READING THE FINE PRINT: EVALUATING DISCREPANCIES IN PRINT READING DISABILITY STATISTICS

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In recent years, data from two national surveys have been used to generate estimates of the prevalence of visual impairment from a print reading disability measure: the National Health Interview Survey (NHIS) of the National Center for Health Statistics, and the Survey of Income and Program Participation (SIPP) of the Census Bureau. These estimates differ substantially. According to the 1991-92 SIPP, 9.7 million people 15 years old and older have difficulty reading newspaper print, and 1.6 million of those cannot read newspaper print at all (McNeil, 1993). According to an adjusted estimate based on a combination of the 1977 NHIS and 1984 NHIS-Supplement on Aging, 4.3 million people (approximately 4.2 million people 15 years old and older) cannot read newspaper print[1]. Concerns about this apparent discrepancy led the National Library Service for the Blind and Physically Handicapped, along with a consortium of private agencies and consumer groups of blind people, to support research to investigate the discrepancy and improve prevalence statistics more generally. As a part of this effort, researchers from the U.S. Census Bureau and the National Center for Health Statistics, with the assistance of the American Foundation for the Blind, developed a research plan using cognitive interviewing methods to explore why responses to the two print disability measures differ so widely.

Before examining the specific wordings of questions, we considered features of the overall designs of the NHIS and SIPP that could be potential causes for the observed disparity.

Differences in overall design of the surveys

First, there was an 8-year spread between the NHIS and SIPP data collection. However, the NHIS estimates were weighted to 1990 population parameters, which should have accounted for demographic changes.

Second, the respondent rules for the two surveys are different. The 1984 NHIS Supplement on Aging was written for self-report. However, SIPP respondents and 1977 NHIS respondents sometimes answered print disability questions by proxy for other members of the household[2]. People may draw on different cognitive processes to respond for themselves as opposed to others (c.f. Schwarz and Wellens, 1997). When looking at 1992 SIPP data, about 5.8% of self-respondents reported difficulty reading newspaper print; whereas only 3.8% of people responding for some other member of their household reported difficulty reading newspaper print. Thus, self-proxy rules could have an impact on the estimates.

Last, the overall content of the two surveys is quite different. The SIPP largely consists of questions on income and participation in government funded financial assistance programs. Additional questions appear on periodic modules (such as the health and disability topical module), but the core of the interview deals with income and related issues. In contrast, the NHIS focuses on health and health related behavior. Furthermore, the NHIS print disability question follows a series of vision-related questions about glaucoma, cataracts, use of magnification devices to do close work, and so on. It is important to consider the possible influence of the previous questions on responses to print disability questions.

Differences between SIPP and NHIS questions

There are four obvious ways in which the NHIS and SIPP question wordings themselves differ. The first and most obvious is that there are a different number of print disability questions used on the SIPP and NHIS. The NHIS asks only one question in which respondents indicate that either they can see well enough to read newspaper print, or they cannot (see Appendix). The SIPP, on the other hand, asks two questions: whether respondents have difficulty seeing print and, if yes, whether they are able to see print at all (see Appendix). The SIPP therefore has a total of three response outcomes: respondents can indicate that they do not have any difficulty seeing the words and letters in ordinary newspaper print, that they have some difficulty, or that they cannot see the print at all.

The NHIS requires respondents to make one judgment, which places them in one of two outcomes; the SIPP requires respondents to make two judgments, placing them in one of three outcomes. In other words, the two surveys ask respondents to make different response decisions. Obviously the SIPP allows greater specificity in

[1] See Nelson and Dimitrova (1993) for further explanation of the NHIS estimates.

[2] The prevalence of proxy responses in the 1977 NHIS are unknown. The probable procedure at that time was to ask one "household respondent" to provide print disability responses for other family members.

answering. Respondents may be reluctant to say that they are incapable of reading print (given the NHIS alternatives), whereas they might agree with the softer SIPP language that they "had difficulty" doing so.

A second difference in the wording of the two measures was in the placement of the instruction informing respondents to answer in reference to wearing glasses or contact lenses, if that is how they see best. In SIPP, this instruction is explicit and contained within the first print disability question. But the NHIS includes this instruction only as part of a lead-in to a series of questions. The print disability question is the third in this series; the lead-in could be forgotten and the frame of reference not included when respondents form their responses.

