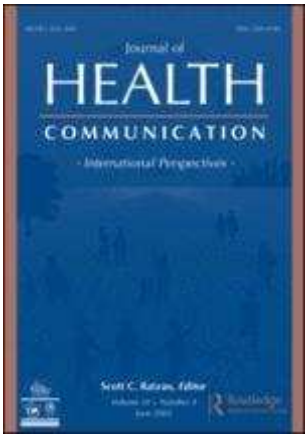

The Conceptualization and Measurement of Cognitive Health Sophistication

Journal:	*Journal of Health Communication*
Manuscript ID:	UHCM-2010-0365.R2
Manuscript Type:	Original Article
Keywords:	health literacy, cognitive complexity, information processing, health behavior, measurement validation

The Conceptualization and Measurement of Cognitive Health Sophistication

Abstract

This article develops a conceptualization and measure of cognitive health sophistication–the complexity of an individual's conceptual knowledge about health. Study 1 provides initial validity evidence for the measure–the Healthy-Unhealthy Other Instrument (HUHOI)–by showing its association with other cognitive health constructs indicative of higher health sophistication. Study 2 presents data from a sample of low-income adults to provide evidence that the measure does not depend heavily on health-related vocabulary or ethnicity. Results from both studies suggest that the HUHOI can be used to capture variability in the sophistication or complexity of an individual's health-related schematic structures based on responses to two simple open-ended questions. Methodological advantages of the HUHOI and suggestions for future research are highlighted in the discussion.

Keywords: health literacy, cognitive complexity, information processing, health behavior

The Conceptualization and Measurement of Cognitive Health Sophistication

Understanding why some people adopt protective health behaviors while others do not is vastly important for health communication scholars and practitioners. Particularly influential in the decision process are the various ways in which individuals think about health. Indeed, an "individual's appraisal of the environment and resources" available to help prevent or control health-related behavior is a key variable thought to influence health behavior and decisions within a range of theoretical perspectives (Murray-Johnson & Witte, 2003, p. 473). Whereas some individuals think health is merely physical (e.g., absence of illness), others define health in psychosocial (e.g., having a positive outlook) or behavioral (e.g., exercise, eat right) terms; still others hold a variety of health concepts in their cognitive system (Makoul, Clayman, Lynch, & Thompson, 2009). Underlying all research concerned with lay representations of health seems to be an implicit assumption that there are more and less sophisticated ways to conceptualize health with higher levels of sophistication tied to multifaceted conceptualizations of health..

Although cognitive health sophistication (CHS) seems an integral part of an individual's capacity to deal effectively with health care matters, the construct is rarely addressed in the extant research. Drawing from the work on cognitive complexity developed in the literature on social-cognitive ability (Bell, 2004; Burleson & Caplan, 1998; Crockett, 1965; Delia, 1977), we assume that individuals possess several domain-specific cognitive constructs that "constitute the basic cognitive structures through which persons interpret, anticipate, evaluate, and understand aspects of the world" (Burleson & Waltman, 1988, p. 2). If how we think about health influences the likelihood of attending to and adopting health-related recommendations, it is both theoretically and pragmatically important to discover how individual health conceptualizations influence outcomes.

The purpose of this article is to develop and provide initial validity evidence for the Healthy-Unhealthy Other Instrument (HUHOI) which quantifies the structure of an individual's conceptual knowledge about health. Toward this aim, we first conceptually define CHS and situate the HUHOI within the broader social cognitive literature. Then we report Study 1 in which we administered the HUHOI to a sample of US undergraduate students along with other measures to explore concurrent validity. Then we report a second study designed to assess the degree to which scores on the HUHOI are affected by verbal ability.

The Conceptualization of Cognitive Health Sophistication

Cognitive complexity is the relative complexity (or simplicity) of an individual's perceptions and interpretations within specific domains (Bell, 2004; Burleson & Caplan, 1998; Crockett, 1965). In general, an individual with a more complex cognitive system in a particular domain is able to describe that domain in more sophisticated ways than an individual with a less complex system. Like other functional domains (e.g., cars, people), individuals can have more or less sophisticated cognitive systems constituting health. This cognitive health complexity, what we term cognitive health sophistication (CHS), has the potential to influence a host of health-related outcomes from decisions and judgments to behavior and well-being.

Certainly the idea that individuals vary in their conceptualizations of health is not new (see Bjorner, Fayers, & Idler, 2005; Makoul, et al., 2009). Although studies reveal that adults from various countries and of different backgrounds hold one or more conceptualizations about health in their cognitive system, missing is research that addresses the sophistication of thinking about health. If certain conceptualizations of health can be considered more or less sophisticated and, thus, lead people to adopt more nuanced strategies to maintain their health, teaching people

more nuanced and multifaceted views of health might be an efficacious strategy to increase their objective health status and their self-perceived health and well-being.

