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Discussion and Presentation of the Disability Test Results from the Current Population Survey

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Abstract

In accordance with an effort to design a set of questions for the Current Population Survey (CPS) to measure disability, potential questions were drawn from existing surveys, cognitively and field tested. Based on an analysis of the test data, a set of seven questions was identified, cognitively tested, and placed in the February 2006 CPS for testing. Analysis of the data revealed a lower overall disability rate as measured in the CPS than in the field test, with lower positive response rates for each question. The data did not indicate that there was an adverse effect on the response rates.

KEY WORDS: Disability; CPS; Employment.

1. Overview

1.1 Development of the Questions

The Current Population Survey (CPS) has never contained questions that were designed or intended to measure disability.[2] This paper begins by describing a process designed to identify and thoroughly test a set of questions that can be placed in the CPS in order to provide an accurate and timely measure of the employment rate of people with disabilities. The results and analysis of recent field testing constitute the latter portion of this paper. The disability test results from the CPS are test findings and should not be considered official BLS estimates of the disabled population, or a substitute for existing disability measures.

On March 13, 1998, Executive Order 13078 established the Presidential Task Force on the Employment of Adults with Disabilities (PTFEAD). This task force was an over-arching organization that provided an operating base for several committees and work groups with mandates specified in the Order. With respect to disability statistics, the Executive Order stated:

> *The Bureau of Labor Statistics of the Department of Labor and the Census Bureau of the Department of Commerce, in cooperation with the Departments of Education and Health and Human Services, the National Council on Disability, and the President's Committee on the Employment of People with Disabilities shall design and implement a statistically reliable and accurate method to measure the employment rate of adults with disabilities as soon as possible, but no later than the date of termination of the Task Force [September 2002]. Data derived from this methodology shall be published on as frequent a basis as possible.*[3]

The definition of disability given in the Executive Order states "An adult with a disability is a person with a physical or mental impairment that substantially limits at least one major life activity." This definition is the first prong of

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[2] A complete, in-depth discussion of the question development and testing process can be found on line at: http:/www.bls.gov/ore/pdf/st050190.pdf

[3] Excerpt from "Executive Order 13078: Increasing Employment of Adults With Disabilities," available online at: http://permanent.access.gpo.gov/lps9586/www.dol.gov/dol/_sec/public/programs/ptfead/2000rpt/execorder.htm

the Americans with Disabilities Act (ADA) definition. It embraces the view that disability is a function of the interaction between an individual with an impairment and his/her environment.

Pursuant to this mandate, the Task Force established the Employment Rate Measurement Methodology (ERMM) Work Group. About 17 Federal Agencies comprised the ERMM Work Group.

The primary vehicle for collecting labor force data for demographic groups is the Current Population Survey, a monthly survey of about 60,000 households conducted for Bureau of Labor Statistics by the Census Bureau. This survey was chosen as a good instrument for the disability questions for two main reasons. First, since the CPS is a monthly survey, it would satisfy the requirement in the Executive Order to present the data on "as frequent a basis as possible." Second, since the CPS is already the official source of labor force data for various demographic groups, it seemed logical that people with disabilities should be included among these other demographic groups. In order to minimize the impact the addition of these questions would have on the CPS, the ERMM Work Group decided that the question set should be designed with the goal of using as few questions as possible.

Candidate questions were drawn from several major surveys for testing. These questions were first tested in a cognitive laboratory in order to ensure that they were appropriate for the purpose of this effort. Following the cognitive testing, the questions were placed in the National Comorbidity Survey (NCS) for a field test. The NCS is a nationally representative survey that contains extensive questions on mental health and physical well being. The additional information collected in the NCS provided a more complete depiction of the disability status of respondents.

The results from the NCS interviews were analyzed by experts at Rutgers, Harvard, and Indiana University. This analysis produced a disability classification system identifying 24 categories of respondents that could be broadly grouped into those who: A) definitely have a disability, B) probably have a disability, C) possibly have a disability, D) are very unlikely to have a disability, and E) are not worth re-contacting in an attempt to gain further information.

