

Research Papers

Health disparities among adults with physical disabilities or cognitive limitations compared to individuals with no disabilities in the United States

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Abstract

Background: National survey data indicate the number of individuals reporting a disability is rising. Those with disabilities experience a large number of barriers to health promotion and disease prevention programming. However, only a limited number of studies have used nationally representative data to examine the health status of individuals with disabilities in comparison to those without disabilities.

Objective/Hypothesis: We used the Medical Expenditures Panel Survey (MEPS) to examine whether disability is associated with higher prevalence rates for common chronic diseases, lower use of preventive care and higher health care expenditures. Our research hypothesis was that nationally, adults with either physical disability or cognitive limitations experience significant health disparities in comparison to those with no disability.

Methods: We conducted a retrospective analysis comparing the health of adults (18 and over) with physical disabilities or cognitive limitations to individuals with no disability using data from the 2006 full year consolidated data file from the Medical Expenditures Panel Survey (MEPS). We used chi-squared tests, t-tests, and logistic regression to evaluate the association.

Results: Individuals with physical disabilities or cognitive limitations had significantly higher prevalence rates for 7 chronic diseases than persons with no disabilities. The disability groups were also significantly less likely than the no disability group to receive 3 types of preventive care.

Conclusions: These data suggest that adults with disabilities and chronic conditions receive significantly fewer preventive services and have poorer health status than individuals without disabilities who have the same health conditions. This indicates a need for public health interventions that address the unique characteristics of adults with disabilities, many of whom are at risk for high cost, debilitating conditions that may not have as severe an effect on other population segments. Published by Elsevier Inc.

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Preserving the health and wellness of individuals with disabilities is an important public health concern, yet those with disabilities continue to experience a large number of health disparities and barriers to health promotion and disease prevention programming [1-3]. The prevalence of individuals reporting a disability is 47.5 million (21.8% of the total population). This rate has increased by 7.7% since 1999 when the national prevalence was 44.1 million [4]. Given that a large proportion of the population currently has a disability and trend data indicate that this number is rising [5], the health and public health care systems will experience many changes in the demands

placed on them [6]. People with disabilities are likely to have unique health needs, and, as a result, there will be an increased demand for health care services, greater physical accessibility of public spaces [7] and a need to shift public health focus from prevention of disabling conditions to viewing people with disabilities as a substantial minority population that experiences health disparities [8]. To shift our focus in this way and to plan appropriate public health programs requires that we more clearly identify existing health disparities for this population.

Some work has already been done in this area. A few studies used national data to examine the health of adults with disabilities. Rasch et al. [9-10] conducted a 2-part study using Medical Expenditure Panel Survey (MEPS) and National Health Interview Survey (NHIS) data to examine prevalent health conditions and incidence of secondary conditions. They found that the health of adults with mobility limitations is worse than that of adults with

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cognitive or no limitations. Using the NHIS, Chevarley et al. [11] found that women with functional limitations rate their health status worse than those with no functional limitation, are more likely to have poor health behaviors and are less likely to receive preventive cancer screenings. Jones and Bell [12] found similarly poor health behavior rates among those with severe functional limitations using NHIS data. In addition, some studies [13–16] have used MEPS or NHIS data to compare the receipt of preventive cancer screening rates between women with disabilities to women with no disability. They found that women with a disability received breast and cervical cancer screenings less often than their nondisabled peers.

Some studies have used state Behavioral and Risk Factor Surveillance Surveys (BRFSS) to investigate disparities. In North Carolina, Havercamp, Scandlin, and Roth [17] examined health disparities among adults with developmental disabilities, other disabilities and those not reporting disabilities. They found that adults with developmental disabilities experience significant disparities in medical care use and health in comparison to peers with no disabilities. Kinne, Patrick, and Doyle [18] examined secondary conditions among individuals with disabilities using state BRFSS data, finding a significant risk of secondary conditions for people with disabilities.