Although not a measure of health literacy per se, our conceptualization of CHS is related to at least one aspect of health literacy, namely an individual's capacity to deal with health issues (Baker, 2006, p. 878). Of course health literacy is a complex phenomenon (Baker, 2006; DeWalt, Berkman, Sheridan, Lohr, & Pignone, 2004; Jensen, 2011; Kingid et al., 2004), making it difficult to fully define and measure. What has been noted, however, is that current measures primarily tap abilities to read and understand printed materials with fewer options available to assess an individual's general conceptual knowledge about health (Baker, 2006). Thus, the current manuscript additionally contributes to the literature on health literacy measurement by developing and providing validity evidence for a new instrument that seeks to assess CHS.

Study 1: Developing a Measure of Cognitive Health Sophistication

The first study sought to develop a measure that quantifies the sophistication of general health-related knowledge. Our measure of cognitive health sophistication (CHS), the Healthy-Unhealthy Other Instrument (HUHOI), was informed by the Role Category Questionnaire (RCQ; Burleson & Waltman, 1988), originally developed to assess a representative sample of the interpersonal constructs individuals have available for interpreting social interaction (Crockett, 1965). The RCQ is an open-ended instrument that asks participants to describe two well-known individuals, one liked and the other disliked. Using a free-response method like the RCQ has the advantage of not only being a "natural [task] for research participants, but … also [preserving] participants' spontaneous structuring of the social world" (Burleson & Bodie, 2008, p. 953). Thus, similar to the RCQ, the HUHOI asks respondents to describe two individuals: one whom they think of as "healthy" and another who is "unhealthy." Three question prompts (see

Appendix) serve to prompt descriptions of a healthy person; the same three questions are asked with reference to the unhealthy person.

Participant descriptions are coded for the number of unique health constructs represented. The higher this discrimination score, the more cognitively complex the individual and, thus, the higher his or her information processing ability in the domain of health (Burleson & Waltman, 1988; Meyer, 1996).[1] Like the RCQ for interpersonal constructs, certain health constructs are not scored on the HUHOI: identical or repeated words (e.g., saying "smoker" twice); physical traits (e.g., tall, blue eyes) and information about the described person's social role (e.g., "my daughter"); age, or other demographic information; tautological statements (e.g., "She is healthy"); and the participant's feelings about the described person (e.g., "I think that is bad.").

Seeking Validity Evidence

Since the HUHOI is cast to measure a cognitive construct, our primary concern was with exploring how CHS relates to other cognitive phenomenon discussed in the health communication literature. Perhaps the most widely used health cognition construct is health locus of control (HLOC; Wallston, Wallston, & DeVellis, 1978) which refers to how individuals differ in their beliefs about whom or what controls the destiny of their health. Especially relevant for our purposes is the fact that the HLOC is discussed in the realm of sophistication: people who have a more internal sense of personal control about their health are described as "more potent, competent, effective persons" (Wallston & Wallston, 1982, p. 67). Internals tend to seek out more information about health and, in turn, understand health in more sophisticated ways; they also engage in more cognitive demanding coping strategies when stressed (see Masters & Wallston, 2005). To the extent that these strategies are reflections of a more sophisticated approach toward health when compared to their external counterparts, we propose

that individuals with higher CHS should be more likely to attribute the locus of their health behaviors to internal causes (H1).

The second cognitive disposition we explored was the motivation to control health. Dutta-Bergman (2004) defined health orientation as a cognitive disposition toward health that "triggers an individual's interest in a particular issue or topic, subsequently leading to active engagement" about health-related issues (p. 275). Research generally distinguishes between two dimensions of health orientation, namely health information orientation and prevention orientation (Moorman & Matulich, 1993). Health information orientation refers to the intrinsic interest to search out information about health, whereas prevention orientation refers to the tendency to actively maintain good health. In general, higher levels of motivation signal more active engagement with and thinking about health-related issues (Bodie & Dutta, 2008; Dutta & Bodie, 2006); thus, our measure of CHS should be positively related with these constructs (H2).

The final cognitive disposition we explored was health-related self-efficacy (Strecher, DeVellis, Becker, & Rosenstock, 1986), the perceived ability to exert personal control over health. This belief should be positively associated with conceptual knowledge about health; that is, as CHS increases so too should confidence regarding the ability to control and find information about health (H3).

The primary utility of cognitive measures of health is that by correctly identifying certain cognitive types, practitioners can design more appropriate interventions (DeWalt, et al., 2004; Jensen, King, Davis, & Guntzviller, 2010). By extension, it is possible that interventions attempting to increase conceptual knowledge about health might promote the adoption of healthy behaviors. Of course, this is only true to the extent that CHS is related to actual health practice. To the extent that our measure of CHS is useful for identifying individuals who might benefit

from intervention, it is necessary to establish its relation with health outcomes and behaviors. In particular, people with higher CHS should engage in more healthy behaviors and show signs of better health (H4).

Methods

Two-hundred and seventy-five undergraduates (163 female, 110 male, 2 missing responses) with a mean age of 20.35 (*SD* = 2.25) enrolled in communication courses at a large Midwestern university completed an online study for a small amount of extra credit or to fulfill a course research requirement. The survey took approximately 20 minutes to complete. The sample was primarily Caucasian (*n* = 222; 80.7%), and represented all class ranks: freshmen (*n* = 82), sophomore (*n* = 54), junior (*n* = 67), senior (*n* = 71).

