Published in final edited form as:

Disabil Health J. 2013 October ; 6(4): 280–286. doi:10.1016/j.dhjo.2013.04.006.

Disparities in chronic conditions and health status by type of disability

Willi Horner-Johnson, PhD¹, Konrad Dobbertin, MPH¹, Jae Chul Lee, PhD², Elena M. Andresen, PhD¹, and the Expert Panel on Disability and Health Disparities³

¹Institute on Development & Disability, Oregon Health & Science University

²Rehabilitation Medicine Department, Clinical Research Center, National Institutes of Health

³The members of the Expert Panel are: Charles E. Drum, JD, PhD; Glenn T. Fujiura, PhD; Lisa I. Iezzoni, MD, MSc; Gloria L. Krahn, PhD, MPH; and Jana J. Peterson-Besse, MPH, PhD.

Abstract

Background—Prior research has established health disparities between people with and without disabilities. However, disparities within the disability population, such as those related to type of disability, have been much less studied.

Objective—To examine differences in chronic conditions and health status between subgroups of people with different types of disability.

Methods—We analyzed Medical Expenditure Panel Survey annual data files from 2002–2008. Logistic regression analyses considered disparity from three perspectives: 1) basic differences, unadjusted for other factors; 2) controlling for key demographic and health covariates; and 3) controlling for a larger set of demographic variables and socioeconomic status as well as health and access to healthcare.

Results—Individuals with vision, physical, cognitive, or multiple disability types fared worse than people with hearing impairment on most health outcomes. This was most consistently true for people with multiple disabilities. Even when all covariates were accounted for, people with multiple types of disability were significantly more likely ($p < 0.05$) than those with hearing impairment (reference group) to report every poor health outcome with the exception of BMI 25 and lung disease.

Conclusions—While many of the differences between disability types were reduced when controlling for other factors, some differences remained significant. This argues for a more individualized approach to understanding and preventing chronic conditions and poor health in specific disability groups.

Keywords

People with disabilities; health status disparities; chronic conditions; adult; population surveillance

© 2013 Elsevier Inc. All rights reserved.

Corresponding author Willi Horner-Johnson, PhD 707 SW Gaines Street Portland, OR 97239 Phone: 503-494-9273 hornerjo@ohsu.edu.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

A portion of the findings reported here were presented at the 140th annual meeting of the American Public Health Association, Oct. 27–31, San Francisco, CA.

Introduction

Public health research has a long history of illuminating health disparities impacting various population groups. Much of the research has focused on race, ethnicity, or socioeconomic status, but studies have also examined disparities related to characteristics such as gender, sexual orientation, and rural residence.¹⁻³ There is gathering momentum within the disability and health field to build broader recognition of people with disabilities as another population experiencing health disparities. Although recent conceptualizations of disability and health⁴ recognize that people with disabilities can enjoy good health, research indicates that they are more likely to experience poor health than people without disabilities. For example, obesity, oral disease, diabetes, depression, and anxiety are highly prevalent among people with disabilities.⁵⁻⁸ People with disabilities are also much more likely than those without disabilities to rate their health as fair or poor.^{9, 10} In fact, some public health agencies already report on health and healthcare disparities between people with and without disabilities, confirming overall disparity.¹¹

As the population of people with disabilities continues to grow¹² and gain attention as a public health priority group, there is an increasing need for research on the specific aspects of health disparities *within* this population. The general disparity patterns described above are apparent despite the broad range of variation within the disability population. However, health may differ considerably among people with disabilities in relation to other factors such as age, race, or type of disability. Yet, there is limited research examining health differences between subgroups of people with disabilities. A recent literature review found 17 studies of health outcomes (e.g. cardiovascular disease, injury) reporting results by disability type. Of these, only five used population-based data, and just one of that subset compared multiple different categories of functional disability.¹³ More research is clearly warranted in order to identify disability groups most in need of health interventions and inform the types of interventions to apply.