A third difference involves specificity of the print type. The SIPP asks respondents to think of "ordinary newspaper print" whereas the NHIS simply says newspaper print. Respondents sometimes indicated that their answers depended on whether they were talking about the headlines, the articles or sections like the classifieds or obituaries.

The last difference between the two measures involves the direction in which the question is asked. A "yes" response to the NHIS means that the respondent is able to read newspaper print. In contrast, a "yes" response to the first SIPP item indicates that the respondent has difficulty reading newspaper print. A bias toward "yes" responses in general could partially explain the discrepancy in statistics from the two surveys: this bias would decrease estimates of print disability from the NHIS, and increase estimates of print disability from the SIPP, which is consistent with our discrepancy.

Methodology

The study presented here is exploratory, focusing on the meanings and interpretations of the questions, using cognitive laboratory techniques. We made an effort to incorporate some features into our design that would allow investigation into the role of context on question interpretation.

We developed three different interview conditions to explore what factors respondents considered when answering the print disability questions. In each condition, respondents answered sections of the NHIS and the SIPP, including the print disability measures. The forms differed in terms of which section was administered first (and subsequently probed), and also in terms of the context provided by preceding questions. We were particularly interested in possible context effects created by vision-related questions in the NHIS. Table 1 outlines the basic content of the three interviewing conditions.

This design allowed us to make several comparisons. First, we made between-form comparisons by examining differences in responses to the first items administered on each form. For example, comparing responses to Form 1 and Form 2 allowed us to evaluate whether the visual ability questions directly preceding the NHIS print disability measure might have influenced responses to the NHIS measure. Similarly, a comparison of responses to Form 2 and Form 3 allows us to examine the interpretations of the NHIS and SIPP questions without the potential influence of the preceding visual ability questions. Responses to Form 1 and Form 3 allowed us to compare interpretations of the NHIS and SIPP print disability measures in their usual context-- in both cases, we administered the questions that precede the print disability measures in the actual SIPP and NHIS questionnaires.

We also made within-form comparisons. After having answered both the NHIS and the SIPP print disability questions, respondents were explicitly asked if they thought there were any differences or similarities between the two measures.

Table 1: Three interview conditions

Form 1
• abbreviated version of NHIS core interview • visual ability questions • NHIS print reading disability measure • **cognitive probing** • *abbreviated version of core SIPP interview* • *SIPP print reading disability measure* • **cognitive probing**
Form 2
• abbreviated version of NHIS core interview • NHIS print reading disability measure • **cognitive probing** • *abbreviated version of core SIPP interview* • *SIPP print reading disability measure* • **cognitive probing**
Form 3
• *abbreviated version of core SIPP interview* • *SIPP print reading disability measure* • **cognitive probing** • abbreviated version of core NHIS interview • visual ability questions • NHIS print reading disability measure • **cognitive probing**

Eleven respondents were interviewed with Form 1, nine were interviewed with Form 2, and ten were interviewed with Form 3. Responses to cognitive probes were coded independently by the two interviewers. The purpose of the coding was to determine, as much as possible, the frame of reference respondents used while answering— for example,

whether respondents included glasses or other aids while answering the question; whether respondents were thinking of headlines, regular print text, or some other size of print; and so on. We also coded more objective information— for example, whether or not respondents wore glasses or used magnification devices on a regular basis. (Percent agreement between coders was 90%; all differences were reconciled prior to analysis.)

Respondents

With the assistance of staff from the American Foundation for the Blind, respondents were recruited from Johns Hopkins University, as well as the Virginia Department for the Visually Handicapped and a Washington, DC- based ophthalmology practice of retina specialists. Respondents were recruited from clinical settings because we were interested in interviewing people within a specific range of impaired visual acuity, and within a limited geographical area. Because of the transportation needs of this population, all respondents were interviewed in their homes and were paid $25 as a token of appreciation for their participation in a 30 minute interview.

