

## Reliability of Survey Data in Forensic Settings

What data can and cannot tell us about disability, labor force participation and wages

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Joy, J. (2017) The reliability and validity of the six-question disability measure in the Current Population Survey: What the data can and cannot tell us about disability and labor force participation. Virginia Commonwealth University, Richmond.

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## Data sources: common types

- Census Bureau
  - American Community Survey (Census)
  - Current Population Survey (BLS)
  - National Health Information Survey (NHIS)
- Bureau of Labor Statistics
  - Occupational Employment Survey (OES)
  - Employer Cost for Employee Compensation
- Administrative Data
  - Social Security Administration
  - Department of Justice: EEOC & ADA claims
  - ADP: Largest publisher of private payroll

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## Disability Data: Counting Persons with Disabilities

- Non-Forensic
  - United States, state and county governments (i.e. 1 in 5 or 51 million)
- Researchers
  - Related to government-funded research
  - Treatment advances
  - Education
  - For-profit uses
- Forensic
  - Work Life Expectancy Models
  - Labor Force Participation
  - Earnings by Educational Attainment

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### Literature Review

- Most disability statistics are based upon responses from a single survey administration (Erickson, 2012; Burkhauser, Houtenville, 2006).
  - May overestimate the incidence of disability by including persons with short-term impairments
- Research by Burkhauser and Daly (1996) and Burkhauser and Wittenburg (1996) excluded individuals whose health conditions were short-term as evidenced by an affirmative response on only one survey administration.
- The Social Security's definition of disability also has long established that a period of one year as a demarcation between short-term and long-term health conditions.
- Considerable debate over uses and misuse of disability data in Forensic settings (Clecka, J., & Skoog, G., 2001; Ireland, 2006; McNeil, 2000; Gamboa, A., Gibson, D, 2010).

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### Current Population Survey

- In March of every year, the Census Bureau supplements the basic monthly survey with additional survey questions. This is known as the Annual Social and Economic Supplement (more commonly known as the March Supplement) to the CPS.
- The March Supplement is a survey of approximately 200,000 non-institutionalized civilians. It is an expanded survey administered to all households in the panel.

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### Cognitive Model of Survey Response

- Developed by Roger Tourangeau in 1984
- Serves as a theoretical framework of how people respond to survey questions
- Used widely in health survey research (Johnson, 2015)
- Formal studies of test item-response for new survey questions prior to widespread implementation (Brault, Stern, Raglin, 2007; US Census, 2006; Wittenburg and Nelson, 2006).

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### How People Answer Health-Status Questions

- Self-assessed health status data is strongly correlated with objective findings by medical and rehabilitation providers (Nagi. 1969); Maddox and Douglas,1973; LaRue et al.,1979)
- Disability is a social construct and the result of and interaction with complex social-economic characteristics (Haber and Smith 1971; Oliver 1990).

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### Cognitive Model of Survey Response

- Step I:** Comprehension: occurs when the survey respondent understands the question by identifying the key concepts and determining what the surveyor is asking.
- Step II:** Retrieval step by recalling the relevant information from memory. A question elicits either a very narrow or broad collection of memories.
- Step III:** Judgment occurs when the survey respondent formulates an answer based on the comprehension and retrieval of the information.
- Step IV:** Response step: the respondent expresses the answer in the best way they can.

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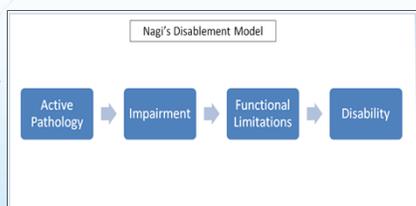
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### Nagi's Disablement Model



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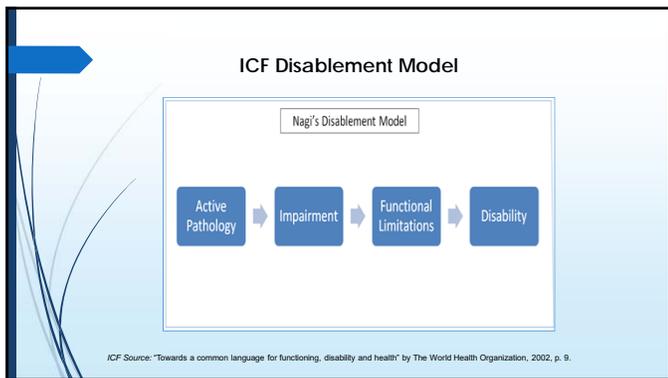
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- ### 6 Disability Questions
- Surveyor asks "This month we want to learn about people who have physical, mental, or emotional conditions that cause serious difficulty with their daily activities. Please answer for household members who are 16 years old or over."
- Is anyone deaf or does anyone have serious difficulty hearing?
  - Is anyone blind or does anyone have serious difficulty seeing even when wearing glasses?
  - Because of a physical, mental, or emotional condition, does anyone have serious difficulty concentrating, remembering, or making decisions?
  - Does anyone have serious difficulty walking or climbing stairs?
  - Does anyone have difficulty dressing or bathing?
  - Because of a physical, mental, or emotional condition, does anyone have difficulty doing errands alone such as visiting a doctor's office or shopping?