The present study was designed to help build the evidence base regarding health disparities within the population of people with disabilities. The purpose was to: 1) provide population-level estimates on the prevalence of various chronic conditions and perceived fair or poor mental and physical health among adults with different types of disabilities, and 2) examine the impact of controlling for demographic, health, and socioeconomic covariates when analyzing the association between disability type and health outcome variables. The study was guided by the Expert Panel on Disability and Health Disparities, a national advisory group convened specifically for this project. The Expert Panel provided extensive experience in disability, epidemiology, medicine, and public health.

Methods

Data Source

We combined 2002-2008 full-year consolidated files from the Medical Expenditure Panel Survey (MEPS) Household Component (HC) to create our data set. The Agency for Healthcare Research and Quality (AHRQ) conducts the MEPS to collect data concerning demographics, healthcare utilization, quality of care, healthcare expenditures, sources of payment, and health insurance. Each year a new panel of sample households is selected for the HC from the previous year's National Health Interview Survey (NHIS) sample using an overlapping panel design.^{14, 15} For each panel, information is gathered through five in-person interviews providing data over a two year period. The MEPS uses multistage stratified sampling to provide a nationally representative sample of the U.S. civilian non-institutionalized population. The MEPS over-samples Hispanics, African Americans,

Asians, and low-income persons to increase the precision of estimates for these groups. AHRQ creates full-year consolidated files that include data from two consecutive panels, weighted to provide annualized U.S. population estimates. Response rates for the years we analyzed ranged from 56.9% (2007) to 64.7% (2002).¹⁶

Sample

Our analyses focused specifically on working-age (18-64 years) adults with disabilities. We decided to limit our analyses to this age group because health and healthcare access issues change substantially for adults age 65 and older, most of whom are on Medicare. We defined disability based on categories of basic actions difficulty described by Altman & Bernstein.¹⁷ These categories included limitations in physical functions (e.g. walking, lifting), cognition (e.g. memory, decision-making), vision, or hearing. These groupings mirror broad functional categories described in the International Classification of Functioning, Disability and Health (ICF).⁴ The MEPS interview has a series of items assessing level of difficulty with each of the above functions; we included people with any reported degree of difficulty other than “none”.

Measures

Dependent Variables—The Expert Panel selected key chronic health conditions addressed in Healthy People 2020.¹⁸ These included whether individuals had ever been diagnosed with arthritis, cardiovascular disease, diabetes, stroke, or lung disease (yes or no to each). We also examined body mass index (BMI: 18.5 to <25 versus ≥25) and perceived physical health and perceived mental health (excellent/very good/good versus fair/poor). Dependent variables were based on interviewee responses to questions about each diagnosis as well as perceived health. BMI was based on interviewee-reported height and weight.

Primary Independent Variable—The multiple items used to identify difficulties in basic actions (see *Sample* above) were recoded into a single variable reflecting type of disability. The categories were: 1) hearing impairment only; 2) vision impairment only; 3) limitation in physical function only; 4) cognitive limitation only; 5) more than one type of impairment or limitation.

Covariates—We used an iterative regression model building process, with core covariates included in partially adjusted models and a more extensive set of covariates added in expanded models. We defined covariates as those that were associated with health outcomes and disability type, but not variables that were proxies for either exposure or outcome to avoid over-adjusting our models. A test of collinearity among model covariates revealed that all correlations were $r < 0.5$.

Core covariates in the partially adjusted models included race/ethnicity (non-Hispanic White, non-Hispanic Black, non-Hispanic American/Indian/Alaskan Native, non-Hispanic Asian/Native Hawaiian/Pacific Islander, non-Hispanic multiple races, or Hispanic), gender, and age (18-29, 30-39, 40-49, 50-59, 60-64). These variables were included given their known association with health disparities in the general population.^{19, 20} Health outcome variables served as additional covariates when modeling other health outcomes, to help us disentangle disparities specifically attributable to disability type. For example, when perceived physical health status was the dependent variable, perceived mental health status and chronic conditions were covariates. We also controlled for body mass index (18.5 to <25, 25 to <30, 30 to <40, and 40 or higher) as a health covariate. To control for variations in limitations within disability type, the Expert Panel recommended adjusting for presence of complex activity limitation (yes or no). Complex activity limitations are defined as restrictions in the ability to fully participate in activities such as work, housework, and self-

care tasks. We identified such limitations using responses to questions about need for assistance with activities of daily living, and limitations in work, housework, social, or recreational activities.¹⁷