All respondents had been previously diagnosed as having a visual acuity between 20/60 and 20/100 with best correction. Some respondents had been diagnosed as long as several years before this study; and none of the respondents had their vision retested as part of this study. These respondents were selected with the expectation that none would say they were clearly unable to read newspaper print, nor that they could quite easily read newspaper print.

We interviewed a total of 30 respondents, selected by certain age, race and education criteria. Age was an important criterion because most visual impairment is among older people. Almost all respondents were above the age of 55. Race was another selection criterion since blacks and whites have different rates of clinically measured visual impairment. Approximately 2/3 were white and 1/3 were non-white. An attempted selection criterion was literacy level. Since NHIS specifically says "read" in the question wording we thought that literacy might explain some differences in the estimates. However, given the limited number of respondents who fit our visual criteria, we were unable to recruit individuals for whom literacy was an issue. All respondents were literate. Gender was not included as a selection criteria because print disability rates for men and women are not different. As much as possible, we included a mix of age, race, and education levels across each interviewing condition.

Interviewing Protocols

In each of the interviewing conditions, the interviewer administered the questionnaire without interruption until the respondent answered the first print disability questions. Cognitive probing began at that point in the interview, using a semi-scripted interviewing protocol. Some of the suggested probes included:

- What does this question sound like it is asking to you?
- How did you decide that your answer was ____?
- How easy was it for you to decide that?
- When answering, were you thinking about being able to "see" newspaper print, or were you thinking about being able to "read" newspaper print? Is there a difference?
- In your own words, can you tell me how well you can see newspaper print?
- Using this sample of newspaper, describe what you are seeing by choosing a number between 1 and 10, with 1 being "can't see at all" and 10 being "can read the paragraph without any difficulty."

Following these probes, interviewers asked the print disability question from the opposite survey, and asked additional probes about whether the questions addressed different concepts. Finally, respondents were asked whether their vision prevented them from doing any activities that were important to them.

This general outline was followed in all interviews. However, interviewers were also free to pursue discussions that seemed pertinent to the goals of the study.

On the whole, the interviews yielded useful information about respondents' frames of reference, general visual abilities, and sources of ambiguity in the questions. Our analysis of the interview data is largely based on anecdotal evidence, as is typical in qualitative research, but where possible we include some quantitative reports based on coding of interview content.

Results

Interpretation of central concepts in print disability questions

For virtually all respondents, the central concept of "being able to read print" was equivalent across SIPP and NHIS questions. When asked to compare the meanings of questions, no subjects reported that questions from different surveys addressed different conceptual domains— that is, the ability to "see words and letters" is functionally the same as being able to "see well enough to read."

Respondents were generally consistent in answering the question based on a "functional ability" to read. The ability to make out some letters, or the ability to slowly piece through the headline of a story, was usually insufficient for them to indicate ability to read print, for both NHIS and SIPP questions. For example, a respondent who said "no" to the NHIS question (he could not see well enough to read newspaper print) explained that "I can read headlines, but... [reading] headlines is not reading the newspaper." Although the NHIS question does not specify "ordinary" print,

respondents tended to interpret the question as referring to an inability to read something substantial. As one respondent said, the NHIS question asked if he "can pick up the paper and read it."

Another respondent pointed out that the SIPP questions referred to a pragmatic ability to read: individual words "don't do you any good if you can't read [articles]." Consistent with that interpretation, his actual response was that he did have difficulty.

However, the questions do address different severity levels of print disability. The second SIPP question (SIPP 2) addresses the most severe visual impairment: ability to see the words and letters at all. The NHIS question about the ability to see well enough to read addresses a less severe impairment. The initial SIPP question (SIPP 1), about having difficulty seeing words and letters, addresses the least severe impairment among these questions. We would expect SIPP 1 to generate the most reports of print disability, SIPP 2 to generate the least, with the NHIS question somewhere in between. Respondents' answers in our study confirm this hierarchy:

Table 2: Responses to print disability questions in the cognitive interviewing study

Question	Number of respondents with specified disability (out of 30)
SIPP 1— Difficulty seeing words and letters	23
NHIS— (Can't) see well enough to read	18
SIPP 2— Cannot see words and letters at all	13

Thus, it seems likely that the implied severity in the question is a very important influence on response, even though the questions otherwise address similar concepts.