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- ### Research Question One:
- **Research Question 1:** Are individuals' responses to the new CPS disability questions stable over time?
    - **Hypothesis 1:** Individuals' responses to the new CPS disability questions are stable over time.

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**Research Question Two:**

- **Research Question 2:** Is there a significant difference in the reliability of individuals' responses to the CPS disability questions among those with sensory, cognitive and physical impairments?
  - **Hypothesis 2:** There is a significant difference in the reliability of individuals' responses to the CPS disability questions among those with sensory, cognitive and physical impairments.

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**Research Question Three:**

- **Research Question 3:** Is there a statistically significant relationship between individuals' responses to the CPS disability questions and their employment status (and/or labor force participation status)?
  - **Hypothesis 3:** There is a statistically significant relationship between individuals' responses to the CPS disability questions and their employment status.

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**Research Question Four:**

- **Research Question 4:** Does knowledge of the full set of employment status (or labor force participation status) predictors (e.g. age, sex, educational attainment, race, ethnicity, marital status, and disability) make a difference in predicting employment status over time?
  - **Hypothesis 4:** Knowledge of the full set of employment status predictors does make a difference in predicting employment status over time.

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### Research Question Five:

- **Research Question 5:** After controlling for contextual factors (demographic characteristics), does type of disability further contribute to the prediction of labor force participation status among survey respondents?
  - **Hypothesis 5:** After controlling for contextual factors, type of disability does further contribute to the prediction of labor force participation status among respondents.

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### CPS Panel Rotation Example

	2013												2014			
Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Month-in-Sample	1	2	3	4	CFP	5	6	7	8							

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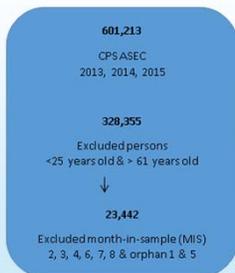
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### Survey sample




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### Demographics: Age

AGE BY GROUP	FREQUENCY	PERCENT
25-34	2909	24.8
35-44	3119	27.6
45-54	3391	28.9
55-61	2191	18.7
TOTAL	11721	100.0

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### Demographics: Race

RACE	FREQUENCY	PERCENT
WHITE	7043	60.1
BLACK	1098	9.4
HISPANIC	2578	22.0
ASIAN	675	5.8
OTHER	328	2.8
TOTAL	11721	100.0

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### Demographics: Marital Status

MARRIAGE STATUS	FREQUENCY	PERCENT
NOT MARRIED	4144	35.4
MARRIED	7577	64.6
TOTAL	11721	100.0

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### Educational Attainment

EDUCATION	FREQUENCY	PERCENT
LESS THAN HIGH SCHOOL	1153	9.8
HIGH SCHOOL	3300	28.2
SOME COLLEGE	3189	27.2
BACHELORS	2589	22.1
GRADUATE	1490	12.7
TOTAL	11721	100.0

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### Demographics: Wages

WAGE BY GROUP	FREQUENCY	PERCENT
LESS THAN \$10,000	3655	31.2
\$10,001-\$25,000	1992	17.0
\$25,001-\$50,000	2991	25.5
\$50,001-\$99,999	2128	18.2
OVER \$100,000	955	8.1
TOTAL	11721	100.0

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### Demographics: Part-time vs. Full-time Work

		Work MIS 5			
			Part time	Full time	Total
Work MIS 1	Part time	Count	366	310	676
		% of total	5.2%	4.4%	9.5%
	Full time	Count	329	6088	6417
		% of total	4.6%	85.8%	90.5%
Total		Count	695	6398	7093
		% of Total	9.8%	90.2%	100%

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### Research Question 1: Key Findings

- Hypothesis 1:** Individuals' responses to the new CPS disability questions are stable over time.
- This study first conducted a test-retest reliability analysis using the Kappa correlation coefficient as the measure of the degree of reliability.
- Physical disability as well as having any disability had the strongest Kappa correlations at .523 and .535 respectively.
  - Difficulty hearing, mobility, remembering, and self-care all had moderate positive Kappa findings.
  - Vision had the weakest positive Kappa of .288.

DISABILITY TYPE	KAPPA	STRENGTH
DIFFEAS	.407	Moderate
DIFFEYE	.288	Fair
DIFFREM	.415	Moderate
DIFFPHYS	.523	Moderate
DIFFMOB	.475	Moderate
DIFFCARE	.400	Fair
DIFFANY	.535	Moderate

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### Research Question 2: Key Findings

**Stability of Disability Responses over Time (12-months)**

Hypothesis II: There is a significant difference in the reliability of individuals' responses to the CPS disability questions among those with sensory, cognitive and physical impairments.

