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Colleen Pennington
Wright State University - Main Campus, pennington.43@wright.edu

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Colleen Pennington

Dr. Jeannette Manger, Research Manager, Wright State University Boonshoft School of
Medicine

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Abstract

Objective: To compare the prevalence of cognitive disabilities, mobility disabilities, and
depression rates by varying categories including U.S. State, gender, and region. *Methods:* Data
was obtained from the CDC Wonder data set for the prevalence of cognitive and mobility
disabilities from the U.S. states for the years 2017-2018. Data was also obtained from the CDC
for incidence of depression among the general population and those identifying with any
disability. Data was analyzed with ANOVA and t-tests using SPSS. *Results:* Results reveal a
significant difference in disability type and gender throughout the United States. There is also a
significant difference in depression incidence in the general population and in the population of
people who have disabilities. No significant difference in type of disability and location in the
United States was found through this research.

Key Words: Disability, Gender, Location, Depression

Introduction/Literature Review

As of 2015, the rate of disability in the United States is 12%.[1] Since the passage of the

Americans with Disabilities Act in 1990, public spaces have become more accessible and

people living with disabilities have been protected by law in reference to discrimination and

employment.[2] The downstream effects of this historic law for those with disabilities are

assuredly many, including more access to healthcare through employment and more physical

accessibility to healthcare. Since 2011, unemployment rates among those who are disabled

have trended downward (15.0% to 7.3%).[3] Since businesses have the option of offering

healthcare to their employees in the United States, this uptick in employment rates is a further

positive move in this populations access to quality healthcare. Following this trend, between

age groups of 18-44 and 45-64, reports of having no health care were low (21.2 and 13.0,

respectively).[4] Based on this data, healthcare and accessibility have been steadily improving

in the United States in the last thirty years. However, movement for equality and accessibility

for those identifying as having a disability has dragged in momentum up until the last 30 years

and continues to be an uphill battle. Adults with disabilities are found to be four times as

likely to report being in poor or fair health than people with no disabilities.[1] Despite advances

in technology, legal guidance, and health care in America, we are still falling short in care for

12% of our population. A deeper look into the prevalence of disability type, prevalence and

location, and the relation of these factors to mental health is necessary to evaluate how to

adapt the national healthcare approach to disability.

Mental health in particular continues to be one of the most neglected public health issues

globally.[5] Continued funding cuts, social stigma, and inaccessibility overshadow those

suffering from mental illness. In 2018, only 43.3% of Americans living with a mental illness received treatment.[6] Even more concerning is that this number only includes those individuals who have been diagnosed with a mental illness, implying the percentage of those untreated may be higher . A 2017 study found that nearly everyone will present with a diagnosable mental illness at some point in their lives.[7] This combined with a general global lackluster interest in mental health diagnosis and treatment suggests that a generous portion of society is currently living with untreated and even undiagnosed mental health issues. Besides being an important aspect of improving healthcare and long-term health for those individuals living with a disability, poor mental health is associated with a number of comorbidities. People who have depression are 40% more likely to develop cardiovascular and metabolic diseases than the general population.[6] With a heightened awareness of these risk factors and the prevalence of mental illness, medical providers could provide more tailored treatment and resources to patients, especially of a particular population such as those who have disabilities.

Finding literature that relates disability type, regional location, and gender proves difficult. These factors have not been compared all at once in the existing literature on the topic. There is some on the health disparities related to ethnicity, disability, and sexual orientation[5] This indicates that the topic has been investigated in some fashion to this point, although with slightly different variables. One paper identifies depression as the globally leading cause of disability, with special mention in the lower- to middle-income nations.[8] There is a brief analysis of the data set used in for this analysis found on the CDC website.[4] The literature found is often ultra-specific and tends to focus less on a nation-wide picture of the layout of factors previously listed, which can help identify where treatment of people who have disabilities falls short on a more universal level.