In addition to the covariates above, expanded models controlled for marital status (married; widowed, divorced or separated; or never married), region of the U.S. (Northeast, Midwest, South, or West), residence in a metropolitan statistical area (MSA: yes or no), language spoken most in the home (English or other), education (bachelor's, master's, or doctorate; other degree; General Educational Development (GED)/high school diploma; or no degree), family income as percent of Federal Poverty Line (<400%, 200 to <400%, 125 to <200%, 100 to <125%, <100%), and employment status (employed or not employed). We also included two healthcare access variables as covariates in expanded models. First, we used data on sources of healthcare coverage during each month to categorize presence and type of health insurance as: 1) privately insured all year; 2) publicly insured all year; 3) uninsured part of the year and either privately or publicly insured the remainder; and 4) uninsured all year. Second, we assessed presence of a usual source of medical care other than an emergency room (yes/no).

Data Analysis

We performed logistic regression using Stata version 12.0²¹ to account for the complex survey design of MEPS. Taylor Series Linearization was used for variance estimation.²² Although we calculated estimates for a subpopulation of adults with disabilities from the overall 2002-2008 MEPS sample, the entire sample was used to calculate standard errors, thus retaining the nationally representative nature of the data.²³ Restricting our analyses to a subpopulation of adults with disabilities resulted in several strata with a single primary sampling unit (also known as singleton strata) and, consequently, no variance. Therefore, we used the average variance from all other strata (scaled variance) and applied it to the singleton strata. Using the mean variance of other strata for the singletons ensures that observations within singleton strata are retained for calculation of accurate estimates, while simultaneously not pushing the overall variance away from the mean.²³ In all models, hearing limitation served as the reference group to which other disability types were compared because our preliminary analyses indicated that this group had more positive perceived health. A p-value of <0.05 was used as the cutoff for statistical significance.

Results

Out of 228,365 individuals included in the MEPS for the years 2002 through 2008 there were 133,368 who were of working-age (18-64 years), of which 26,451 were people with disabilities (see Figure 1). We excluded the small number of individuals who were insured all year long but part of the time was private insurance and part was public insurance (n=305). These individuals could not be combined with any of the other insurance type subgroups as exploratory analyses indicated that they did not follow patterns similar to the other subgroups. We further excluded individuals with a BMI <18.5 (n=438) due to the comparatively small size of this subgroup. Finally, after excluding all individuals with missing data on the variables of interest (n=1,334) we had an analytic sample of 24,374 working-age adults with disabilities. The majority of the sample was non-Hispanic White, married, living in an MSA, and high school educated (see Table 1).

Health characteristics of the sample are shown in Table 2. A BMI ≥25 was the most common health issue, while a history of stroke was the least common. Health outcomes were not distributed evenly across disability types; in general a higher proportion of individuals with more than one type of limitation reported most of our measured health outcomes. Within the multiple disability group, 78.9% had two types of limitations, 17.4%

had three types, and 3.4% had four limitation types. The vast majority (89.2%) of individuals with multiple disabilities had a physical disability in addition to one or more other disability types (cognitive, hearing, and/or vision). The most common combination of disabilities was physical and cognitive.

Table 3 presents results of the regression analyses. Across all three models, people with vision limitations were significantly less likely than the hearing impairment reference group to have arthritis or to have a BMI ≥ 25 . The vision limitation group was more likely to have diabetes, but this was only significant in the expanded model. In the crude model, people with vision limitations were more likely to have fair/poor mental health, but this was no longer statistically significant when controlling for covariates in the partially adjusted and expanded models.

People with cognitive disabilities were less likely to have arthritis in unadjusted analyses, and did not differ significantly from the reference group in partially adjusted and expanded models. This group was less likely to have BMI ≥ 25 in both crude and partially adjusted models. With the addition of the expanded set of covariates, the association with BMI was no longer statistically significant. In all three models, the cognitive limitation group had significantly elevated odds of stroke and fair/poor mental health. They also had higher odds of fair/poor physical health in the crude model, but this effect was fully accounted for by the covariates in the partially adjusted and expanded models.

