically they want to know how to lose weight or control blood sugar or lower blood pressure....They will not see the importance of nutrient density to the needed diet changes.
- I question if patient's would fill this out, many people, especially if they have literacy issues may be intimidated by this.
- What are you thinking! You must not be in the real world where your outpatients hate to do any homework, can get flustered by forms and feel put off by the form

of questions. They come to learn, and assessment of knowledge should be done face to face

“Not Necessary” (3)

- One can ascertain this information in 2 minutes by sitting down with the client. I don't feel this adds anything to the evaluation process.
- b/c the education would still have to be completed regardless of nutrition knowledge or the clients ability to read or write. It would be quicker to ask a few verbal questions to get the clients understanding of nutrition/diet.
- It does not tell me anything that would not be apparent in our initial conversation about what brings the client to see an RD

“Should be updated to 2010 Dietary Guidelines” (2)

- Needs to be based on 2010 dietary guidelines.
- Yes...my comments....should reference 2010 dietary guidelines (not 2005). Some of your answers are too easy. Do not like use of suicide in answer list. Q1 should be "To lose weight, a person should eat ___calories with answers being more or less. For Q4, I would list a common nutrient to limit (saturated or trans fat), not cholesterol. I would also list either all foods or all nutrients). Q 5 and 6 are good.

Miscellaneous

- If appropriate to meet pt's needs, some questions may be a bit difficult for pts to answer
- Not with the poor questions as written. I would not use it.
- The terms 'nutrient dense' and 'calorie dense' seem to complicated. The concept of 'density' seems pretty advanced.

Macronutrients

12. The purpose of this section is to identify the client's knowledge of macronutrients. Does this section accomplish its purpose?

“Too difficult/encourages guessing” (8)

- I think many people will just guess on this section
- it assumes previous knowledge
- leave out questions 5 and 6, they are too high literacy
- only if the client knows them, not if he guesses correctly
- the questions use language that might be difficult for consumers
- too difficult
- too hard
- too technical for those without any previous knowledge

“Suggested Changes” (5)

- #5 is assessing fat type not macronutrient

- Yes mostly, but would call this section macronutrients and micronutrients. Macro are your carb, protein and fat and micro are the vit and minerals
- I don't consider saturated fat a macronutrient so the question does not belong here. When does butter not have fat?
- The question is 'Foods like oil, butter, meat and cheese are sources of . . .'. Secondly, consider giving a group of foods: bread, rice, fruits, milk. 2nd group: milk, meat, kidney beans. 3rd group: oil, butter, margarine, meat, cheese. Then the questions are 1. which group is a source of protein? Which group is a source of carbohydrate (natural sugars)? Which group of foods provides fat? Worded this way, it would provide information to the RD, but also generate some questions on the part of the client. Such as 'I knew that there was carbohydrate in bread and fruit, but was surprised that milk was included in the same group'
- This is not an easy survey to complete. I hope you get responses. Q#1 - Are you testing a client's knowledge of the word starch or carbohydrate. Many persons may know bread contains carbohydrate but don't call it a starch. Q#4 is hard to answer, change question so blank is at the end of question. Q#6 has many levels.
- Some of the questions might be confusing as the foods have multiple benefits. For example question 6 - requires some test taking ability. I.e. Beans are a good source of fiber; however, that is not one of the choices. The person taking the test must be able to identify that protein is also a good nutrient for this food.
- This seems to assess if they know what the different types of macronutrients are and where they're found but doesn't really get into what they do/why they are necessary. If I remember correctly, there is a section later that will discuss food groups, so I felt like this section should have gone into more depth about the macronutrients' functions versus groupings, if that makes sense.

“Unnecessary” (2)

- Again, I question the usefulness of this
- It provides only a very basic understanding. A one-to-one discussion with the client might be more effective.