Research Questions

1. **What is the relation between disability type and geographical location?**

   A. **Is there a relationship between adult cognitive disability prevalence and U.S. State in 2017?**

   B. **Is there a relationship between mobility disability prevalence and U.S. State in 2017?**

2. **What is the relation between disability type and gender?**

   A. **Is there a relationship between mobility disability and gender in 2017?**

   B. **Is there a relationship between cognitive disability and gender in 2017?**

3. **What is the relation between incidence of depression and disability?**

   A. **Is there a difference in prevalence of depression in persons who identify as having a disability versus persons who do not identify as having a disability in state?**

   B. **Is there a relationship in prevalence of depression and region in the United States?**

Methods

Context/Protocol

The research data has previously been collected by the CDC and the DHDS and includes gender-specific data for people ages 18 and older. Data analysis includes a breakdown of the data in reference to geographic location, gender, and disability type. The data utilized

which was previously collected through the CDC Wonder data page and the Disability Health Data System utilized the National Center on Birth Defects and Developmental Disabilities. The data collected is from the year 2017. The CDC compiled the data from The Behavioral Risk Factor Surveillance System, which used a telephone survey of people over the age of 18 in the Continental U.S., The District of Columbia, Guam, Puerto Rico, and the U.S. Virgin Islands.

Data Collection

Data was searched for breakdown by gender, disability type, and reports of depression. It was then organized into spreadsheets in order to complete data analysis. This included cognitive disability broken down by state and gender, mobility disability broken down by state and gender, and reported depression rates among any disability type broken down by state. Depression rates in any disability type were then compared to state depression rates in the general population in order to compare incidence.

Data Analysis

Data was analyzed through comparison of gender, disability type, and geographic location (in reference to the United States). Through this analysis, numerical data helped determine if there was any significance to the listed factors and their relation to each other. Specific comparisons with higher numerical values than others were considered in reference to the other data values available.

Results

The incidence of cognitive disability among females (12.76) was statistically higher than male cognitive disability (10.34) by a paired t-test ($p < 0.001$). Incidence of mobility

disability for females (14.69) was statistically higher than incidence of male mobility disability (11.43) by a paired t-test (p < 0.001). Incidence of disability of any type in women was statistically higher (27.44) than incidence of any disability in men (24.83) by a paired t-test (p < 0.001) (Table 1). Incidence of cognitive disability (11.09) by state was higher than mobility disability (16.72) by a paired t-test (p <0.001) (Table 2). A one-way ANOVA test comparing depression rate in those with disabilities by region (Northeast, Midwest, South, West) was not statistically significant (Figure 1). The rate of depression with disability (44.82) was statistically higher than the rate of depression in the general population (19.15) by a paired t-test (p < 0.001) (Table 3).

Table 1: Disability and Gender T-test Results

T-test Subject	Female Mean	Male Mean	P Value
Mobility Disability	14.69 (3.50)	11.43 (3.40)	< 0.001
Cognitive Disability	12.76 (2.78)	10.34 (2.31)	< 0.001
Any Disability	27.44 (4.92)	24.83 (4.39)	< 0.001

Table 2: Disability Type by State T-test Results

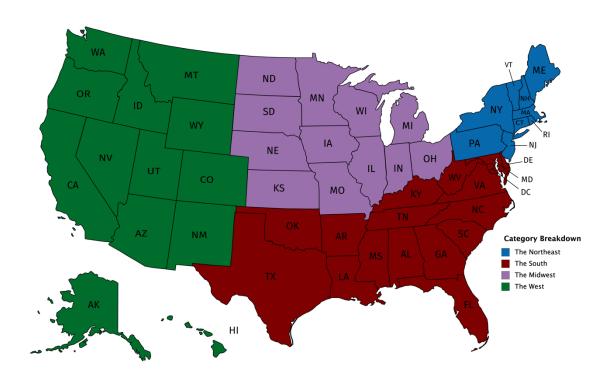| T-test Subject	Mean	P Value
Mobility Disability	11.09 (2.72)	< 0.001
Cognitive Disability	16.72 (4.45)	< 0.001

Figure 1: Regional Breakdown of United States for ANOVA Test

A one-way ANOVA comparing depression rate in the general population regionally was not statistically significant.