Although a sample of convenience, our use of college students should not be denounced entirely. For instance, many theoretical questions concerning health literacy can be answered by using data collected from college students (e.g., its relation to health information seeking and Internet use; Bodie & Dutta, 2008); indeed, a strong case for generalizability can be made from research testing general theoretical principles irrespective of the population sampled (Shapiro, 2002). In addition, one limitation of existing measures that tap elements of health literacy is their relative ceiling effect in populations with high levels of educational attainment; even in populations where functional health literacy is quite high there is still individual variability in health practices, adherence to medical advice, and the ability to search for and understand health information (Kingid, et al., 2004). Such small differences in conceptual knowledge about health can have potentially large effects on individual health and well-being.

HUHOI. The HUHOI was administered first, and participants were asked to spend five minutes describing first the healthy, and then the unhealthy, other. The first author, who has

been trained in the use of the RCQ and is familiar with its operation, developed a coding rubric; slight modifications of the rubric found in Burleson and Waltman (1988, pp. 26-27) made the measure applicable to measuring CHS.[2] Two trained coders established high intercoder reliability as assessed by the intraclass correlation (r = .99) on 29% of the data and, thus, independently coded the remaining data. The mean HUHOI score was 18.10 (SD = 7.23).

Health locus of control. Form A of the Multidimensional Health Locus of Control Scale (MHLOCS) (Wallston et al., 1999; Wallston, et al., 1978) consists of 24-items (6-point Likert) that assess internality (6 items; α = .73) and three types of externality (6 items each): power (α = .76), chance (α = .77), God (α = .96). Higher scores indicate higher internal/external tendencies.

Health motivation. Two dimensions of health motivation were measured based on past research (Champion, 1985, 1993; Dutta-Bergman, 2004; Dutta & Bodie, 2006; Gebhardt, van der Doef, & Paul, 2001). Six items (5-point Likert) constituted a measure of *health information orientation* (e.g., "I make a point to read and watch stories about health"; α = .90), and five constituted a measure of *prevention orientation* (e.g., "I actively try to prevent disease and illnesses"; α = .76).

Health-related self-efficacy. To measure health-related self-efficacy, we utilized the Self Rated Abilities for Health Practices scale (SRAHP; Becker, Stuifbergen, Oh, & Hall, 1993). Respondents assessed the degree to which they were able to practice 28 health behaviors on a five-point scale from 0 (*Not at all*) to 4 (*Completely*). Each subscale achieved adequate internal consistency: Nutrition (e.g., "Eat a balanced diet"; α = .81), Psychological Well Being (e.g., "Change things in my life to reduce my stress"; α = .83), Exercise (e.g., "Fit exercise into my regular routine"; α = .88), and Responsible Health Practices (e.g., "Figure out where to get information on how to take care of my health"; α = .82).

Health outcomes and behaviors. We measured health using two distinct approaches. First, participants reported their height and weight, which was used to calculate their Body Mass Index (BMI; *range* = 16 – 44; *M* = 23.83, *SD* = 4.41). Second, participants reported on eight negative (e.g., smoke a cigarette, cigar, cigarillos, or little cigar) and four positive (e.g., exercise) health behaviors and the number of days in the past week (0 – 7) they had done each. An aggregate health behavior index, computed by averaging the negative and the positive behaviors (after reverse scoring), produced a mean score of 1.70 (*SD* = .71). Higher numbers mean more occurrences of negative health behaviors in a given week.

Results

With *N* = 275 and alpha set at .05, power to detect effects for a one-tailed correlation was .51 for small effects (*r* = .10) and in excess of .99 for medium (*r* = .30) and large effects (*r* = .50). Zero-order correlations indicated that the HUHOI was statistically related to an internal HLOC (*r* = .13, *p* = .03), health information orientation (*r* = .14, *p* = .02), and each dimension of health-related self-efficacy: self-reported nutrition (*r* = .15, *p* = .01), well-being (*r* = .18, *p* = .002), exercise (*r* = .12, *p* = .04), and responsible health practice (*r* = .19, *p* = .002). The relation between HUHOI scores and the three external HLOC measures and between HUHOI scores and prevention orientation did not reach a conventional level of statistical significance, *ps* > .20. Thus, H1 and H2 were partially supported, while H3 was fully supported.

H4 proposed to assess the link between the HUHOI and actual health outcomes. In support of this hypothesis, HUHOI scores were statistically associated, and in expected directions, with BMI, *r* = -.20, *p* <. 001, and self-reported health behaviors, *r* = -.12, *p* = .04.

Brief Discussion

Study 1 primarily provides convergent validity evidence for the HUHOI by showing its statistical relation to scales assessing health-related cognitions and two measures of health behavior. Although significant, the correlations were small in magnitude which could be due, in part, to the lack of a shared method (i.e., scaled and coded responses). Further research demonstrating more theoretically relevant relationships between the HUHOI and related constructs as well as multitrait-multimethod validity assessments is needed.