13. Is this section important to include in the instrument?

“Testing is not the best approach” (3)

- quizzes may not be the best way to access; pts feel nervous, may not be as open to change
- I am concerned already with the length of the test. In addition, there is significant test taking anxiety among general populations. People may feel judged.
- No, it would be quicker just to get on with it and explain it all, or gently find this out via discussion.

“May not relate to consult” (2)

- Too basic and may not relate to the presenting problem.
- As a pretest it covers some macronutrient content areas that may not be pertinent to the consult

“Unsure” (2)

- Can't say
- unsure

“Too difficult” (2)

- if pt can answer these?s, they already have a significant knowledge base
- too hard
- ok, if easier questions used

Miscellaneous

- i would teach clients this sort of information
- the questions are too specific, need a more general approach
- This section seems to be a big leap from the previous section and lacks the same introduction that was provided with the first section.

14. Has anything been left out of this section that you feel is important?**“Definition/Explanation of ‘macronutrient’” (4)**

- An explanation of macronutrients
- Explanation what is a macro versus micronutrient
- Functions of and necessity for the macronutrients.
- suggest a definition of macronutrients if you are going to use the term as a title

“Foods/Nutrients to Include in instrument” (6)

- a question about food sources of healthy fat
- dairy products not mentioned
- more complex food combinations
- need emphasis on water
- omega 3 fatty acids
- sodium

“Provide an Introduction” (2)

- The explanation of why they are being asked these questions.
- A brief comment of introduction might seem more user friendly or less intimidating or will the RD provide this lead in?

“Issues with Fat” (3)

- Questions pertaining to saturated/transfat etc. should be included in a separate section.
- I would want to know that someone could identify food sources of starch or fat, NOT that they already know the difference between types of fat
- I would want to know if they understand which foods are considered starches or fats, not that they know the type of fat pretests need to be diagnosis-specific to be pertinent to client...adult learners need to know why they need to know information in order to learn it.

“Issues with Carbohydrate” (4)

- differentiate between natural occurring sugars in food and added sugars
- do not use word starch and sugar in foods, rather carbohydrate
- More questions on carb sources

- fiber/carb

“Unsure” (2)

- can't say without seeing the whole instrument
- unsure

“Suggested Rewording”

- This questionnaire is too long for the average outpt appointment
- q #4 source of protein is poorly worded
- i would lump cheddar cheese with butter and lard because it can be an important source of Ca and protein for some pts
- I would suggest to just have them identify food groups and not confuse them with options for vitamins, minerals, & specific types of fats
- Q1. Eliminate, the starch in bread. Just state...bread is a type of ____ . Q5: the last answer is trans saturated. they are separate types of fats. May want to consider adding micronutrient to subject title along iwth macronutrients as the only macronutrients are carb, protein and fat and they should be listed in all answers.

Household Food Measurement

15. The purpose of this section is to identify the client's knowledge and estimation of recommended portion sizes of commonly consumed foods. Does this section accomplish its purpose?

“ Visual reference needed for size estimation” (11)

- The size of the cups, plates is really unknown without other sizes to compare it to
- hard to grasp portions unless the pictures are life sized.
- lacks perspective, something familiar to compare against
- It would be better if the foods were pictured next to a standard item to help clients evaluate the pictures
- the milk glass and the hamburger should be modified. Have milk glass next to a similar style measuring cup or the like. Hamburger on a plate to see plate model portion.
- I would use references in the images. familiar household items such as deck of cards, mouse, etc. the first one almost looks like a pitcher.
- The foods that are compared to a known serving size work better than a picture with no scale--like the picture of milk
- too hard to tell from pictures, pts. don't understand "portion"
- Except for the milk, you did a great job of putting the food into a context so that the portion is easily visualized. Put the milk next to a bowl of cereal or something.
- very difficult to estimate portions with use of the plate which may or may not be similar to what the client is use to. Some of the portions did not look like what I would expect to see for the portion amount specified - would it be more affective to show different portion sizes and ask to select a appropriate portion size
- Multiple foods in the pictures require people to separate out the foods not in question.