Operational Definition of Print Disability and the Implied Frame of Reference

Another difference is that the SIPP questions ask explicitly about ability to see while wearing glasses. No respondents asked interviewers for clarification about whether they should include glasses while answering this question— it was clear to them that they should. But the NHIS question does not specify that glasses should be included (although such guidance is given at the beginning of the section, several questions earlier). Consequently, four respondents expressed uncertainty about whether their NHIS response should include the use of glasses or other aids. Interviewers asked respondents to interpret the question as they thought most appropriate, and virtually all respondents who wore glasses assumed that the NHIS question should be answered based on their reading ability with glasses. What should be noted is that the format of the NHIS permits uncertainty in the response process. This increases the chance that there will be differences in how the question is interpreted across respondents.

Respondents were less likely to answer the question based on their abilities to read with magnification devices. Sixteen respondents reported that they used high-powered magnifiers to assist with reading, and eight of those specified that they did not answer in reference to using magnifiers. For example, one respondent said that he could not read newspaper print at all (SIPP 2) but later mentioned "Oh, I can [read regular newsprint] with a magnifier, that is, some of it." In any case, answering with respect to magnification devices is much less common than answering with respect to glasses, regardless of the questionnaire form that was administered. Only three respondents who used magnifiers answered questions while considering those devices. (We did not ascertain a clear frame of reference from the remaining five respondents).

Altogether, it seems that respondents generally answer the print disability question based on their "everyday abilities." Respondents who wear glasses all of the time seem to include them when evaluating their ability to see. Because they use glasses constantly, it almost goes without saying that asking about their ability to see implies "with glasses." Though a few did include magnifiers in their answer, more sophisticated magnifiers are apparently less likely to be considered in this light, since using a magnifier entails particular effort that would not be taken as easily for granted. For example, one of our respondents who could only see print with special magnifiers responded to both the NHIS and SIPP questions that he could not read print.

In general, there seemed to be a consensus on the implied frame of reference. In the next section we consider another factor that could influence the frame of reference in answering: preceding survey questions.

Context effects from preceding questions

The most notable difference between the two questionnaires are the contexts in which the print disability questions appear. While the SIPP print questions do not appear with any other vision-related questions, the NHIS question follows a lengthy series of vision-related questions. We believe that these vision questions may influence the frame of reference of the NHIS print question— in fact, print disability estimates from the NHIS should probably be viewed as a product of that series of questions, not just the print disability question alone. Such an effect of preceding context on the interpretation of subsequent questions has been well documented in the literature (Schuman, 1992; Schuman and Kalton, 1985).

One possible effect of the preceding questions would be to "prime" respondents to consider additional factors in their answers. For example, the preceding questions mention using a "magnifying glass to read or do other close work." Perhaps this question influences some respondents to include magnification devices while

answering about print disability. We do have some modest evidence that print disability responses may be influenced by the presence of the context questions.

We first checked to see if respondents' answers to the SIPP and NHIS questions were consistent. Keep in mind that the two SIPP questions create three possible outcomes: 1) able to read print without difficulty; 2) able to read print, but with difficulty; 3) not able to read print at all. As we had hoped, everyone able to read print on the NHIS fell into the first two SIPP categories; and everyone not able to read print on the NHIS fell into the last two SIPP categories. However, the SIPP responses differed depending on whether context questions had preceded them. Table 3, below, considers only those respondents who said they were able to read print on the NHIS:

Table 3: Response to SIPP print disability question by presence or absence of context for those respondents able to read print according to NHIS

	Form 1 *SIPP preceded by NHIS context Q's*	**Form 2 & 3** *SIPP not preceded by NHIS context Q's*
SIPP response:		
Can read print	5	2
Read with difficulty	1	4

Table 3 shows that respondents who answered the NHIS context questions before the SIPP question, Form 1, rated their ability to read print higher than those who did not , Forms 2 and 3 (Fisher's exact test, $p<.11$). A similar effect appears among respondents who reported that they were not able to read print on the NHIS (Table 4, below). Here also, respondents rated their ability to read print higher when they had previously answered the NHIS context questions. That is, SIPP ratings were higher for Form 1 than for Forms 2 and 3 (Fisher's exact test, $p<.09$).