In consultation with BLS staff, the information contained in the 24 categories was used to classify respondents according to the likelihood of disability. Disability is not a clear-cut status by any measure, so there were several borderline cases for whom disability status was difficult to determine. Once the more difficult cases were identified, 100 of these respondents were re-contacted to gain further information. The data collected through the re-interviews were combined with the NCS data to create a more complete profile for each respondent. These enhanced profiles were placed into a Delphi process that successfully determined disability status for the majority of the respondents.

After establishing the disability status of the respondents, statistical analysis was conducted to determine which small set of questions could most accurately identify people with disabilities. The accuracy of this small set of questions was gauged through comparison with the disability status established using the full set of information. The analysis used three basic techniques to ascertain the best predictors of disability status: 1) stepwise regression; 2) highest R-squared regressions using all 5-, 6-, and 7-question sets; and 3) a combinatorial approach, comparing the classification accuracy of all 5-, 6-, and 7-question sets.

In order to identify people with disabilities more accurately and minimize the overcount, the question sets were tested to determine the optimal number of positive responses that would be needed to indicate a high probability of a disability. The receiver operator characteristic (ROC) analysis and the classification tree analysis (with the CART program) were used.

The performance of the best sets was evaluated in the following areas:

- a quality index defined as 100 – undercount – (2*overcount);
- overall accuracy;
- percentage identified as disabled;
- overcount[4];

[4] In the interest of clarity, the terms overcount and undercount used in this paper refer to the following concepts: Overcount – the portion of persons who were identified as *not disabled* using the full set of information collected via

- undercount;
- overcount by demographic characteristics;
- undercount by demographic characteristics.

The question set that best addressed these areas of concern is listed in Appendix A, along with the algorithm that was determined to work best at accurately identifying people with disabilities.

Following the identification of the question set, the seven questions were placed within the CPS instrument and cognitively tested in order to determine if they were understandable within a labor force survey, and to determine if they could be successfully asked in a household format. (The NCS was conducted through personal visits, and there were no proxy respondents.) There were no major problems identified, and the household format worked well in the cognitive tests.

1.2 The Question Set

Q1. Does anyone in this household who is 15 years old or over have a hearing problem that prevents them from hearing what is said in normal conversation even with a hearing aid?

If "yes" to Q1. → Who was that?

Q2. Does anyone in this household who is 15 years old or over have a vision problem that prevents them from reading a newspaper even when wearing glasses or contacts?

If "yes" to Q2. → Who was that?

Q3. Does anyone in this household who is 15 years old or over have any condition that substantially limits one or more basic physical activities, such as walking, climbing stairs, reaching, lifting, or carrying?

If "yes" to Q3. → Who was that?

Q4. Does anyone in this household who is 15 years old or over have any other physical disability?

If "yes" to Q4. → Who was that?

Q5. Does anyone in this household who is 15 years old or over have any emotional or mental disability?

If "yes" to Q5. → Who was that?

Q6. Because of a physical, mental or emotional condition lasting **3 months or longer**, does anyone in this household who is 15 years old or over have difficulty learning, remembering or concentrating?

If "yes" to Q6. → Who was that?

Q7. Because of a physical, mental or emotional condition lasting **3 months or longer**, does anyone in this household who is 15 years old or over have difficulty participating fully in school, housework, or other daily activities?

If "yes" to Q7. → Who was that?

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the NCS, but were identified as *disabled* using the short question set. Undercount – the portion of persons who were identified as *disabled* using the full set of information collected via the NCS, but were identified as *not disabled* using the short question set.

1.3 The Algorithm for Disability Status

To be classified as disabled:

"Yes" to question 1 (a person has difficulty hearing)

OR

"Yes" to question 2 (a person has difficulty seeing)

OR

"Yes" to 2 or more of questions 3 through 7.