“ Issues with ‘portion’ or ‘serving’” (5)

- I think you should refer to 1 serving instead of 1 portion. A portion is how much we choose to serve ourselves, and can contain multiple servings.
- I personally don't like to educate in terms of portions, but in actual sizes. What someone thinks is a portion or serving can vary widely
- A section would have to precede this section assessing clients understanding of serving vs. portion sizes.
- Looks like more than 1/2 cup rice, on first photo. Are you sure? What is a 'portion?' How are you expecting a person to respond to that. It would make me frustrated trying to answer that.
- Define who the portion is for, or they might answer based on themselves.

“Difficult” (3)

- Many of my clients do not know how much is a cup.
- assumes previous knowledge.

“Replace grapefruit” (2)

- Grapefruit isn't common in the groups I serve. Grapes, bananas and apples are common fruits.
- Grapefruit is a less commonly used fruit. Might try to include a more commonly used fruit.

Miscellaneous comments

- People won't put their real opinions, but try to second guess the "right" answer.
- would like to see it in color, not sure if people could tell the burger from the bun in black and white
- What about the vegetables? You are focusing too much on foods that people might need to limit and not enough on foods that need to be increased. (I have a neighbor who believes that the pea in a potpie is a vegetable serving.)

16. Is this section important to include in the instrument?

“yes, but...” (2)

- Would be appropriate but would prefer to see this area handled differently
- It's important, but you need to rethink your use of portion and the many 'diets' that would use portion/serving/choice.

“too hard” (2)

- too hard
- It is too hard to judge from photos, you would need models. People will feel at a disadvantage before you even start.

Other

- It would be a good post-education assessment tool
- difficult to say without reviewing the entire instrument
- most people will need education on portion size with cups measure any way

17. Has anything been left out of this section that you feel is important?

“Include vegetables” (11)

- You might include a portion of vegetables (both starchy and nonstarchy), too.

- and no example with veggies
- and vegetables
- or vegetable portion size
- vegetables
- vegetables
- vegetables
- vegetables- people take too small portion
- vegetables?
- how about including a vegetable portion
- include nonstarchy vegetables

“Reference for visuals needed” (5)

- and use of inanimate objects to assist portion estimation
- comparing the shown portions with a commonly known item that the individual would be better able to visualize the true amount being demonstrated - ie deck of cards, tennis ball, etc
- testing estimation ability for volumes....many cannot estimate volumes....these pictures give no reference to those clients who cannot estimate portions....
- I think all pictures should have something in them to reference the size. For example, a spoon, a fork, etc. The first 4 pictures don't have anything visual for reference.
- some std for comparison of portion sizes...the cup and plate may be large or small-- it's hard to get perspective

“Modify milk image” (8)

- For milk, Is this about right portion size
- Milk / only 2 choices / 8 oz often considered a portion
- Ned to include about the right portion under milk
- about right option with milk,
- with milk picture include another item with it so the size can be easier seen
- Would it be useful to include something in the photos to put the foods into perspective, like a 16 oz water bottle next to the milk?
- That 8 ounce glass could easily be a 16 ounce glass like most of my clients use athome...the photo has no sizing reference and I see what I am familiar with.
- The first picture is missing c.

“Other Beverages” (8)

- A fruit juice portion
- Other drinks besides milk (i.e. soda or energy drinks)
- include juice portion
- alcohol
- soda portions
- soda,
- question on serving size of orange juice

- fruit juice

“Fats/Oils” (7)

- Portions of fats, oils, dressings, etc.
- fat sources, like butter, salad dressings, oil, etc.
- fat..such as teaspoon or tablespoon of butter or oil
- portions of added fat
- something on fat serving
- salad dressings, nuts would be helpful
- and or salad dressing

“Issues with portions” (6)

- Define who these portions are for.
- Refer to them as recommended portions rather than right portions
- are the portions according to the MyPyramid recommendations?
- are you asking about portions or servings? Serving size is different than a portion.
- recommend specifying what "1 portion" means, is this different than diabetic choices?
- while the words help the reader to understand the portion size, if the picture is not "actual size" might confuse the client?