- This analysis tested the difference between independent Kappa correlations.

Level of Stability	
Most Stable	DIFFPHYS
	DIFFMOB
	DIFFCARE, DIFFEAR, DIFFREM
Least Stable	DIFFEYE

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### Research Question Three: Key Findings

- Hypothesis 3:** There is a statistically significant relationship between individuals' responses to the CPS disability questions and their employment status.
- A general estimation equation (GEE) utilized a logistic model with a binomial link function.
- The hypothesis was tested for two levels of labor force participation—employed and unemployed. The null hypothesis was that there is no relationship between functional impairment and employment status.

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### Research Question Four: Key Findings

- A general estimation equation (GEE) using a logistic model with a binomial link function was used.
- This hypothesis was tested in the same manner as research question three
- However, the demographic variables were added in order to determine the impact of these characteristics upon employment.

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### RQ3: Disability Type and Employment

- **Hearing.** The analysis of hearing difficulties on employment status indicated that the odds of not working were 31.9% greater for persons with a hearing disability than those without a disability.
- **Seeing.** The analysis of vision difficulties on employment status indicated that the odds of not working were 57.6% greater for persons with a vision difficulty than those without a disability.
- **Remembering.** The analysis of cognitive difficulties on employment status presents an even less encouraging picture than found with sensory disabilities. Compared to persons without disabilities, the odds of not working were 80.7 % greater for persons with a cognitive difficulty.
- **Physical.** The analysis of physical difficulties on employment status indicated that the odds of not working were 86.0 % greater for persons with a physical difficulty than those without a disability.
- **Mobility.** The analysis of mobility difficulties on employment status indicated that the odds of not working were about 94% more likely for respondents with this disability type than those without a disability.
- **Self-care.** The analysis of self-care difficulties on employment status indicated that the odds of not working were 92.4% greater for persons experiencing a self-care difficulty than those without a disability.

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### Confidence Intervals

DISABILITY TYPE	CONFIDENCE INTERVAL	RELATIVE STRENGTH
HEARING	1.235-1.415	Weaker
SEEING	1.451-1.704	Weaker
REMEMBERING	1.728-1.878	Stronger
PHYSICAL	1.806-1.917	Stronger
MOBILITY	1.882-2.005	Stronger
Self-Care	1.847-2.005	Stronger

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## Research Question Four: Key Findings

- Hypothesis 4: Knowledge of the full set of employment status predictors does make a difference in predicting employment status over time of CPS respondents.
- This hypothesis was tested in the same manner as research question three; however, the demographic variables were tested in order to determine the impact of these characteristics upon employment.

	Dependent Variable: Employment Status	
	Coefficient	Standard Error
Sex (male)	.824***	.0452
Race (other)	-.314***	.131
Race (Black)	-.294***	.073
Race (Hispanic)	-.003	.058
Race (Asian)	-.163	.099
Marriage Status (not married)	-.228***	.0461
Education (less than high school)	-.648***	.0741
Education (some college)	.419***	.0572
Education (Bachelor)	.824***	.0655
Education (Graduate)	1.110***	.0849
Age	-.013***	.0022

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## Research Question Five: Key Findings

Hypothesis 5: After controlling for demographic factors, the type of functional impairment does further contribute to the prediction of labor force participation status of CPS respondents.

- Research Question five built upon question four with use of CEE but also added in the set of disability questions to the model. Demographics (sex, education, race) overall had a much lower impact on the probability of employment than most disability types.

- For example:
  - Being male had .887 probability of employment
  - Having a physical disability reduced probability of employment by just over 200% (-2.132)

	Independent Variable: Employment Status	
	Coefficient	Standard Error
Sex (male)	.887	.067
Race (Black)	-.334	.0746
Race (Hispanic)	-.130	.0592
Race (Asian)	-.252	.0997
Race (Other)	-.262	.1380
Marriage Status (not married)	-.046	.0480
Education (less than high school)	-.628	.0766
Education (some college)	.366	.0594
Education (Bachelor)	.681	.0671
Education (Graduate)	.958	.0867
Age	-.005**	.0023
Hearing	-.155	.1948
Eye	-.336***	.2711
RemotelySighted	3.926***	.1575
Physical	-2.132***	.1288
Blindness	1.926***	.2616
Self-Care	-.389	.2887

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## Summary of Findings

- The six disability questions can generally be regarded as reliable over two survey administrations
- Some disability types are more stable than others (self-care vs. hearing)
- One year period: a reasonable demarcation between impairment and disability
- Lack of specificity in disability types will always require the application of clinical judgement (N=1 v. mean)
- Will not solve the debate over uses and misuses of disability data in forensic settings

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