Study 2: The Relationship between CHS and Verbal Fluency

As with all studies, Study 1 contains limitations (see General Discussion), perhaps the most relevant of which is that fact that HUHOI scoring is based on the count of unique health constructs; thus, performance on the instrument is possibly affected by verbal ability (for review see Burleson & Bodie, 2008). If health constructs are primarily about distinct words and phrases used to describe health, then the instrument merely measures the subject's vocabulary. Of the various ways to measure health-related vocabulary, the most utilized is the Rapid Estimate of Adult Literacy in Medicine (REALM; Davis, Long, & Jackson, 1993), a verbal fluency test that has participants read a list of common medical terms. If the HUHOI is simply a measure of health-related vocabulary, it should demonstrate a strong association with the REALM (H1).

Other proxy measures for health-related vocabulary include educational attainment and obtaining English as a second (as opposed to a first) language. In general, research shows health-based literacy scores are lower among those with lower levels of educational attainment (Schillinger, Barton, Karter, Wang, & Adler, 2006). Inadequate health literacy scores among immigrants, in English or Spanish, can be a barrier to those individuals engaging in preventive health services (Garbers & Chiasson, 2004; Guntzviller, Jensen, King, & Davis, 2011). Furthermore, immigrant populations are vulnerable to poor health outcomes as a result of health

disparities potentially due in part to low levels of health literacy (Kreps & Sparks, 2008), a finding consistent with several studies suggesting low literacy relates to a variety of negative health outcomes (DeWalt, et al., 2004). Thus, we propose that the HUHOI will be strongly and positively associated with educational attainment and English proficiency (H2).

In addition to exploring whether the HUHOI is primarily a measure of health-related vocabulary, we also explored the degree to which our new measure can be utilized with individuals representing different ethnicities and age cohorts. Measures like the REALM may be more challenging for older populations (Grazmararian et al., 1999) and certain ethnic groups (Nurss, Baker, Davis, Parker, & Williams, 1995); thus, we ask whether HUHOI scores are contingent on the demographic characteristics of respondents (RQ1).

Method

Participants. Low-income adults (N = 131; 97 females) were recruited from seven counties in Indiana through university extension programs servicing low-income populations. To qualify as low-income, participants had to be at or below 200% of the poverty line, a criterion routinely used by Indiana agencies to identify individuals in need. Participants' mean age was 42.9 years (SD = 17.5). Table 1 provides other demographic information.

Procedure. University extension employees helped researchers identify eligible participants in seven poverty-stricken counties in the state of Indiana. Participants were recruited (and participated) in their homes/apartments, shelters, food pantries, rehab centers, or transitional living spaces and were offered $30 in grocery certificates to complete the study.

In the study, participants were read a consent form describing their rights and the study's purpose. Upon obtaining consent, a researcher offered the participant a three-page survey (Flesch-Kincaid grade level = 4.9) in either 12-point or 18-point Times New Roman. To

accommodate the visually impaired and individuals with exceptionally low literacy levels, participants had the option to have the survey read by the researcher (n = 11). Per IRB instructions, participants were debriefed and encouraged to ask questions.

Verbal fluency. Verbal fluency was measured using the full 66-item Rapid Estimate of Adult Literacy in Medicine (REALM; Davis et al., 2003). The REALM is a verbal fluency test which includes a list of 66 medical terms that participants are asked to read aloud. Mispronounced and skipped words are counted as incorrect. Participants in the current study had a raw mean score of 54.38 (SD = 14.55). Individuals that score below a 61 on the REALM will struggle with most health materials (Davis et al., 2003); 45.8% of the sample scored below 61.

Cognitive health sophistication. CHS was measured using a modified version of the HUHOI developed for Study 1. Participants in this study were interviewed and asked to verbally describe both a "healthy" and an "unhealthy" other. The same question prompts used in Study 1 (see Appendix) served to initiate the participants talking about these others. All interviews were audio recorded, and the HUHOI portion lasted no more than 10 minutes to maintain consistency with Study 1 data. Oral descriptions of healthy and unhealthy individuals were then transcribed into 114 pages of text. The first author subsequently read these transcripts and trained two undergraduate research assistants to assess the number of unique health constructs represented. Intercoder-reliability, as assessed by the intraclass correlation coefficient, was high (r = .97) with 20% of the data; these coders then each independently scored half of the remaining data (M = 9.64, SD = 5.37, R = 0 - 34).

Results and Discussion

With N = 131 and alpha set at .05, power to detect effects for a one-tailed correlation was .31 for small effects (r = .10), .97 for medium effects (r = .30), and in excess of .99 for large

effects (r = .50). Power to detect effects for a one-way ANOVA with three groups (N = 125; α = .05) was .15 for small (f = .10), .70 for moderate (f = .25), and .98 for large effects (f = .40).

Table 2 displays the zero-order correlations among the variables assessed in this study. HUHOI was positively associated with REALM scores (H1); however, the strength of the association was moderate indicating that the HUHOI is not completely dependent on health-related vocabulary. Indeed, some level of shared variance is expected as each taps different components of the larger construct of health literacy. In addition, and consistent with prior research, both the REALM and the HUHOI were statistically related to educational attainment (H2). The HUHOI was not, however, related to whether the participant spoke English as his or her first language, whereas REALM scores were related with non-native English speakers having lower scores (M = 39.78, SD = 19.39) than native English speakers (M = 55.46, SD = 13.63). Finally, REALM scores were statistically and negatively related to age, whereas HUHOI scores were not.