Other community-based research has found similar disparities in health among those with cognitive limitations or physical disabilities and their nondisabled peers. Descriptive studies on women with physical disabilities revealed preventive screening deficiencies for heart disease and a higher proportion of cardiovascular disease risk factors compared to women without disabilities [19]. Additional community studies on people with a disability revealed an increased prevalence of obesity [20] and, on average, 12 to 14 reported secondary conditions per person [20–22]. Those experiencing the greatest degree of mobility limitation reported the highest number of secondary conditions [20]. Community studies also found that individuals with cognitive limitations have a high prevalence of secondary conditions such as hypertension and periodontal disease [23,24] and insufficient preventive cancer screening rates [25].

For this study we model the World Health Organization's (WHO) framework of the *International Classification of Functioning (ICF)*, which views disability and function as bio-psychosocial and multidimensional. Disability and function are affected at 3 levels: body, person, and society [26]. The ICF also defines health and disability as separate constructs, such that a person with a disability can be healthy or unhealthy, just as a person without a disability can. In addition, the ICF considers disability and function to be on a continuum, where disability is not a dichotomous outcome (one is disabled or not), but rather a matter of extent. This means that as scientists studying disability, we must choose an arbitrary threshold to determine how we will measure it. In this study, we are most interested

in examining all people who fall into either of 2 categories of disability—physical disability or cognitive limitation—regardless of how they acquired it.

Given the relative dearth of literature examining nationally representative samples of individuals with disabilities, our goal was to help answer the question: What is the current health status of people with cognitive limitations or physical disabilities in comparison to those without disabilities? Specifically, we sought to examine whether disability is associated with higher prevalence rates for common diseases, lower use of preventive care and higher health care expenditures. Our hypothesis was that nationally, adults with either physical disability or cognitive limitations experience significant health disparities in comparison to those with no disability.

To analyze our hypothesis and answer our research question, we used data from the MEPS. The MEPS is a nationally representative dataset that provides information about the use and cost of health insurance coverage and health care. Using these data allowed us to analyze and compare people with disabilities and people without disabilities in terms of overall health and secondary conditions, health care use and expenditures. We also identified the health disparities that exist between the 2 disability groups.

Methods and materials

We conducted a retrospective analysis comparing the health of adults (18 and over) with physical disabilities or cognitive limitations to individuals with no disability. The data presented in this paper were taken from the MEPS 2006 full year consolidated data file.

Medical Expenditures Panel Survey

The MEPS annual survey provides a nationally representative sample of the health care utilization and expenditures of U.S. families and individuals, their medical providers (physicians, hospitals, pharmacies, etc.) and employers. It also provides data regarding specific health conditions, health services use, cost and the different methods of coverage and payment for health care. As a subsample of respondents from the previous year's National Health Interview Survey, the MEPS involves a complex sampling methodology to ensure a nationally representative population [27]. Individuals with cognitive limitations are included in the survey through proxy response [28].

Analytic variables

We classified respondents into 1 of 3 groups: cognitive limitations, physical disabilities or no disability. We defined the "cognitive limitations" group using the MEPS definition of anyone who "(1) experience[s] confusion or memory loss, (2) [has] problems making decisions, or (3) require[s] supervision for their own safety"; anyone who answered

“yes” to questions COGLIM31 or COGLIM53 was considered to have a cognitive limitation [27]. Physical disability was defined using questions WLKLIMXX (functional limitation) and ADLHLPXX (uses assistive device variables); also, anyone who answered yes to both WLKLIMXX variables, to the last 2 rounds of ADLHLPXX (activities of daily living help for 3 or more months) or to both AIDHLPXX variables was considered to have a physical disability. All those who did not answer yes to the above questions were considered to have no disability. The cognitive limitations group and the physical disability group are not mutually exclusive; some individuals reported having conditions in both of these categories of disability.

To examine “perceived health status,” we used the question about perceived health status (RTHLTHXX). This question appears in 3 rounds across the year; we used the last of these 3 rounds. *t*-Test comparison of responses between rounds revealed no statistically significant changes between them. Receipt of a Pap test was assessed only for women 18 years of age and over, while receipt of mammography was assessed only for women 40 years of age and over.