In unadjusted models, people with physical disabilities and those with multiple disabilities fared statistically significantly worse than the reference group on all health outcomes. For people with physical disabilities only, all but two of these associations ceased to be significant when covariates were added. The exceptions were arthritis and perceived physical health. However, for people with multiple disabilities, most associations remained significant in the partially adjusted and expanded models (see Table 3).

Discussion

Across the health outcomes we evaluated, the number of statistically significant associations decreased as more covariates were added to the models. The magnitude of the odds ratios also generally diminished as we accounted for more covariates. For some associations, such as that between cognitive limitations and mental health status, the attenuation was substantial. These trends were anticipated and confirm that there is a confounding effect by covariates on the health outcomes we evaluated. In other words, some portion of each association we observed in crude models was attributable in part to covariates which we controlled for in subsequent models. The implications for health disparities research are obvious: whether or not one determines there are disparities depends on how disparity is defined. If any difference between groups is considered a health disparity, there is evidence of ample disparities related to type of disability. If, however, disparity is defined as differences remaining after controlling for other factors that could explain the difference, fewer disparities were apparent between subgroups of people with disabilities based on disability type.

In an effort to uncover disparities specifically attributable to disability type, we took a conservative approach and controlled for other health problems when examining each of our outcome variables in adjusted models. This approach may raise concerns about over-adjustment, particularly given the strong association of cognitive disability with poor perceived mental health and of physical disability with poor perceived physical health. We therefore conducted sensitivity analyses (results available from authors) in which we did not control for perceived health status. Odds ratios for differences related to disability type

increased somewhat, but not dramatically, in these analyses. The changes did not materially affect the interpretations we report here, and overall patterns of findings remained consistent.

In addition to definitional issues, understanding disparity is complicated by possible variations in the directionality of the relationships in this study. While in some cases health problems may be the cause of disability, chronic conditions and other poor health outcomes also occur as secondary and preventable conditions among those with previously existing disabilities.²⁴ For example, while arthritis may itself cause mobility limitations, people with pre-existing mobility limitations also appear to be at increased risk of developing arthritis due to greater strain on limbs not impacted by the primary disability.²⁵

There were relatively few statistically significant differences between people with vision limitations and the hearing limitation reference group. The most consistent differences were lower odds of arthritis and of overweight/obesity in the vision limitation group. People with cognitive disabilities also had somewhat less risk of arthritis and high BMI, but were more likely to have had a stroke, and much more likely to have fair/poor mental health. Even in the expanded model, the effect of cognitive limitations on the odds of fair or poor mental health was quite high (OR=5.03, $p<0.01$); indeed this was the strongest association observed in the expanded models. This finding may reflect challenges in measuring mental health in a way that is distinct from symptoms of cognitive conditions. In other words, an individual identified as having cognitive limitations because of difficulty with decision-making or memory may perceive his or her mental health to be poor for the same reasons. A similar conundrum has been noted previously for people with mental health disabilities.²⁶ Alternatively, people with cognitive limitations may be more likely to experience other mental health issues such as depression and anxiety.²⁷

Significant disparities were apparent across all dependent variables for people with physical disabilities only and for people with multiple disabilities (most of whom had a physical disability). Physical disability may place individuals at greater risk for developing chronic conditions and poor health. However, at least some of the physical limitations experienced by individuals in these groups may actually have been due to the chronic conditions studied. In the case of people who only had physical disability, the relationship to poor health outcomes was attenuated by controlling for covariates. This was not the case, though, for people with multiple disabilities. In both the partially adjusted and expanded models, people with multiple disabilities continued to have elevated odds for a greater number of health problems than any other disability group. Again, individuals in this category may have acquired at least some of their limitations due to health problems, while in other categories disability and health may be less intertwined.