To examine the extent to which each measure is contingent on ethnicity, we conducted two one-way ANOVAs with self-reported ethnicity as the independent variable and the REALM and HUHOI as separate dependent variables.[3] Omnibus results indicated that the HUHOI scores were not contingent upon ethnicity, $F(2, 114) = .99$, $p = .37$, whereas REALM scores, $F(2, 121) = 10.24$, $p < .001$, $\eta^2 = .14$, were related to ethnicity. There were no statistically significant pairwise differences in HUHOI scores across those reporting Caucasian, Hispanic/Latino, or Black/African American ethnicities (see Table 3). For REALM scores, Caucasians had higher scores than those self-identifying as either Black/African American (r^2 = .06) or Hispanic (r^2 = .22); the latter two also differed (r^2 = .10).

The primary implication of Study 2 is that the HUHOI appears to be a viable measure of health cognitions with the potential to shed light on issues of literacy in a variety of populations. Although related to vocabulary, that shared variance might be the result of the fact that each measure (the HUHOI and REALM) are both tapping elements of health literacy.

General Discussion

This article reports the development of, and validity evidence for, an open-ended measure and basic-level coding scheme that permits an in-depth analysis of individual perception, understanding, and interpretation of health. The resulting Healthy-Unhealthy Other Instrument (HUHOI) can be used to identify the frames and constructs that an individual uses to understand and interpret health. To date, no measures have been developed that provide a global picture of the cognitive makeup of a person's health-related knowledge. The HUHOI is a promising instrument to reliably and validly capture variability in the sophistication or complexity of an individual's health-related schematic structures. This opens the door for the inclusion of cognitive health sophistication in existing health behavior models, which should serve to advance both theory and practice. To the extent that health outcomes are contingent upon knowledge about health and health care, this measure can help to ascertain specific areas of knowledge that need to be fostered or specific aspects of health that are being misunderstood by particular constituent groups. Measures of functional health literacy have afforded practitioners tools to justify the tailoring of health materials to specific reading levels (see Zarcadoolas et al., 2005). The HUHOI seems to have the potential to afford those same practitioners a tool to justify what aspects of health need to be addressed and, perhaps, how to address them.

Indeed, one advantage of the HUHOI is that it is open to multiple measurement methodologies based on theoretical advances or in response to a need for more granular analysis

of response content. So, for instance, instead of measuring cognitive health sophistication, modifications to the HUHOI can be made to assist in the measurement of disease specific health sophistication or conceptual health knowledge about particular aspects of health care. Existing measures related to the health literacy construct do not have this same flexibility. Using the HUHOI along with, or independently of, other health literacy measures will allow researchers a more thorough assessment individual health skills. As the HUHOI is used in additional research, benchmark scores could be computed for certain populations that indicate an appropriate or lacking level of health sophistication. These benchmarks could potentially diversify the HUHOI's utility in medical practice contexts.

On a related note, future research might examine the relations among individual literacy, health sophistication, and how people construct mental representations of specific illnesses (e.g., Orbell et al., 2008). Such relations would be meaningful insofar as they could identify mechanisms by which skill deficiencies translate into negative health outcomes. That is, individuals with lower literacy skills may have poorer health outcomes because they possess incomplete or inaccurate illness representations (e.g., they think all breast cancer is inherited) or, as suggested by the present study, less sophisticated health knowledge (e.g., they don't think of nutrition when they think of health).

The HUHOI affords researchers other advantages beyond specificity. First, unlike a traditional self-report measure, the open-ended nature of the HUHOI does not require participants to "guess" their skill level. Self-report assessments of domain competence consistently demonstrate overestimation by study participants compared to expert assessments or objective measures of the relevant constructs (Ehrlinger, Johnson, Banner, Dunning, & Kruger, 2008). Kruger and Dunning (1999) argue that the metacognitive ability to reflect on one's skill

level is a reflection of an actual skill level. Hence, accurate self-assessments are contingent upon the presence of an underlying aptitude. The HUHOI, as a reflective and descriptive activity, independently assessed by trained coders, is unlikely to overestimate an individual's knowledge about health.

Similarly, unlike a formal test the HUHOI is not restricted by a particular set of a priori skills that may or may not be relevant in all cases and may be either too easy or too hard depending on the population under consideration. Allowing respondents to talk through a conceptualization of a healthy/unhealthy other might also lessen test-related anxiety that participants might experience during close-ended or fill-in-the-blank measurement tools. Anecdotal recounting of the interviews conducted for Study 2 suggests that participants can stumble through their conceptualizations and still have a relatively high score; indeed, it is not the number of words or how eloquent the speech used to describe someone but the relative *sophistication* of that description. Results from Study 2 also support that this instrument allows measurement of general health sophistication that was not contingent upon ethnicity, age, or whether English was a participant's native language providing a further advantage over test-based measures of health knowledge.