Demographics

Using the MEPS data, we describe the population on the basic demographic characteristics of sex, age, race and education. For age, we calculated the mean and percentages by groups: 18-34, 35-54, 55-64 and 65+; those under 18 were excluded from the analyses. Race was aggregated as white, black and other. We also reported presence of underweight, overweight and obesity using level obesity categories that are based from the National Heart, Lung and Blood Institute [29]. Receipt of health insurance was measured using INSCOV06. The receipt of Medicaid and Medicare was measured using questions MCDEV06 and MCREV06 respectively. Income categories were created using the 2006 poverty thresholds established by the U.S Census Bureau [30]. Finally, we were unable to distinguish rural versus urban as there is no such designation in the MEPS full year consolidated data file.

Statistical analyses

For descriptive statistics, percentages were computed for categorical variables. Means and standard deviations were computed for continuous variables. We used crosstabs and *t*-tests to examine bivariate associations between disability groups and health outcomes (i.e., perceived health status, health insurance, health care and preventive care use and chronic disease). We used SPSS 17.0 with the Complex Samples Add-On (2008) to analyze the data. The add-on allowed for more accurate estimation of variance given the complexity of the sampling design involved in national surveys like MEPS. The percentages presented in all tables were weighted using MEPS weights (PERWT06F) to reflect national estimates.

We performed direct age-adjustment on chronic disease prevalence rates using the 2000 U.S. Standard Population

with 18 age groups [31] in order to control for the differences in age distribution between the 3 groups. Whenever a response was “inapplicable,” “not ascertained,” “don’t know” or “refused,” it was treated as missing data. For Logistic Regression analyses, we used INSCOV06 aggregating all type(s) of public health insurance.

Results

Characteristics of the sample

The distribution of sex was nearly even for those with cognitive limitations and physical disabilities (40.8 % male and 39.2% male, respectively) (Table 1). However, in the no disabilities group, there was a greater proportion of men (49.6% male) than the cognitive limitations and physical disabilities groups. Average age varied widely between the groups. While the group with no disabilities averaged 41.7 years, the cognitive limitations group averaged 59.0 years and the physical disabilities group averaged 60.1 years (Table 1). Those with no disabilities had the largest percentage (37.1%) of people in the youngest age bracket (18-34), and those with physical disabilities had the largest percentage (42.8%) of those over the working age (65+). The group with cognitive limitations had percentages in each age category close to those of the physical disability group. The distribution of race was similar for all groups, with the exception that the cognitive limitations group had a slightly larger proportion of individuals who were black. Nearly half of all groups had graduated from high school. Those with no disability were more likely to have some college than both of the other groups. The group with cognitive disabilities had the highest percentage who did not graduate from high school.

While the majority of individuals in all 3 groups had private health insurance, those with no disability (76.1%) held private insurance more often than those with physical disabilities (57.4%) and those with cognitive limitations (44.8%) (Table 2). Individuals with cognitive limitations were significantly more likely to receive Medicaid or Medicaid and Medicare (28.5%) than the other 2 groups (physical disability = 16.2% and no disability = 5.5%, $p = .0000$) (Table 2).

Adults without a disability rated their health as excellent or very good 2.7 times more than those with a physical disability and 3.4 times more than those with cognitive limitations (Table 2). Only 4.6% of those with no disability rated their health as “fair,” and only .5% of this group rated their health as “poor.” On the other hand, there was little difference between the disability groups in who rated their health as “fair” or “poor.”

Prevalence of chronic diseases and conditions

Controlling for age, sex, race, income, education, health insurance status, and obesity, logistic regression analysis

Table 1
 Characteristics of the Study Samples: Comparison of Individuals with Cognitive Limitations or Physical Disabilities to Those With No Disability