Table 4: Response to SIPP print disability question by presence or absence of context for those respondents not able to read print according to NHIS

	Form 1 *SIPP preceded by NHIS context Q's*	**Form 2 & 3** *SIPP not preceded by NHIS context Q's*
SIPP response:		
Read with difficulty	3	2
Cannot read print	2	11

We considered the possibility that these differences are explained by actual differences in visual abilities— that is, that those who received Form 1 happened to have better vision than those who received Forms 2 and 3. However, we created a simple code to reflect visual abilities based on respondent descriptions of how well and under what circumstances they could see, and the results did not vary across forms.

In a comparison of Form 1 and Form 2 responses, we failed to find an interaction between NHIS responses and presence of the context questions. We believe this is because of the small sample size and the lack of variability possible in a binomial response. The NHIS only has two response outcomes (either the respondent can read print or she cannot). Context effects would be more noticeable on the SIPP questions, which have three possible outcomes, permitting more variety of responses.

Overall, this analysis suggests that the NHIS context questions may somehow influence respondents to rate their ability to read print more highly. Although the sample sizes are very small, the differences in Tables 3 and 4 approach statistical significance. An important next step would be to interview an expanded sample of respondents, covering various permutations of visual difficulties and assistive devices, with and without preceding context questions. Only then could this problem be evaluated with the attention it needs.

Summary

The NHIS and SIPP print disability questions appear to have very similar subject matter. Virtually all respondents felt the concept of "being able to read print" was equivalent across SIPP and NHIS questions.

However, there are still important differences in how print disability is operationalized across the two questionnaires. The SIPP measure differentiates between levels of impairment: one question asks whether the respondent has difficulty seeing words and letters; another assesses whether he is able to see words and letters at all.

These appear to be categorically different levels of severity. In contrast, the NHIS only asks whether the respondent can or cannot read newspaper print.

The SIPP question explicitly mentions that respondents should answer in reference to wearing glasses, if they usually wear them. The NHIS question does not specifically mention this, although it seems that most respondents answer in reference to wearing glasses, if they typically wear glasses to read or do other close work. It is possible that respondents do this because wearing glasses seems to be a logical interpretation even without being stated. Nevertheless, it seems preferable to specify on future surveys that we are interested in vision with glasses (if respondents wear them), rather than leaving this to chance interpretation.

Despite these seeming discrepancies, respondent interpretations seemed quite consistent. Typically, respondents answered in terms of regular-sized newspaper print, while wearing glasses but not with additional magnification devices. This appears to constitute their functional ability to read, under everyday circumstances.

This analysis also suggested that the battery of questions preceding the NHIS measure creates a context effect influencing respondents' assessment of their ability to read print. When asked a series of visual-oriented questions before the print disability measure, respondents seemed to rate their ability to read print more favorably than without the preceding questions. This may at least partially account for the differences between estimates from the two surveys.

Still, this potential context effect should be investigated in a more sophisticated experiment. Data should be collected through traditional interviewing techniques and larger samples, in order to isolate the unique effect of the context questions. Procedural factors that could have contributed to differences between NHIS and SIPP responses should be eliminated— specifically, proxy rules, and the age of the target population, should be fixed. Complex demographic adjustments due to variations in time of data collection could be avoided.

Isolating the impact of context is an important step toward identifying the optimal measure of print disability. In any case, it is important to note that importing the NHIS or SIPP questions alone into other surveys would probably not yield the same results. Any attempt to develop a standard measure of print disability should also include standardization of the preceding context questions.

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Appendix

Print Reading Disability Measures

SIPP

1) (Do you/Does Name) have difficulty seeing the words and letters in ordinary newspaper print even when wearing glasses or contact lenses if (you/Name) usually wears them?

[] Yes, has difficulty
[] No difficulty -- skip to 3

2) (Are you/Is he/she) able to see the words and letters in ordinary newspaper print at all?

[] Yes
[] No

NHIS

The next few questions are about how well you can see (wearing your (glasses/contact lenses) if that is how you see best.)

1) Can you see well enough to recognize.....

2) Can you see well enough to watch t.v.....

3) Can you see well enough to read newspaper print?

[] Yes
[] No