In a larger sense, the present article contributes to research attempting to identify and measure key constructs that contribute to successful navigation of the health care environment. Several scholars (e.g., Abel, 2008; Baker, 2006) have recently lamented the fact that measures of reading level cannot fully capture "the complex human skills involved in becoming a health literate citizen" (Zarcadoolas, Pleasant, & Greer, 2005, p. 196). In general, the HUHOI seems to assist in identifying a particular facet of "health literacy" that is inadequately covered in the current literature. Specifically, it moves beyond verbal fluency and numerical abilities to help

provide the opportunity for researchers to approach health literacy as a multidimensional construct. Using cognitive health sophistication in future research affords researchers, practitioners, and clinicians the opportunity to treat health literacy as more than a collection of skills related only to functional literacy. Moreover, research that exclusively focuses on very low-literate populations, although useful in many respects, serves to perpetuate ignorance with regard to how small differences in conceptual knowledge about health can have potentially large effects on individual health and well-being (Kingid et al., 2004). The HUHOI takes an initial step toward research that attends to distinct domains of health literacy and can serve both low and high functionally literature populations equally well.

Limitations

Although the HUHOI starts to bridge a methodological gap, the current study is not without its limitations. The sample size for each study is relatively small, and more research should examine how the measure predicts behaviors within other populations. Additionally, the presence of the interviewer in the second study may have prompted participants to either expand or reduce their responses, based on, for instance, the participant's comfort with the interviewer. In addition, the HUHOI only asks participants to describe two individuals. Thus, it is not perfectly clear how this method ensures an overall picture of health sophistication.[4]

Finally, neither study directly compared the effectiveness of the HUHOI and the other literacy measures relative to health outcomes or behaviors, or identified conditions under which the HUHOI would be a better measure of underlying health cognitions. Future research should examine when and to what extent the HUHOI might function as a better overall index than traditional measures of health literacy (e.g., REALM) to help guide health interventions. These limitations notwithstanding, the present study provides researchers with a means to study

conceptual health knowledge and a foundation for research explicating the relations among conceptual knowledge and health literacy skills.

References

Abel, T. (2008). Measuring health literacy: Moving towards a health-promotion perspective. *International Journal of Public Health, 53*, 169-170.

Baker, D. W. (2006). The meaning and the measure of health literacy. *Journal of General Internal Medicine, 21*, 878-883.

Becker, H., Stuifbergen, A., Oh, H., & Hall, S. (1993). Self-rated abilities for health practices: A health self-efficacy measure. *Health Values, 17*(5), 42-50.

Bell, R. C. (2004). Cognitive complexity. In J. Scheer & B. Walker (Eds.), *The Internet Encyclopedia of Personal Construct Psychology [Accessed August 4, 2010]*. Hamburg, Germany: PCP Information Centre.

Bjorner, J., Fayers, P., & Idler, E. (2005). Self-rated health. In P. Fayers & R. B. Hays (Eds.), *Assessing quality of life in clinical trials* (2nd ed., pp. 309-324). Oxford: Oxford University Press.

Bodie, G. D., & Dutta, M. J. (2008). Understanding health literacy for strategic health marketing: eHealth literacy, health disparities, and the digital divide. *Health Marketing Quarterly, 25*, 175-203.

Burleson, B. R., & Bodie, G. D. (2008). Constructivism and interpersonal processes. In W. Donsbach (Ed.), *The international encyclopedia of communication* (Vol. 3, pp. 950-954). Oxford, United Kingdom: Blackwell.

Burleson, B. R., & Caplan, S. E. (1998). Cognitive complexity. In J. C. McCroskey, J. A. Daly, M. Martin & M. J. Beatty (Eds.), *Communication and personality: Trait perspectives*. Cresskill, NJ: Hampton Press.

Burleson, B. R., & Waltman, M. S. (1988). Cognitive complexity: Using the Role Category Questionnaire measure. In C. H. Tardy (Ed.), *A handbook for the study of human communication: Methods and instruments for observing, measuring, and assessing communication processes* (pp. 1-35). Norwood, NJ: Ablex.

Champion, V. L. (1985). Use of the health belief model in determining frequency of breast self-examination. *Research in Nursing and Health, 8*, 373-379.

Champion, V. L. (1993). Instrument refinement for breast-cancer screening behaviors. *Nursing Research, 42*, 139-143.

Crockett, W. H. (1965). Cognitive complexity and impression formation. In B. A. Maher (Ed.), *Progress in experimental personality research* (Vol. 2, pp. 47-90). New York: Academic Press.

Davis, T. C., Long, S. W., & Jackson, R. H. (1993). Rapid estimate of adult literacy in medicine: A shortened screening instrument. *Family Medicine, 25*, 391-395.

Delia, J. G. (1977). Constructivism and the study of human communication. *Quarterly Journal of Speech, 63*, 66-83.

DeWalt, D. A., Berkman, N. D., Sheridan, S. L., Lohr, K. N., & Pignone, M. P. (2004). Literacy and health outcomes: A systematic review of the literature. *Journal of General Internal Medicine, 19*, 1228-1239.

Dutta-Bergman, M. J. (2004). Primary sources of health information: Comparisons in the domain of health attitudes, health cognitions, and health behaviors. *Health Communication, 16*, 273-288.