2. Field Test of the Questions in the CPS

Whenever a change to the CPS is considered, one of the main concerns of the agencies involved is ensuring that there are as few adverse affects on the CPS response rate as possible. In order to determine what effect the addition of a set of disability questions might have, the disability question set was tested in the February 2006 CPS, in a joint effort between BLS, the Census Bureau, the Office of Disability Employment Policy (ODEP), and the National Institute on Disability and Rehabilitation Research (NIDRR). The test contained the disability question set, which was asked directly after the end of the regular monthly CPS questions. There were two primary goals with the Disability test: to compare the CPS disability rate to that obtained from the NCS and to evaluate the effect on CPS response rates in the following month.

The test used a split-panel design, which included households that were in their first through third or fifth through seventh monthly interviews. Under this design, half of the households were asked the disability questions, while the other half were not asked any additional questions. This design ensured that enough households received the disability questions to provide meaningful data. In addition, differences in the February-March response rate between households that were asked the disability questions and those that were not asked any additional questions could be examined to determine if asking the disability questions adversely affected the likelihood of households continuing to participate in the CPS. In general, there was a lower overall disability rate as measured in the CPS than in the NCS, and there did not seem to be any adverse effect on the response rates for households that had received the disability question. The next section includes some detailed figures and tables from our analysis. The final section explains some technical details about the construction of the estimates from the CPS, as well as technical issues involved in the comparison of CPS results to the NCS estimates.

3. Figures and Tables

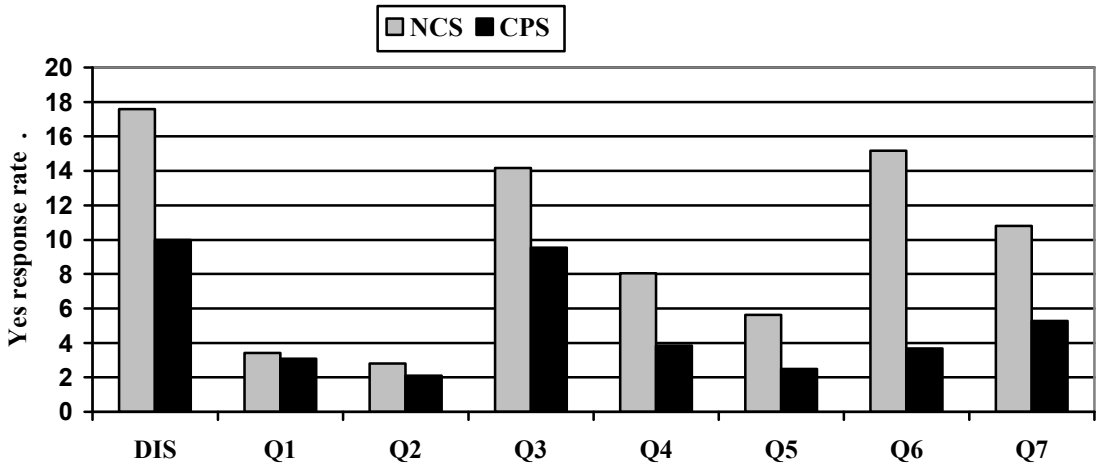
3.1 Description of Figures and Tables

Those households that received the disability questions were asked a series of 7 questions inquiring if anyone in the household over the age of 15 had the condition described in the question, and, if so, who in the household had that condition. These conditions included difficulty hearing, difficulty seeing, limitations of basic physical activities, other physical disabilities, emotional or mental disabilities, difficulty learning, remembering or concentrating, and difficulty participating fully in daily activities. The specific questions that were asked were listed above. It should be noted that none of the individual questions have been tested to determine if they accurately identify a sub-category of people with disabilities, and therefore should not be used for this purpose. In addition, the disability test results from the CPS are test findings and should not be considered official BLS estimates of the disabled population, or a substitute for existing disability measures.