Limitations

Our analyses were cross-sectional and therefore do not allow determinations of cause and effect. As noted above, while people with certain disabilities may be at greater risk for health problems, it is also possible that some disabilities have resulted from health problems. Lack of clarity about the temporality of relationships is a typical issue when comparing people with and without disabilities but is even more complex when all members of the analytic sample have disabilities with a variety of etiologies. The result may be that our models are a conservative view of the differences among these groups of people with disabilities. Long-term longitudinal studies are needed to better understand the overlap and distinctions between disability, chronic conditions, and health status. Further, while this study sheds some light on differences related to type of disability, our categories were quite broad. As such, variation within each category may have obscured patterns associated with more specific disability groups. For example, within the cognitive disability category, the

health experiences of an individual with a developmental disability are likely to differ from those of a person with dementia. Analyses of more nuanced data on disability etiology could uncover additional disparities. Lastly, our variables were based on data reported by interviewees and are therefore subject to reporting bias, such as the tendency to over-report height and under-report weight, leading to inaccurate (typically reduced) BMI. Estimates of BMI also may be somewhat less accurate for people who have been weighed less recently (e.g. wheelchair users receiving care at a clinic without a wheelchair accessible scale). However, given the high proportion of overweight and obese people in our physical and multiple disability groups, we do not believe under-reporting of weight substantially impacted the patterns of our findings.

Conclusion

Our results are derived from a nationally representative population sample of working-age adults with disability. The findings advance our understanding of within disability health differences, although temporal relationships between disability and poor health require further exploration. While many of the differences between disability types were reduced when controlling for other factors, other differences remained significant. This argues for a more individualized approach to understanding and preventing chronic conditions and poor health in specific disability groups.

Acknowledgments

This work was supported by grant #H133A080031 from the National Institute on Disability and Rehabilitation Research/DOE. However, the contents do not necessarily represent the policy of the Department of Education, and you should not assume endorsement by the Federal Government.

References

1. Bennett KJ, Probst JC, Pumkam C. Obesity among working age adults: The role of county-level persistent poverty in rural disparities. *Health Place*. 2011; 17(5):1174–1181. [PubMed: 21665515]
2. Conron KJ, Mimiaga MJ, Landers SJ. A population-based study of sexual orientation identity and gender differences in adult health. *Am.J.Public Health*. 2010; 100(10):1953. [PubMed: 20516373]
3. Cherepanov D, Palta M, Fryback DG, Robert SA, Hays RD, Kaplan RM. Gender differences in multiple underlying dimensions of health-related quality of life are associated with sociodemographic and socioeconomic status. *Med.Care*. 2011; 49(11):1021. [PubMed: 21945974]
4. World Health Organization. *International Classification of Functioning, Disability and Health*. World Health Organization; Geneva, Switzerland: 2001.
5. McDermott, S.; Platt, T. The health of adults with disability in family practice-1990-2003. Paper presented at the Conference of the National Center on Birth Defects and Developmental Disabilities; Washington, DC. 2004.
6. National Institute of Dental and Craniofacial Research. *A Plan to Eliminate Craniofacial, Oral, and Dental Health Disparities*. National Institute of Dental and Craniofacial Research; Bethesda, MD: 2002.
7. Nosek MA, Howland C, Rintala DH, Young ME, Chanpong GF. National study of women with physical disabilities: Final report. *Sex.Disab*. 2001; 19(1):5–40.
8. Froehlich-Grobe K, Lollar D. Obesity and disability: Time to act. *Am J Prev Med*. 2011; 41(5):541–545. [PubMed: 22011427]
9. Chevarley FM, Thierry JM, Gill CJ, Ryerson AB, Nosek MA. Health, preventive health care, and health care access among women with disabilities in the 1994-1995 National Health Interview Survey, Supplement on Disability. *Womens Health Issues*. 2006; 16(6):297–312. [PubMed: 17188213]
10. Drum CE, Horner-Johnson W, Krahn GL. Self-rated health and healthy days: Examining the “disability paradox”. *Disability and Health Journal*. 2008; 1(2):71–78. [PubMed: 21122714]