Dutta, M. J., & Bodie, G. D. (2006). Health orientation as a predictor of exercising: A psychographic approach. *Social Marketing Quarterly, 12*, 3-18.

Ehrlinger, J., Johnson, K., Banner, M., Dunning, D., & Kruger, J. (2008). Why the unskilled are unaware: Further explorations of (absent) self-insight among the incompetent. *Organizational Behavior and Human Decision Process, 105*(98-121).

Garbers, S., & Chiasson, M. A. (2004). Inadequate functional health literacy in Spanish as a barrier to cervical cancer screening among immigrant Latinas in New York City. *Preventing Chronic Disease, 1*(4), 1-10.

Gebhardt, W. A., van der Doef, M. P., & Paul, L. B. (2001). The Revised Health Hardiness Inventory (RHHI-24): Psychometric properties and relationship with self-reported health and health behavior in two Dutch samples. *Health Education Research, 16*, 579-592.

Grazmararian, J. A., Baker, D. W., Williams, M. V., Parker, R., Scott, T. L., Green, D. C., et al. (1999). Health literacy among Medicare enrollees in a managed care organization. *JAMA, 281*, 545-551.

Guntzviller, L. M., Jensen, J. D., King, A. J., & Davis, L. A. (2011). The foreign language anxiety in medical office scale (FLAMOS): Developing and validating a measurement tool for Spanish-speaking individuals. *Journal of Health Communication, 16*, 849-869.

Jensen, J. D. (2011). Addressing health literacy in the design of health messages. In H. Cho (Ed.), *Health communication message design: Theory, research, and practice*. Thousand Oaks, CA: Sage.

Jensen, J. D., King, A. J., Davis, L. A., & Guntzviller, L. M. (2010). Utilization of Internet technology by low-income adults: The role of health literacy, health numeracy, and computer assistance. *Journal of Aging & Health, 22*, 804-826.

Kingid, D., Affonso, D., Chudler, E., Gaston, M., Meade, C., Parker, R., et al. (2004). *Health literacy: A prescription to end confusion*. Washington, DC: Institute of Medicine.

Kreps, G. L., & Sparks, L. (2008). Meeting the health literacy needs of immigrant populations. *Patient Education and Counseling, 71*, 328-332.

Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of Personality and Social Psychology, 77*, 1121-1134.

Makoul, G., Clayman, M. L., Lynch, E. B., & Thompson, J. A. (2009). Four concepts of health in America: Results of national surveys. *Journal of Health Communication, 14*, 3-14.

Masters, K. S., & Wallston, K. A. (2005). Canonical correlation reveals important relations between Health Locus of Control, coping, affect, and values. *Journal of Health Psychology, 10*, 719-731.

Meyer, J. R. (1996). What cognitive differences are measured by the Role Category Questionnaire? *Western Journal of Communication, 60*, 233-253.

Moorman, C., & Matulich, E. (1993). A Model of consumers preventive health behaviors: The role of health motivation and health ability. *Journal of Consumer Research, 20*(2), 208-229.

Murray-Johnson, L., & Witte, K. (2003). Looking toward the future: Health message design strategy. In T. L. Thompson, A. M. Dorsey, K. Miller & R. Parrott (Eds.), *Handbook of health communication* (pp. 473-495). New York: Erlbaum.

Nurss, J. R., Baker, D. W., Davis, T. C., Parker, R., & Williams, M. V. (1995). Difficulties in functional health literacy screening in Spanish-speaking adults. *Journal of Reading, 38*, 632-637.

Orbell, S., O'Sullivan, I., Parker, R., Steele, B., Campbell, C., & Weller, D. (2008). Illness representations and coping following an abnormal colorectal cancer screening result. *Social Science and Medicine, 67*, 1465-1474.

Schillinger, D., Barton, L. R., Karter, A. J., Wang, F., & Adler, N. (2006). Does literacy mediate the relationship between education and health outcomes? A study of a low-income population with diabetes. *Public Health Reports, 121*, 245-254.

Shapiro, M. A. (2002). Generalizability in communication research. *Human Communication Research, 28*, 491-500.

Strecher, V. J., DeVellis, B. M., Becker, M. H., & Rosenstock, I. M. (1986). The role of self-efficacy in achieving health behavior change. *Health Education and Behavior, 13*, 73-92.

Wallston, K. A., Malcarne, V. L., Flores, L., Hansdottir, I., Smith, C. A., Stein, M. J., et al. (1999). Does God determine your health? The God Locus of Health Control scale. *Cognitive Therapy and Research, 23*, 131-142.

Wallston, K. A., & Wallston, B. S. (1982). Who is responsible for your health? The construct of health locus of control. In G. S. Sanders & J. Suls (Eds.), *Social psychology of health and illness* (pp. 65-95). Hillsdale, NJ: Erlbaum.

Wallston, K. A., Wallston, B. S., & DeVellis, R. (1978). Development of the multidimensional health locus of control (MHLC) scale. *Health Education Monographs, 6*, 160-170.