To be classified as disabled in our analysis, an individual had to be identified as having difficulty hearing, or difficulty seeing or have answered "Yes" to at least two of the other questions. As was described in the previous section, this algorithm was developed based on the answers to these questions when they were included in the NCS along with the more extensive information collected in the NCS. The algorithm is designed solely to determine whether an individual has a disability or not. The following analysis includes both a comparison of disability rates for various demographic groups as found in the CPS and the NCS, and an exploration within the CPS of the

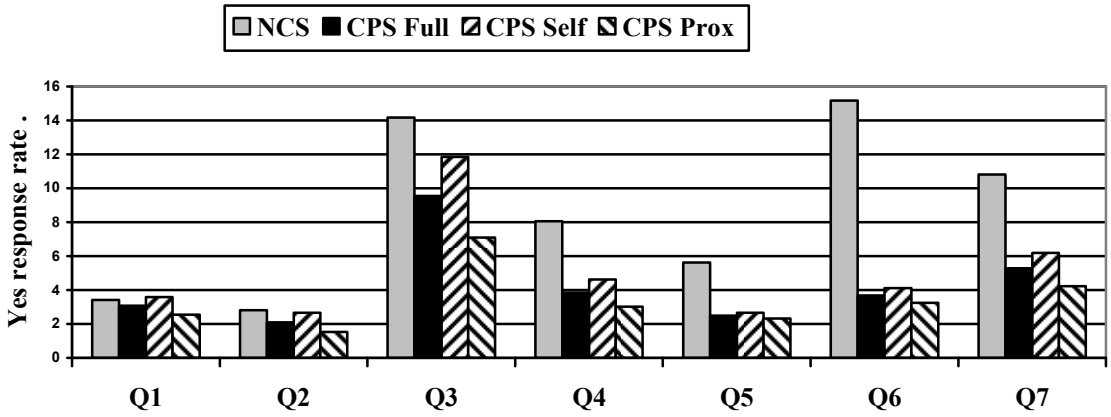
responses to each specific question.[5] The CPS estimates were restricted to those age 18 and older, since the NCS data did not include those under the age of 18.

Figure 1. "Yes" Response Rate by Question and Disability (missing excluded)



This figure presents the overall disability rate from the CPS compared to that from the NCS, as well as the "yes" rate for each of the individual questions. The Disability rate for CPS was lower than NCS (10.0% versus 17.6%). These rates were derived using the restrictive disability classification algorithm described above. The "yes" response rate was lower in the CPS than in the NCS for each of the seven questions as well. However, the largest differences occurred for Questions 6 and 7. Question 6 asks about a condition lasting 3 months or longer that caused difficulties learning, remember, or concentrating. Question 7 asks about a condition lasting 3 months or longer that caused difficulty participating fully in school, housework or other daily activities. In the NCS, 15.2% of respondents had a "yes" recorded for question 6, compared to only 3.7% in the CPS. For question 7, 10.8% of NCS respondents provided an answer of "yes" compared to 5.3% of CPS respondents. The proportions of respondents with "yes" recorded to Questions 1 and 2 were relatively close for both the CPS and the NCS, although the proportion of "yes" responses for these two questions was still lower in the CPS than in the NCS. Note that those persons whose disability status could not be determined were classified as "missing" and excluded from the analysis presented in this graph.

Figure 2. "Yes" Response Rate by Question and Disability with CPS Self and Proxy (missing excluded)



[5] A full discussion of the results of the February CPS test, along with extensive data tables, is available online at: http://www.bls.gov/ore/pdf/ec060080.pdf

This figure augments the information in Figure 1, by also including a "yes" rate for CPS respondents who were a self reporter, and a "yes" rate for those whose answers were obtained by proxy response. We conducted this additional analysis because all of the NCS data was self reported. In general, the self reporters in the CPS had a slightly higher overall disability rate and "yes" rates to the individual questions than the proxy respondents. Even when the CPS estimates were restricted to those who reported for themselves, the pattern of a lower disability rate and "yes" responses to the individual questions in the CPS compared to the NCS persisted, however.