11. Agency for Healthcare Research and Quality (AHRQ). National Healthcare Disparities Report 2011. AHRQ; Rockville, MD: 2012.
12. Iezzoni LI. Eliminating health and health care disparities among the growing population of people with disabilities. *Health Aff.* 2011; 30(10):1947–1954.
13. Rowland, M.; Peterson, J.; Dobbertin, K.; Walsh, ES.; Horner-Johnson, W.; The Expert Panel on Health Disparities among Individuals with Disabilities. Health Outcome Disparities among Subgroups of People with Disabilities - A Scoping Review. In Review
14. Ezzati-Rice, TM.; Rohde, F.; Greenblatt, J. Sample Design of the Medical Expenditure Panel Survey Household Component, 1998-2007. Agency for Healthcare Research and Quality (AHRQ); Rockville, MD: 2008.
15. Cohen JW, Cohen SB, Banthin JS. The Medical Expenditure Panel Survey: A national information resource to support healthcare cost research and inform policy and practice. *Med.Care.* 2009; 47(7 Suppl 1):S44–S50. [PubMed: 19536015]
16. Agency for Healthcare Research and Quality (AHRQ). [cited 2013 13 March] MEPS-HC Response Rates by Panel. c2009. Available at: http://meps.ahrq.gov/survey_comp/hc_response_rate.jsp
17. Altman, B.; Bernstein, A. Disability and Health in the United States, 2001–2005. National Center for Health Statistics; Hyattsville, MD: 2008.
18. U.S. Department of Health and Human Services. Healthy People 2020. U.S. Department of Health and Human Services; Rockville, MD: 2010.
19. Centers for Disease Control and Prevention (CDC). Measuring Healthy Days. CDC; Atlanta, GA: 2000.
20. Centers for Disease Control and Prevention (CDC). CDC Health Disparities and Inequalities Report - United States, 2011. Vol. 60. Morbidity & Mortality Weekly Report; MMWR: 2011. p. 1-113.
21. StataCorp. Stata. Version 12. StataCorp; College Station, TX: 2011.
22. Levy, PS.; Lemeshow, S. Sampling of populations. 4th ed. J. Wiley; Hoboken, NJ: 2008.
23. StataCorp. Stata Survey Data Reference Manual. Release 12. StataCorp LP; College Station, TX: 2011.
24. Turk, MA. Secondary conditions and disability. In: Field, MJ.; Jette, AM.; Martin, L., editors. Workshop on Disability in America: A New Look. Institute of Medicine, National Academies Press; Washington, DC: 2005. p. 185-193.
25. Morgenroth DC, Gellhorn AC, Suri P. Osteoarthritis in the disabled population: A mechanical perspective. *PM&R.* 2012; 4(5, Supplement):S20–S27. [PubMed: 22632698]
26. Hall T, Krahn GL, Horner-Johnson W, Lamb G, the RRTC Expert Panel on Health Measurement. Examining functional content in widely used health-related quality of life scales. *Rehab Psych.* 2011; 56(2):94–99.
27. Hassiotis A, Serfaty M, Azam K, Strydom A, Martin S, Parkes C, Blizard R, King M. Cognitive behaviour therapy (CBT) for anxiety and depression in adults with mild intellectual disabilities (ID): A pilot randomised controlled trial. *Trials.* 2011; 12(1):95–101. [PubMed: 21492437]

Figure 1.
analytic Sample Selection Process - Medical Expenditure Panel Survey Household
Component 2002-2008

Table 1

Demographic characteristics of Medical Expenditure Panel Survey Household Component 2002-2008 adults aged 18-64 years with disabilities

Characteristic	N (weighted %)
Race/Ethnicity [*]	
White	14,669 (72.7)
Black	4,216 (12.1)
American Indian/Alaskan Native	198 (0.8)
Asian/Native Hawaiian/Pacific Islander	648 (2.5)
Multiple races	553 (2.1)
Hispanic	4,090 (9.6)
Female	13,808 (52.4)
Age (years)	
18-29	2,827 (12.2)
30-39	3,418 (13.5)
40-49	6,438 (26.3)
50-59	8,155 (33.3)
60-64	3,536 (14.8)
English language spoken most in home	21,669 (93.5)
Marital Status	
Married	12,067 (50.8)
Widowed, divorced or separated	7,028 (27.0)
Never married	5,279 (22.1)
Region	
Northeast	3,317 (15.8)
Midwest	5,187 (23.3)
South	10,226 (38.4)
West	5,644 (22.5)
Resides in Metropolitan Statistical Area	18,731 (79.5)
Education	
Bachelor's, Master's, or Doctorate	3,714 (19.2)
Other Degree	1,914 (8.9)
GED/HS [†]	12,903 (55.2)
No Degree	5,843 (16.7)
Family Income [‡]	
400%	6,476 (35.0)
200% to <400%	6,619 (29.3)
125% to <200%	3,823 (13.4)
100 to <125%	1,505 (4.7)
<100%	5,951 (17.6)
Employed	13,123 (61.0)
Total	24,374 (100)