Descriptive variables	No disability Percent (95% CI) weighted n = 157,547,267 unweighted n = 16,215	Cognitive limitations Percent (95% CI) weighted n = 14,999,036 unweighted n = 1880	Physical disability Percent (95% CI) weighted n = 38,027,050 unweighted n = 4359
Gender			
Male	49.6 (48.9-50.3)	40.8 (38.2-43.5)	39.2 (37.6-40.8)
Age			
Mean	41.7 (41.3-42.0)	59.0 (57.8-60.3)	60.1 (59.4-60.9)
18-34	37.1 (35.9-38.3)	12.5 (10.4-15.0)	8.8 (7.6-10.2)
35-54	41.3 (40.1-42.4)	28.9 (26.6-31.4)	28.4 (26.7-30.3)
55-64	12.9 (12.2-13.6)	18.0 (15.9-20.5)	19.9 (18.6-21.3)
65+	8.8 (8.2-9.4)	40.5 (37.6-43.5)	42.8 (40.7-44.9)
Race			
White	81.1 (79.5-82.6)	77.4 (74.7-80.0)	81.5 (79.7-83.3)
Black	11.3 (10.2-12.7)	16.3 (14.3-18.5)	13.0 (11.6-14.4)
Others	7.6 (6.7-8.6)	6.3 (5.0-7.9)	5.5 (4.5-6.6)
Education			
Did not graduate from high school	14.8 (14.0-15.6)	31.7 (29.2-34.2)	24.3 (22.7-25.9)
High school graduate	47.7 (46.4-49.0)	50.5 (47.5-53.5)	52.2 (50.3-54.2)
Some tech. or college	37.5 (36.0-39.1)	17.8 (15.4-20.5)	23.5 (21.7-25.4)
Income			
Poor (<100% poverty line ^a)	22.0 (21.1-22.9)	43.6 (40.7-46.5)	32.3 (30.3-34.3)
Low Income (100%-199% poverty line)	16.7 (16.0-17.5)	27.0 (24.6-29.6)	25.6 (24.0-27.4)
Middle Income (200%-399% poverty line)	28.8 (27.9-29.9)	19.2 (16.9-21.8)	25.0 (23.5-26.5)
High Income (\geq 400% poverty line)	32.4 (31.1-33.7)	10.2 (8.3-12.4)	17.1 (15.5-19.0)
Obesity			
% Underweight (BMI = 1-18.4)	1.6 (1.4-1.9)	4.0 (3.1-5.2)	2.3 (1.9-2.9)
% Overweight (BMI = 25.0-29.9)	35.7 (34.8-36.6)	29.4 (26.9-31.9)	30.7 (29.0-32.5)
% Obese (BMI \geq 30)	24.0 (23.1-25.0)	33.3 (30.6-36.1)	39.9 (38.1-41.7)
Mean BMI for all weight categories	26.0 (25.8-26.2)	27.1 (26.5-27.7)	28.2 (27.8-28.6)
Mean BMI for obese category only ^{b,*}	34.5 (34.3-34.7)	36.8 (36.2-37.4)	36.6 (36.3-37.0)

Notes: All point estimates are weighted. Cognitive limitations group includes those who “(1) experience[s] confusion or memory loss, (2) [has] problems making decisions, or (3) require[s] supervision for their own safety”; physical disability includes those with functional limitations or those who use assistive devices.

CI, confidence interval.

^a Poverty Line: 2006 family income as percentage of 2006 national poverty threshold determined by the U.S. Census Bureau (29).

^b BMI: Body mass index categories from the National Lung, Heart, and Blood Institute [29].

* Significant group difference ($p < .0001$) (χ^2), comparing disability groups to the No Disability group.

showed that individuals with physical disabilities or cognitive limitations had higher prevalence rates for 7 chronic diseases than those with no disability when adjusted for age (Table 3). Compared to adults without disability, those with physical disabilities and those with cognitive limitations experienced more cardiac disease, diabetes, and asthma as well as higher blood pressure and cholesterol levels. The 2 disability groups also experienced a particularly higher association with stroke and arthritis than those with no disabilities. However, it is important to consider that the presence of a chronic disease may be the reason some individuals reported themselves as having a disability, and determining how people acquired their disability was not within the scope of our research.

More than 70% of those with physical disabilities were either overweight or obese compared to 62.7% of the cognitive disabilities group and 59.7% of the no disability group. Chi-squared analyses demonstrated that the physical disabilities group had the highest percentage of obesity (39.9%), followed by the cognitive limitations group

(33.3%), but those in the no disability group represented the greatest percentage of overweight (35.7%) (Table 1). Moreover, individuals with physical disabilities or cognitive limitations who were obese had statistically significant higher BMI scores than individuals with no disability (Table 1). In terms of underweight, the cognitive limitations group had a higher proportion than the other 2 groups.