Table 1. Disability Rates and CPS Nonresponse Rates for Disability (population age 18+)

	Disability Rates				**Disability Nonresponse Rate**	
	CPS		NCS	Difference	CPS	
	Rate	90% Confidence Interval	Rate	NCS - CPS	Rate	90% Confidence Interval
Age						
18+	10	9.67, 10.33	17.58	-7.58	6.43	6.04, 6.81
18-34	3.92	3.57, 4.27	9.45	-5.53	6.21	5.65, 6.77
35-49	6.24	5.79, 6.70	14.98	-8.74	6.44	5.89, 7.00
50-64	11.72	11.02, 12.42	22.9	-11.18	6.42	5.77, 7.07
65+	25.65	24.64, 26.65	29.78	-4.13	6.9	6.02, 7.58
Gender						
Men	9.86	9.44, 10.27	14.75	-4.89	6.45	6.01, 6.89
Women	10.14	9.70, 10.57	20	-9.86	6.4	5.99, 6.82
Race/Ethnicity						
Hispanic	6.87	6.13, 7.62	15.77	-8.9	7.09	5.97, 8.21
White Non Hispanic	10.52	10.12, 10.92	18.62	-8.1	6.02	5.59, 6.45
Black Non Hispanic	11.37	10.16, 12.57	14.43	-3.06	8.81	7.38, 10.24
Other Non Hispanic	8.28	7.11, 9.44	13.68	-5.4	5.44	4.14, 6.75
Month in Sample						
MIS 1	10.4	9.60, 11.19	-	-	4.1	3.43, 4.78
MIS 2	10.5	9.55, 11.46	-	-	4.91	4.19, 5.63
MIS 3	9.3	8.52, 10.09	-	-	7.04	6.04, 8.04
MIS 5	10.21	9.30, 11.11	-	-	6.76	5.68, 7.84
MIS 6	9.34	8.46, 10.22	-	-	6.3	5.45, 7.15
MIS 7	10.28	9.39, 11.16	-	-	9.54	8.28, 10.81

This table presents disability rates by demographics for the CPS and the NCS, as well as Month in Sample status for the CPS (recall that month-in-sample 4 and 8 were not included in the disability test). In addition, the CPS disability nonresponse rate in February 2006 is presented. The CPS disability rate is lower than the NCS rate for every demographic group. The CPS disability rates were strikingly lower than the NCS rates for Women, Hispanics and those 18-34 years old. In each of these groups, the CPS disability rate was less than half of the NCS rate.

In the CPS, households in Month in Sample 1 and 5 are typically interviewed in person at their homes, whereas households in other Months in Sample are typically interviewed over the phone. To ascertain whether there were differences in responses to the disability questions depending on the type of interview and to control for potential conditioning effects that could arise through the repeated interviewing of households, disability rates were estimated for the CPS by Month in Sample status. Based on the results reported in Table 2 for the CPS, there were no discernable differences in disability rates by mode of data collection or the number of times a household has been previously interviewed.

Table 2. Labor force status by age, sex, race, ethnicity and disability status (missing excluded).

Characteristic	Disability status		Unemployment rate		Employment to Population Ratio		Labor Force Participation Rate	
	Disabled	Not Disabled	Disabled	Not Disabled	Disabled	Not Disabled	Disabled	Not Disabled
Age								
18+	10.00	83.57	10.50	4.74	21.43	69.00	23.94	72.43
18-34	3.92	89.87	16.03	7.20	38.12	73.34	45.39	79.04
35-49	6.24	87.32	9.32	3.60	35.37	84.15	39.01	87.29
50-64	11.72	81.86	8.92	3.21	29.10	73.43	31.95	75.87
65+	25.65	67.45	7.50	2.30	5.47	16.26	5.92	16.65
Gender								
Men	9.86	83.69	12.16	5.04	25.43	76.63	28.95	80.70
Women	10.14	83.46	8.27	4.39	17.83	61.91	19.44	64.75
Race and Ethnicity								
Hispanic	6.87	86.04	8.48	6.68	29.41	68.90	32.13	73.83
White Non Hispanic	10.52	83.46	8.46	3.76	22.39	69.59	24.46	72.31
Black Non Hispanic	11.37	85.57	23.21	8.65	11.95	66.06	15.56	72.32
Other Non Hispanic	8.28	86.28	25.24	4.88	16.92	67.62	22.64	71.09