“Cereal” (2)

- I would also include cups of cereal
- size of a bowl of cereal

“Sweets” (4)

- and tablespoons of jam
- ice cream or cookies
- and sweets
- what about other foods, like sweets?

“Grapefruit/Fruit” (3)

- cut fruit
- fruit
- change the grapefruit to a large banana

“Fast Foods” (2)

- more fast food examples
- fast foods

“Suggestions with approach to measurement” (3)

- Secondly, you might show 3 meals, a breakfast, lunch and dinner of commonly used foods and then ask about the portions.
- The pictures would have to be in color to be more effective - increasing the cost to reproduce the instrument - on-line version of the test would make this easier. Turning it into a game may help people not think of this as a "test". Making the portion control pictures more simple would be of benefit as the pictures game the choices a bit by having multiple food items --- leading to difficulty in separating out which foods you are asking about.
- Estimating actual measurements. Filling a bowl with cereal and determining how many oz of grains are in the bowl, etc.

Miscellaneous

- 2010 DGAs reference plate method
- I don't like some of the pictures, the hamburger is awful
- What happens if your client is blind?
- foods are not culturally sensitive
- the spaghetti question is confusing..what about the sauce?
- This will be covered in the appointment with food models, measuring cups etc. this might be helpful for a community presentation but not for an appointment with clinical dietitian

Food Label and Numeracy

19. The purpose of this section is to identify the client's ability to understand information (both text and numbers) provided on a food label. Does this section accomplish its purpose?

"Too hard" (6)

- I think the pt will feel panicky and just guess without reading. This will upset him.
- Too many words and not hitting the heart of the matter somehow
- Yes, except that question number 3 is quite difficult
- mostly - asking for a percentage of total recommended fat may be too difficult for many
- some word choices such as numeracy are too difficult
- this needs to be broken down more

Miscellaneous

- I'd start with easy questions, then get harder. Have you seen other research on label literacy?
- i would suggest being consistent with the wording in the question, use either entire container or 2 servings; the vital signs also has a question about food allergies which could be important in reading ingredients list
- Question 3 is too hard and is more a test of math than nutrition. Question 6 should be 'Is this a good source of fiber?' if the question is used at all. I believe that any implication that this food cannot, in some way, be fit in is wrong. Reading labels is about fitting foods in using the context of other healthful choices throughout the day.

21. Is this section important to include in the instrument?

- EXCELLENT
- I would not use the question on % from a 2000 cal diet
- should not used initially with patients, but maybe later
- The pt will want to leave. If he can't manage the math, he will feel terrible. It feels like a math exam.

- I HOPE that my patients could answer most of these questions AFTER we have completed the education. This appears to be geared to a much more sophisticated audience than I usually deal with.
- this would be a part of the diet instruction, again might have a role in a community general group instruction

22. Has anything been left out of this section that you feel is important?

“Number 3 is too hard” (13)

- # 3 is very tricky
- #3 too difficult for many!
- I think question #3 is too complicated.
- Not left out, but I feel the percentage question may be unnecessary.
- Question 3 about the % is too difficult for most of my clients.
- i WOULD DELETE QUESTION 3
- question 3 might be difficult for the average person to figure out
- question number 3 should be left out
- question on the %
- Suggest that Question 3 use only grams of fat rather than the percentage of fat as the Dr. gave the recommendation in grams.
- I don't like question 3. Is that really important to know percentages if they are supposed to be counting fat grams?
- Actually I think the question about the %DV should be omitted, too hard/confusing...no where else I could comment on this.
- I don't think question number 3 is appropriate. I would never ask anyone to use the nutrition label in that way.