Use of preventive screening

Logistic regression analyses controlling for age, sex, race, income, education, health insurance status, and obesity, showed that individuals with no disability were most likely to receive preventive screenings and care for 3 of 4 categories: Pap test within 3 years, mammogram within 2 years and dentist visit within the last 5 years (Table 4). For Pap test, total weighted n's were as follows: no disability = 79,385,230, cognitive limitations = 8,876,294, physical disability = 23,131,214; for Mammogram, total weighted n's were as follows: no disability = 41,843,660, cognitive

Table 2

Perceived Health Status, Health Insurance Status and Usual Source of Care Comparing Cognitive Limitations or Physical Disability Groups to the No Disability Group

	No disability Percent (95% CI)	Cognitive limitations Percent (95% CI)	Physical disability Percent (95% CI)
Perceived health status			
Excellent*	30.4 (29.3-31.5)	5.4 (4.3-6.9)	5.9 (5.0-6.9)
Very Good*	38.2 (37.2-39.3)	14.6 (12.6-16.8)	19.1 (17.6-20.7)
Good*	26.3 (25.2-27.4)	28.8 (26.3-31.4)	33.4 (31.7-35.1)
Fair*	4.6 (4.2-5.1)	28.5 (26.0-31.1)	26.8 (25.1-28.6)
Poor*	0.5 (0.4-0.6)	22.8 (20.7-25.0)	14.8 (13.5-16.2)
Health insurance status			
Private*	76.1 (75.0-77.2)	44.8 (42.1-47.6)	57.4 (55.3-59.4)
Medicaid*	4.8 (4.3-5.3)	14.1 (12.3-16.0)	7.4 (6.6-8.4)
Medicare*	2.6 (2.3-2.9)	18.0 (16.0-20.2)	17.3 (16.0-18.8)
Medicaid and Medicare*	0.7 (0.6-0.8)	14.4 (12.6-16.5)	8.8 (7.9-9.9)
Uninsured*	15.9 (14.9-16.8)	8.6 (7.2-10.3)	9.0 (6.8-8.0)
Usual source of care*	73.3 (71.9-74.7)	89.3 (87.4-90.9)	90.4 (89.2-91.5)
Average yearly medical expenditures per person	\$2,375 (\$2,250-\$2,499)	\$11,487 (\$10,661-\$12,313)	\$10,288 (\$9,689-\$10,888)

Notes: All point estimates are weighted. Cognitive limitations group includes those who “(1) experience confusion or memory loss, (2) have problems making decisions, or (3) require supervision for their own safety”; physical disability includes those with functional limitations or those who use assistive devices.

CI, confidence interval.

* Significant group difference ($p < .0001$) (χ^2), comparing disability groups to the No Disability group.

limitations = 7,533,723, physical disability = 20,472,009. However, the no disability group was the least likely group to have received a flu shot. Of the 2 disability groups individuals with cognitive limitations had the poorest participation in on-time preventive screenings and care for 3 out of 4 categories: no Pap test, no mammogram and no dental visit. After controlling for age, sex, race, income, education, insurance, and obesity, logistic regression analyses showed that individuals with cognitive limitations were less likely to receive a pap smear (AOR 2.02; 95% CI 1.60-2.54; pseudo $R^2 = 18.8\%$) and less likely to receive a mammogram (AOR 1.69; CI 1.30-2.20; pseudo $R^2 = 14.0\%$) than

individuals with no disabilities. Those with cognitive limitations were also less likely to receive dental care (AOR 1.70; CI 1.46-1.98; pseudo $R^2 = 19.1\%$). Individuals with physical disabilities also had a significantly increased likelihood for not receiving these types of preventive services when compared to individuals without disabilities.