This table presents unemployment rates, employment-to-population ratios, and labor force participation rates for those who were classified as disabled and not disabled in the CPS. Respondents' labor force statuses were generated using standard CPS procedures. For each of the labor force rates and ratios, 90% confidence intervals were computed using the method of generalized replication which is briefly discussed in the next section. We only present labor force classifications for the CPS sample, since the labor force classification measure of NCS was not directly comparable to that in the CPS. In all cases, the unemployment rates for the disabled population are higher than for the non disabled. For example, among those who were 18 years of age or older, the unemployment rate for those who had a disability was 10.5% compared to 4.7% for those who were did not have a disability. The employment-population ratios for the disabled population were much lower than the ratios for the non disabled. For example, among those who were 18 years of age or older, the employment-population ratio for those who were disabled was only 21.4% compared to 69.0% for those who were not disabled. Finally, the labor force participation rates for the disabled population were consistently lower than the non disabled. Only 23.9% of those 18 or older who had a disability participated in the labor market compared to 72.4% of those 18 or older who were not disabled.

Table 3. Comparison of Alternative Disability Algorithm (population age 18+).

	Original Disability Algorithm			Alternative Disability Algorithm (Any Question = Yes)		
	CPS		NCS	CPS		NCS
	Estimate	Std. Error	Estimate	Estimate	Std. Error	Estimate
Age						
18+	10.00	0.20	17.58	15.92	0.26	30.27
18-34	3.92	0.22	9.45	6.57	0.29	20.65
35-49	6.24	0.28	14.98	10.06	0.36	25.23
50-64	11.72	0.43	22.90	19.49	0.54	34.00
65+	25.65	0.61	29.78	38.71	0.71	51.59
Gender						
Men	9.86	0.25	14.75	15.32	0.31	25.26
Women	10.14	0.27	20.00	16.47	0.33	34.53
Race/Ethnicity						
Hispanic	6.87	0.45	15.77	11.17	0.57	31.53
White Non Hispanic	10.52	0.24	18.62	16.74	0.30	31.60
Black Non Hispanic	11.37	0.73	14.43	18.57	0.84	23.38
Other Non Hispanic	8.28	0.71	13.68	11.99	0.75	25.34

This table presents a comparison of our disability algorithm (labeled "original" in the table) with an alternative algorithm which would classify someone as disabled if they answered "yes" to *any* question, by demographic groups. Note that the CPS rates remain smaller than those from NCS even under the alternative algorithm. Also note that the alternative algorithm yields much higher disability rates than the "original" algorithm.

4. Technical Details on the Construction of the CPS Estimates, and Comparisons to NCS Estimates

Weighting and Estimation for the CPS Disability Analysis

Second-stage weights for February were used in the analysis of the CPS disability data. For more details on second-stage weights, see Technical Paper 63RV: Current Population Survey – Design and Methodology, available online at http://www.bls.gov/cps/home.htm. No special non-response adjustment (for disability) was done other than that which is done for the basic CPS.

Variance Estimation for the CPS Disability Analysis

Second-stage replicates (160 replicates) were used for variance estimation.

Comparisons between the CPS and the NCS

At the time of the analyses, stratum or SECU (Standard Error Computing Unit) information was not available for the NCS. This information was necessary in order to construct estimates of variances for the NCS estimates which would have correctly reflected the complex nature of the NCS sample design. It is very likely that the NCS estimates presented in this analysis have much larger variances than the associated CPS estimates, because the CPS has a much larger sample size. While it is tempting to use the 90% confidence interval presented for the CPS estimates and see if the NCS falls within that interval, doing so will not yield a valid 10% hypothesis test (for example) of whether the CPS and NCS estimates are significantly different. A truly valid comparison of such differences would require an estimate of the variance of the NCS estimate as well as the CPS estimates.