“Need a Different/Easier Approach” (5)

- I would just ask Do you ever read labels? What do you find helpful about them?
- Idea:ask if they can identify if a number falls between 2 numbers in a range
- Again, if I am teaching fat this session, that is the only testing question that should be included....I cannot cover fat, sodium carb, calories and nutrients in one session, so the pre-test needs to assess only the anticipated content area.
- Again - overwhelming in the length for this survey - making it more fun might help. At this point in the test, I might start to feel like I don't know anything about food. This section is one of the hardest concepts to get across to folks.
- Possibly a prior section that would assess a more basic understanding of the food label without calculations.

“Need to address Ingredients” (2)

- Ingredients for allergies or celiac, etc.
- ingredient list

“Omit #5” (2)

- i WOULD DELETE QUESTION 5
- I would leave out question 5.

“Need to address vitamins/minerals” (2)

- Vitamin content?

- vitamins & minerals

Miscellaneous

- Define a "good" choice for fiber
- I do not agree with the sample menu of Mac & Cheese
- It seems out of context or something.
- Maybe a specific sodium question
- Maybe circling portion size to emphasize looking there first.
- There is nothing on the %DV
- how many carb servings is in 1 cup (for those that do not count grams of cho
- understanding between saturated and unsaturated fats
- I would just change the wording of some of the questions. Question 2 'if you eat nothing else with sodium'.

Food Groups

26. Has anything been left out of this section that you feel is important?

“Need to add ‘others’ category” (6)

- consider desserts
- bacon;
- cooking oil as it is difficult for most people to identify as fat
- leaves out sweets and snack foods, juice etc.
- the "others"
- Sweets and other added sugar foods are not a food group by themselves, but it would be nice to know if clients can identify not only foods which are part of a healthy diet, but also those that should be limited. But maybe that is later on in this activity...

“Include a combination food” (4)

- mixed foods should be added
- more complex food choices
- not sure on this but do you want to have one combination food to see what is done with that?
- and need combo foods

“Cultural variety of foods needed” (2)

- culturally relevant foods
- need to add more cultural variety in list of foods

“Use ‘protein’ to replace meat, poultry, etc.” (2)

- can we think of another word for Meat, Poultry... like Protein foods
- If this is still in the works you should align this with the 2010 dietary guidelines and call the meat, poultry, fish and beans group “protein.”

“More foods needed” (2)

- A broader list of foods

- i would add more food choices like cereal, yogurt, hummus, nuts, corn

“Vegetables” (2)

- Need section on starcy vs non starcy vegetables.
- one more vegetable

“Questions raised” (2)

- is it acceptable for some foods to be placed in more than one food group?
- would this need to be individualized for regular nutrition vs categorizing foods according to the carbs, protein, and fats

Miscellaneous

- This could be earlier in the test to increase success feelings.
- i would limit to two foods per food group and use the term food groups throughout instrument
- starches, not grain (pot)
- This would be a good tool in a classroom or group setting but would not have time in diet instruction, particularly if the pt is paying by the hour
- I hate that “dairy” is “diary.” It should be “calcium.” It is confusing to [sic] but “calcium-fortified soymilk” in the diary [sic] group even though that is where it technically belongs, but I suppose that is UDSA’s [sic] problem.

27. Would you prefer to use the REALM instead of the NLAI (instrument) to assess nutrition literacy in clients?

“Unsure” (5)

- I have no idea what the NLAI is
- Unsure
- Unsure – how does this compare to the NLAI instrument
- Possibly – this appears to assess medical as well as nutrition and may be helpful for all health care staff and only have to be administered once
- Maybe. I like the nutrition focus of the other instrument, but I do not think you need to put a person through all of that to get to the summary (illiterate [sic] or not) Can you connect your survey to the Nutrition Terminology etc to make it more useful. Can you differentiate [sic] between literacies – health, numeracy, general?