Comparison of total medical expenditures

Both disability groups had substantially higher total medical expenditures than the no disability group. Individuals with cognitive limitations (\$11,487/year) had total

Table 3

Age-Adjusted Prevalence Rates^a (per 1000) and Odd Ratios of 7 Health Conditions Comparing Cognitive Limitations or Physical Disability Groups to the No Disability Group

	No disability group	Cognitive limitations group		Physical disability group	
	Rate (95% CI)	Rate (95% CI)	AOR (95% CI) ^b	Rate (95% CI)	AOR (95% CI) ^b
Arthritis*	9.7 (9.2-10.2)	26.7 (24.8-28.6)	3.89 (3.29-4.62)	35.3 (34.2-36.4)	5.17 (4.64-5.77)
Asthma*	7.6 (7.2-8.0)	17.0 (15.0-19.0)	3.42 (2.78-4.22)	71.1 (65.6-76.6)	2.65 (2.29-3.08)
Cardiovascular disease*	5.1 (4.7-5.5)	13.0 (11.7-14.3)	2.95 (2.43-3.58)	19.7 (18.5-20.9)	2.66 (2.28-3.11)
Diabetes*	3.7 (3.4-4.0)	18.0 (16.1-19.9)	2.58 (2.08-3.18)	15.1 (14.0-16.2)	2.23 (1.91-2.60)
High blood pressure*	16.1 (15.5-16.7)	27.5 (25.6-29.4)	2.27 (1.89-2.72)	67.3 (62.6-72.0)	2.08 (1.86-2.32)
High cholesterol*	16.7 (16.1-17.3)	22.4 (20.6-24.2)	1.46 (1.21-1.75)	67.9 (64.7-71.1)	1.53 (1.36-1.72)
Stroke*	0.7 (0.6-0.8)	14.2 (12.3-16.1)	9.56 (6.79-13.46)	1.7 (1.5-1.9)	5.84 (4.30-7.94)

Notes: All point estimates are weighted. Cognitive limitations group includes those who “(1) experience confusion or memory loss, (2) have problems making decisions, or (3) require supervision for their own safety”; physical disability includes those with functional limitations or those who use assistive devices.

CI, confidence interval; AOR, adjusted odds ratio.

* Significant group difference ($p < .0001$) (χ^2), comparing disability groups to the No Disability group.

^a Prevalence rates were age-adjusted (5-year increments) using the 2000 U.S. Standard Population.

^b The multiple logistic regressions on each type of chronic disease were controlled for individual's age, sex, race, income, education, health insurance, and obesity and included the intercept term. The reference group for the disability status is individuals without disability. All statistics were adjusted for the complex survey design of MEPS. The Likelihood Ratio test comparing the predicted model to the null model indicated a significant improvement of fit.

Table 4
Prevalence and Odds Ratios of Preventive Care Use Comparing Cognitive Limitations or Physical Disability Groups to the No Disability Group

	No disability group	Cognitive limitations group		Physical disability group	
	Percent (95% CI) total weighted <i>n</i> = 79,385,230	Percent (95% CI)	AOR (95%CI) ^a	Percent (95% CI)	AOR (95%CI) ^a
No Pap test within past 3 years* (female respondents ≥ 18)	15.0 (14.1-16.0) total weighted <i>n</i> = 79,385,230	37.4 (33.8-41.1)	2.02 (1.60-2.54)	35.4 (33.1-37.8)	1.78 (1.51-2.10)
No mammogram within past 2 years* (female respondents ≥ 40)	24.0 (22.4-25.6) total weighted <i>n</i> = 418,843,660	37.0 (32.9-41.2)	1.69 (1.30-2.20)	30.2 (27.8-32.6)	1.22 (1.02-1.45)
Dental check less than once a year	35.0 (33.8-36.3)	56.7 (53.5-59.9)	1.70 (1.46-1.98)	49.7 (47.8-51.6)	1.50 (1.35-1.66)
No flu shot within past year*	67.3 (65.9)	35.3 (32.2-38.6)	.51 (.43-.61)	35.0 (32.9-37.2)	.59 (.52-.67)

Notes: All point estimates are weighted. Cognitive limitations group includes those who “(1) experience confusion or memory loss, (2) have problems making decisions, or (3) require supervision for their own safety”; physical disability includes those with functional limitations or those who use assistive devices.