Zarcadoolas, C., Pleasant, A., & Greer, D. S. (2005). Understanding health literacy: An expanded model. *Health Promotion International, 20*, 195-203.

Table 1

Demographic Information for Study 2 Participants (N = 131)

Sex	
Male	26.0%
Female	74.0%
Race/Ethnicity	
Caucasian/White	59.5%
African American/Black	26.0%
Hispanic/Latino	9.2%
Mixed heritage	3.8%
Other	1.5%
Education	
5th Grade	1.5%
8th Grade	9.9%
GED	7.6%
Completed high school	55.0%
Attended junior college	3.8%
Vocational training	6.9%
College graduate	15.3%
English second language	
Yes	6.9%
No	93.1%

Table 2

Zero-Order Correlations for Variables Included in Study 2

	REALM	Education	ESL	Age
REALM		.48***	.27**	-.20*
HUHOI	.26*	.42***	.17	.09

Notes: ***p <. 001; **p < .01; *p < .05

Table 3

Descriptive Statistics for Study 2 Measures by Ethnicity

	Caucasian		**Hispanic**		**Black/African American**	
	M	*SD*	*M*	*SD*	*M*	*SD*
HUHOI	9.31[a]	4.45	8.00[a]	6.67	10.39[a]	5.35
REALM	57.96[a]	11.34	40.58[b]	19.85	51.79[c]	14.03

Notes: Caucasian, Hispanic, Black/African American cell sizes as follows: HUHOI (n = 77, 9, 31); REALM (n = 78, 12, 34). Different subscripts across a single row indicate a statistically significant difference ($p < .05$).

Appendix

Healthy/Unhealthy Other Instrument

Our interest in this questionnaire is to learn how people describe others with regard to health. Our concern here is with dispositions, habits, mannerisms -- in general, with the personal traits rather than just the physical characteristics -- which characterize a number of different people.

In order to make sure that you are describing real people, we have set down a list of two different categories of people. Please think of an individual in each one of these categories (but please do not write the names of these individuals on any part of this survey):

1. A person you know well who you consider "healthy".

2. A person you know well who you do not consider very healthy.

Spend a few moments thinking about these individuals, mentally comparing and contrasting the people you have in mind for each category. Think of their habits, their beliefs, their mannerisms, their relations to others, and any other characteristics they have which you might use to describe them to other people.

Now that you have identified a person you know well who you believe is a good example of someone who is "healthy", for the next couple of minutes, try to identify the following things about this person:

1. How do you know this person is healthy?

2. What things do they do that contribute to their health?

3. What are their reasons for being healthy?

In the following areas, please describe as fully as you can the reasons for their healthiness, how they maintain that healthiness, and reasons why you think they are healthy. Write down as many defining characteristics as you can. Do not simply put down those characteristics that distinguish him/her from others on your list, but include any characteristics that he/she shares with others as well as characteristics that are unique to him/her. Pay particular attention to his/her habits, beliefs, mannerisms, and similar attributes. Remember, describe him/her as completely as you can, so that a stranger might be able to determine the kind of person he/she is from your description.

Please spend only about five (5) minutes describing this person.

We would like you to now think about the person you have identified who you believe is a good example of someone who is "not very healthy."

For the next couple of minutes, try to identify the following things about this person:

1. How do you know this person is not very healthy?
2. What things do they do that contribute to their lack of healthiness?
3. What are their reasons for not being healthy?

In the following areas, please describe as fully as you can the reasons for their lack of healthiness, what they do or don't do that keeps them from being healthier, and reasons why you think they are unhealthy. Write down as many defining characteristics as you can. Do not simply put down those characteristics that distinguish him/her from others on your list, but include any characteristics that he/she shares with others as well as characteristics that are unique to him/her. Pay particular attention to his/her habits, beliefs, mannerisms, and similar attributes. Remember, describe him/her as completely as you can, so that a stranger might be able to determine the kind of person he/she is from your description.

Please spend only about five (5) minutes describing this person.

Notes

[1] Although several scholars have noted other ways to code RCQ data , these various ways are typically highly correlated. Thus, the consensus is to use the discrimination index as a proxy for cognitive sophistication (Burleson & Waltman, 1988).

[2]All specific coding rubrics and other information are available upon request.

[3] Low cell sizes for those reporting either mixed (n = 5) or other (n = 1) race categories did not allow for adequate power to detect significant effects of any magnitude. All descriptive data are available from the authors upon request.

[4] For instance, although the instructions lead participants to describe the healthy and unhealthy others as fully as possible, it does not stipulate whether that means the inclusion of as many dimensions of health as possible or whether it means a fuller discussion of individual elements. Of course, the HUHOI represents a sample of the total population of an individual's cognitive health constructs; individuals who think of health in more nuanced ways will have at their disposal more constructs and will, thus, score higher. In a similar way, individuals who discuss a given dimension with greater depth will also be able to score higher. Future research that explores various ways to code HUHOI responses and the relation among these various coding schemes and variables thought to represent relative breadth versus depth of an individual's cognitive health makeup would help to answer these types of important questions. We would like to thank one of the anonymous reviewers on a previous version of this manuscript for pointing out this limitation and providing some of the phrasing we use to address it.