“Easier/Patient Friendly” (3)

- Easier and more concise
- I’m undecided, but this seems easier
- It is faster and less intimidating to a patient

Miscellaneous

- If it comes in Spanish too.
- Many people would not complete the self-assessment
- There are some nutrition words that would be helpful for them to know. Many of the words are too high level for conditions or diagnoses.

28. Are there any sections of the REALM that you feel would be beneficial to include on a new assessment tool?

“A list of nutrition-related words” (5)

- Simple nutrition related words.

- maybe use same tool with nutrition related words or associations in addition to NLAI
- perhaps some nutrition related terms
- use the concept of word recognition but substitute nutrition related terms
- cholesterol etc. and more nutrition related terminology.

“A list of food-related words” (2)

- Could include a list of food related terms, if necessary like calories, nutrition, fat etc
- the food-related words might be useful

“A list of medical-related words” (5)

- nutrition/chronic disease related words
- Include more disease terminology related to poor nutrition and obesity; e.g. hypertension, obesity, diabetes, high
- it might be beneficial to have a new list with nutrition-related diseases as a component to this literacy test
- a list of basic medical terms common to many medical situations
- words specific to the patient's diagnosis

“Reading ability” (5)

- reading out loud
- might be helpful to know reading level, but might be able to get that from NLAI...NLAI more important because it addresses issues specific to nutrition...more than just reading...understanding.
- I think the REALM or NLAI needs to be used to assess reading level as many of the words on NLAI are above 6th grade
- reading level which I think is the goal level.
- asking clients in the beginning to identify a few more difficult words would help identify the ability to read well

“Unsure” (3)

- don't know
- maybe just a few of the most common words. I think this is quite overwhelming
- unsure

Miscellaneous

- As an RD, does this show nutrition illiteracy or medical terms illiteracy?
- I would use the entire tool
- The ability to determine which terms they are familiar with, like the word "macronutrients"
- The special notes
- This is less like a test and less intimidating.
- possible the degree of complexity of words gives some answers

- various words from each of the lists that might help explain why nutrition is related to health status and disease
- it might be quicker than having the client read esp. if reading or translation/interpretation services are needed

33. Would you use an instrument if there was one available?

“Maybe/Unsure” (5)

- My real answer would be maybe, depending on the client
- Not sure
- Perhaps something geared towards college students/athletes
- perhaps would use
- Maybe - it depends on the instrument. I really like the Newest Vital Sign and have used it before.
- I work with predominantly low income, low education, pacific cultures and by pointing out a lack of knowledge would be shameful to many and they may not come back. Maybe if only one or two of these were completed at a visit.

“Yes, if time allows/short instrument/appropriate for audience” (10)

- depends on length of time to complete ; we all have assessment form for ADb A criteria
- I might. would have to be very short & again, priority is developing rapport
- I would use tools that have been validated for the literacy demographic I work with.
- If I liked it and it was validated
- If it was quick and easy to use
- It would have to be short
- it would have to be very simple and quick to use
- must be very simple
- probably sometimes
- with patients/clients, not university students

“Not enough time” (5)

- It would not be a good use of my or my client's time.
- Time constraint. Having an automated test would be nice.
- Way too long
- time prohibits
- would appear to take too long to administer

“Prefer interactive approach” (4)

- I work on the telephone, it would be hard to be interactive
- What a tremendous waste of time, just talk to them, you will find out more that these limited tests can tell you.
- Probably not. I don't think it would save me any time from my current approaches which are more interactive with the patient. I would only use it if it was mailed to the patient ahead of time.
- i ask clients to demonstrate knowledge and can typically tell if they are illiterate

Miscellaneous

- My clients are usually well educated, upper middle class and extremely informed.

- already use individualized questionnaire
- not applicable to current job
- not needed
- rely on physician to notify of illiteracy on order
- we have a pre-test used in outpt. dm which accomplishes similiar goal
- not needed now. used to do a lot with healthy and nutirtion literacy and nutr ed materials at current job many years ago, but transitioned to different responsibilities.