CI, confidence interval; AOR, adjusted odds ratio.

* Significant group difference ($p < .0001$) (χ^2), comparing disability groups to the No Disability group.

^a The multiple logistic regressions on each type of preventive care were controlled for individual’s age, sex, race, income, education, health insurance, and obesity and included the intercept term. Reference group for the disability status is individuals without disability. All statistics were adjusted for the complex survey design of MEPS. The Likelihood Ratio test comparing the predicted model to the null model indicated a significant improvement of fit.

medical expenditures 4.8 times higher than those with no disabilities (\$2,375/year); individuals with physical disabilities (\$10,288/year) had average expenditures 4.3 times higher than those with no disabilities (Table 2). People with physical limitations and cognitive limitations were almost equally likely (90.4% vs. 89.3%) to have a usual source of care, followed by those with no disability (73.3%) (Table 2).

Discussion

The purpose of this research was to identify whether disability was associated with higher prevalence rates for common diseases, lower use of preventive care and higher health care expenditures. Using a national sample, the research built upon the limited foundation of knowledge from nationally representative data for this population.

Prevalence rates of chronic diseases and conditions

To date, few studies have examined the health disparities of individuals with disabilities at the national level. The nature of these disparities needs to be better understood in order to address the costs and complexities associated with attaining optimal health outcomes for this population. Our work confirms previous studies [14,17-18,20,32-34] that demonstrate higher prevalence rates among individuals with cognitive limitations or physical disabilities for cardiac disease, high blood pressure, high cholesterol, diabetes, stroke, arthritis and asthma. In addition, it reinforces the findings that people with disabilities have a higher prevalence of obesity [35-37]. Notably, our findings add that not only do individuals with physical disabilities and cognitive limitations have higher rates of obesity, the average BMI scores among those who are obese in these groups is

significantly higher than the average BMI score for those who are obese in the “No Disability” group. Our findings also confirm previous research from both state and national-level studies [11-12,17] which have found that individuals with disabilities typically report lower health status than persons without disabilities, are more likely to have a usual source of care [9,38] and exhibit higher prevalence rates of multiple chronic diseases [9,10,16,39] than the general population.

All of these findings raise serious concern; obesity and chronic health conditions such as diabetes, high blood pressure and other cardiovascular disease undoubtedly can worsen functional limitations or result in the development of comorbid conditions or premature death [40-44]. While further research is needed to investigate causal pathways, if any, the immediate implications of this association between disability and chronic conditions are clear: persons with disabilities experience far higher risk for adverse health outcomes than persons without disabilities, whether these outcomes are related to access to medical services, morbidity and mortality, or overall health expenditures. To date, the amount of research devoted to investigating the disparities in prevalence and co-existence of serious chronic conditions experienced by individuals with disabilities fails to equal the severity of the problem. Our population-level findings demonstrate a critical need for further research in this area to identify the determinants of risk.

The disparate prevalence findings in our study also point to the need to make widely available public health interventions and disease management programs that are tailored to the unique needs of disability groups in managing and improving their health behaviors, especially those related to weight loss, physical activity and disease management [e.g., 45-47]. Effectively addressing these needs will require taking into consideration the specific physical and

social determinants of health for each disability group (e.g., physical disability, intellectual disability, mental health disorder) as well as their available resources. Changes in behavioral health must be fostered through increasing appropriate physical supports, including developing physically accessible exercise facilities and integrating with acute care systems in ways that fully incorporate behavioral health strategies into disease management.

Use of preventive screening

Given the higher prevalence for chronic conditions among adults with disabilities and the correlation between chronic conditions and preventive screening, it was not surprising that our work also reinforced findings of other state and national-level studies [15-17,34,48-49] that indicate people with disabilities are far less likely to receive important preventive screenings. Not only were the screening rates worse than the “no disability” group, the rates at which each group received preventive cancer screenings and dental care was far below accepted standards of care suggested by the U.S. Preventive Services Task Force [50] and the American Dental Association (even though most people with disabilities have a primary care source). Adults with cognitive limitations fared the worst, confirming the state and local level research of others and reiterating the need to make effective screening programs available that are designed specifically for these adults. Anderson et al. recently confirmed this, too, stating, “[Disability associated healthcare expenditure] may be reduced by using preventive care services and health promotion interventions, and by improving access to medical care for people with disabilities to reduce the incidence of secondary conditions to disability through early diagnosis and intervention” [51, p. 50].