* Except for Hispanic, all categories are ethnically non-Hispanic

[†] Graduate equivalency degree/High school degree

[‡] Percent of Federal Poverty Line

Health characteristics of Medical Expenditure Panel Survey Household Component 2002-2008 adults aged 18-64 years with disabilities

Table 2

Health Outcome	All disability N (weighted %)	Disability Type N (weighted %)			
		Hearing	Vision	Physical	Cognitive
Arthritis	9,814 (39.1)	651 (22.2)	579 (16.6)	3,335 (47.3)	300 (18.3)
BMI 25	17,832 (71.7)	2,153 (70.9)	2,367 (62.8)	5,370 (75.3)	1,134 (62.8)
Cardiovascular Disease	3,871 (15.4)	281 (9.3)	258 (7.5)	1,049 (15.0)	165 (10.0)
Diabetes	3,639 (13.0)	234 (7.0)	286 (7.1)	949 (12.2)	158 (8.7)
Lung Disease	4,374 (17.2)	335 (10.9)	390 (11.1)	1,213 (16.9)	236 (13.3)
Stroke	1,211 (4.2)	33 (1.2)	51 (1.6)	224 (2.9)	59 (3.3)
Fair/Poor Mental Health	5,157 (18.0)	158 (4.8)	256 (6.3)	848 (10.5)	739 (38.7)
Fair/Poor Physical Health	9,539 (33.7)	356 (10.6)	551 (12.1)	2,611 (32.6)	616 (30.5)
Total*	24,374 (100)	3,023 (100)	3,619 (100)	7,039 (100)	1,742 (100)

* Weighted percent of total sample in each disability category: hearing 14.9%, vision 15.4%, physical 29.3%, cognitive 6.6%, more than one type 33.7%

Health outcomes by disability type among adults aged 18-64 with disabilities in the Medical Expenditure Panel Survey Household Component 2002-2008

Table 3

Health Outcome	Disability Type	Unadjusted Model			Partially Adjusted Model [*]			Expanded Model [†]		
		OR [‡]	95% CI	p	OR	95% CI	p	OR	95% CI	p
Arthritis	Hearing	Reference								
	Vision	0.70	0.59, 0.82	<0.01	0.78	0.66, 0.92	<0.01	0.80	0.68, 0.95	0.01
	Physical	3.15	2.77, 3.58	<0.01	2.39	2.08, 2.73	<0.01	2.43	2.12, 2.79	<0.01
	Cognitive	0.79	0.64, 0.97	0.02	0.83	0.66, 1.03	0.09	0.86	0.69, 1.07	0.18
	> One	4.08	3.60, 4.62	<0.01	2.23	1.93, 2.58	<0.01	2.30	1.98, 2.67	<0.01
BMI 25	Hearing	Reference								
	Vision	0.69	0.60, 0.79	<0.01	0.79	0.68, 0.91	<0.01	0.82	0.71, 0.95	0.01
	Physical	1.25	1.11, 1.41	<0.01	1.11	0.97, 1.27	0.13	1.13	0.99, 1.30	0.08
	Cognitive	0.69	0.58, 0.82	<0.01	0.82	0.68, 0.99	0.04	0.87	0.72, 1.05	0.15
	> One	1.22	1.07, 1.38	<0.01	1.02	0.88, 1.18	0.79	1.07	0.93, 1.24	0.34
Cardiovascular Disease	Hearing	Reference								
	Vision	0.80	0.63, 1.01	0.06	1.00	0.78, 1.28	0.97	1.03	0.81, 1.33	0.80
	Physical	1.74	1.44, 2.09	<0.01	1.21	0.99, 1.49	0.07	1.25	1.01, 1.53	0.04
	Cognitive	1.09	0.83, 1.42	0.53	1.09	0.82, 1.45	0.55	1.12	0.84, 1.49	0.45
	> One	2.96	2.47, 3.54	<0.01	1.35	1.09, 1.67	0.01	1.39	1.12, 1.72	<0.01
Diabetes	Hearing	Reference								
	Vision	1.02	0.80, 1.29	0.88	1.29	1.00, 1.67	0.05	1.36	1.05, 1.75	0.02
	Physical	1.86	1.52, 2.28	<0.01	1.03	0.81, 1.31	0.83	1.07	0.84, 1.35	0.60
	Cognitive	1.27	0.97, 1.67	0.08	1.21	0.90, 1.64	0.20	1.20	0.89, 1.62	0.23
	> One	3.30	2.73, 3.98	<0.01	1.25	1.00, 1.57	0.05	1.28	1.02, 1.60	0.03
Lung Disease	Hearing	Reference								
	Vision	1.02	0.84, 1.25	0.81	0.91	0.75, 1.12	0.39	0.90	0.73, 1.11	0.34
	Physical	1.67	1.40, 1.99	<0.01	1.03	0.85, 1.24	0.78	1.03	0.85, 1.24	0.78
	Cognitive	1.26	0.98, 1.62	0.07	0.91	0.69, 1.18	0.47	0.87	0.66, 1.14	0.30
	> One	2.57	2.15, 3.07	<0.01	1.27	1.05, 1.55	0.02	1.22	1.00, 1.49	0.06