Comparison of total medical expenditures

Our findings confirm other studies [52,53] that adults with disabilities have substantially and significantly higher total health care expenditures than adults with no disability. Notably, individuals with cognitive limitations incurred the highest expenditures. While high costs for health care are anticipated to accompany chronic disease, our cost findings for adults with disabilities appear disproportionately large, raising questions as to the cause. Do individuals with disabilities delay seeking treatment at the onset of disease, resulting in the worsening of their condition to the point of requiring more expensive care such as hospitalization? If so, why? Is this delay in seeking care, if real, due to inadequate insurance coverage? Does it result from a lack of awareness or understanding of the disease? Alternately, is the disproportionate cost related to quality of care issues? Are health care providers so focused on the acute condition presented at each visit that chronic conditions are overlooked in the medical examination? Or, do time and/or

insurance coverage prohibit the recommendation and follow through of prevention, management and intervention programs, thus allowing conditions to worsen and require more expensive care? Future research must address these questions to uncover the specific causes of these disproportionate costs.

Future directions and policy implications

Methodologically, our study demonstrates that MEPS can serve as an excellent resource for expanded surveillance work in disability. MEPS data allow researchers to assess the health disparities of individuals with disabilities with a degree of specificity and timeliness not frequently used in existing research.

Our data showed that people with disabilities reported having a usual source of care, but still incurred high total medical expenditures. Such data might indicate that people with disabilities are receiving care, but likely not enough of the right types of care that can effectively prevent disease, manage it effectively, or improve health behaviors. Therefore, instead of simply increasing the amount of care they receive, primary/acute care may require some reshaping.

To achieve this, primary and acute care must be redefined to incorporate more of an emphasis on preventive care, disease management, and healthy behaviors. That is, it needs to be proactive, not just reactive. Instituting such an emphasis will require that health care professionals, policy makers and others adopt the framework of the ICF (described above) in which it is assumed that people with disabilities can be healthy. Until such a framework is more widely accepted, the existing medical care system will remain at odds with the goals of encouraging preventive screening and promoting health behavior changes for people with disabilities.

Limitations

Our study is subject to the known limitations of MEPS data. In particular, it is limited by the use of self-report methodology which can result in reporting errors such as inaccurate recall or poor understanding. In addition, the MEPS survey process uses proxies as respondents for those with cognitive limitations. This methodology sometimes increases bias because the person reporting may not have intimate or accurate knowledge of the experiences for whom she is reporting.

Our research is also limited by the questions available for identifying and defining disability. The questions for identifying individuals with cognitive limitations are very broad. Therefore, they likely include a wide range of disability from intellectual disability to dementia, and there is no way to determine how much of each type of disability is represented as a cognitive disability. Similarly, it is difficult to accurately and specifically know which disability types are represented as a physical disability because the

wording of the questions is equally broad-reaching. Finally, MEPS does not oversample on the basis of disability and as a result, some types of less common disabilities may not be represented.

Conclusions

The results of our study confirm and expand the findings of earlier research on health disparities among individuals with disabilities. Based on cost, we know that people with disabilities are receiving health care, but based on prevalence rates and findings of increased risk and quality indicators, we see that the care they are receiving is not appropriately addressing their needs. These data suggest that adults with disabilities and chronic conditions receive significantly fewer preventive services and have poorer health status than individuals with the same chronic conditions who have no disabilities. This indicates a need for public health interventions that address the unique characteristics of adults with disabilities, many of whom are at risk for high cost and debilitating health conditions that may not have as severe an effect on other population segments. Public health interventions and disease management programs designed to incorporate these specific needs will result in better use of health care expenditures and improved quality of life for individuals with disabilities.

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