Health Outcome	Disability Type	Unadjusted Model			Partially Adjusted Model [*]			Expanded Model [†]		
		OR [‡]	95% CI	p	OR	95% CI	p	OR	95% CI	p
Stroke	Hearing	Reference								
	Vision	1.29	0.78,2.13	0.32	1.51	0.92,2.50	0.11	1.56	0.95,2.59	0.08
	Physical	2.40	1.55,3.71	<0.01	1.34	0.86,2.08	0.20	1.40	0.90,2.20	0.14
	Cognitive	2.78	1.64,4.74	<0.01	2.10	1.20,3.65	0.01	2.16	1.23,3.78	0.01
	> One	7.32	4.89,10.97	<0.01	2.43	1.57,3.76	<0.01	2.49	1.60,3.87	<0.01
Perceived Mental Health [§]	Hearing	Reference								
	Vision	1.32	1.02, 1.71	0.04	1.09	0.83, 1.43	0.53	1.04	0.79, 1.36	0.78
	Physical	2.32	1.83, 2.93	<0.01	0.81	0.62, 1.05	0.11	0.82	0.63, 1.06	0.13
	Cognitive	12.49	9.79,15.94	<0.01	5.94	4.59, 7.69	<0.01	5.03	3.87, 6.54	<0.01
	> One	9.10	7.30,11.36	<0.01	2.06	1.58, 2.68	<0.01	1.88	1.44, 2.44	<0.01
Perceived Physical Health [§]	Hearing	Reference								
	Vision	1.16	0.97,1.39	0.10	1.10	0.91,1.32	0.34	1.06	0.87,1.28	0.56
	Physical	4.09	3.48,4.82	<0.01	2.03	1.70,2.42	<0.01	2.01	1.68,2.40	<0.01
	Cognitive	3.72	3.03,4.57	<0.01	0.91	0.71,1.17	0.46	0.88	0.69,1.12	0.29
	> One	10.46	8.94,12.23	<0.01	2.44	2.04,2.92	<0.01	2.32	1.93,2.79	<0.01

^{*} Models adjusted for gender, age, race/ethnicity, perceived physical health status, perceived mental health status, body mass index, diabetes, arthritis, stroke, cardiovascular disease, lung disease, and complex activity limitation

[†] Models adjusted for gender, age, race/ethnicity, perceived physical health status, perceived mental health status, body mass index, diabetes, arthritis, stroke, cardiovascular disease, lung disease, complex activity limitation, marital status, region of country, metropolitan statistical area, language spoken most in the home, education, family income as percent of federal poverty line, employment status, insurance type or status, and usual source of care

[‡]OR = odds ratio; CI = confidence interval

[§]Data on relationships between chronic conditions and perceived health available from authors on request