Table 3: Average Depression Rate in the United States by Region

Region in the US	Depression Mean and Standard Deviation	Depression with Disability Mean and Standard Deviation
The Northeast	19.26 (3.61)	47.36 (7.85)
The Midwest	18.87 (1.78)	46.85 (3.21)
The South	43.66 (5.19)	43.66 (5.19)
The West	19.61 (4.56)	42.71 (5.29)
P Value	0.946	0.107

Puerto Rico had interestingly different Z scores for male (Z=2.36) and female (Z=0.80) cognitive disabilities, making it higher than the average. West Virginia also had large Z scores for cognitive disability by gender: Z=3.11 for female and Z=2.84 for male (Supplemental Table S1).

Discussion

Based on the data analyzed, prevalence of disability and region in the U.S. is evenly dispersed. This implies that specific consideration of future changes in legal doctrine and healthcare may focus less on disability type and more on the other factors analyzed in this paper. A few states, as mentioned before, had interesting Z scores that made them slightly different in breakdown than other states (Supplemental Table S1). There was a significant difference in the prevalence of any disability and gender when broken down by location, which leaves room for further interpretation and research to determine possible explanations for this outcome. Mobility and cognitive disability prevalence are significantly higher among women than men, which could be helpful in reference to future legislation and health guidance when approaching people who have disabilities. Interestingly, when broken down into four regions in the United States, there was no significant difference in depression prevalence in either the general population or those who had disabilities regionally. This suggests that factors such as climate, social environment, and economic environment may have less of an impact on depression rates and prevalence by location than other factors.

Previous literature addressed existing health disparities and health outcomes. This information, although helpful initially, makes addressing the issues of poor health in

relation to disability more challenging without a more thorough picture. Scrutinization of the distribution of disabilities by region, gender, and disability type allows for a more thorough, specific healthcare and legislative approach to issues regarding this population. One such consideration could be weight management, as there is a strong correlation between obesity, physical disability, and healthcare costs.[9] Another consideration may be ensuring patient education, support, and resources for access to Medicare and Medicaid, since this community continues to struggle with unemployment and employment-based healthcare despite recent decline in these numbers.[10] Given the current events related to the COVID-19 pandemic, it could easily be assumed that a good number of those employed during the prior study may have lost their jobs and the healthcare associated with them.[11] By recognizing mental health as a subset of healthcare that is being underutilized in treatment of people with disabilities and especially those with depression, there is a firm path to take to enact change. Women, in general, trend higher in rate of disability than men. Initial responses to improve health in the disabled population may be able to start here in order to initially address a considerable portion of those affected. Women who have disabilities are especially at risk for a long list of comorbidities including lung disease and cancer, stroke, high blood pressure, visual disturbances, and arthritis.[12] Healthcare providers can heighten their vigilance with this patient population and expand screening for this faction and potentially extend their lives and improve their overall quality of health.

Conclusion

The data collected from the CDC was in the range of 2017 – 2018 and therefore is not as recent as it could be. It was also collected via phone survey, which may cause an

underrepresentation of the American population living with disabilities especially due to the exclusion of those individuals who are deaf or hard of hearing and the decreasing number of people who answer the phone for unrecognized numbers.[13]This may also neglect those people living without access to a phone or who cannot answer the survey questions on their own due to the nature of their disability. Data collected from the Department of Health and Disability Services on the CDC database did not include U.S. territories, leaving out important areas of research.

Other factors contributing to depression, such as socioeconomic status and living circumstances would be useful to compare to rates. Climate and typical weather of a state would also be useful to compare to disability type and prevalence, as well as prevalence of depression, as these can both be factors in mobility, access, and quality of life. Race and immigration status are also critical aspects to analyze in reference to this data, especially considering the refugee crises of the last decade.[14] These factors also come into play with healthcare and healthcare access, which is an especially important issue for those people with disabilities who require regular medical management.

There is a plethora of factors at play in living with a disability and managing life and health. In order to fully understand a population that already struggles with access and care, it is important to analyze the impact that factors such as location and prevalence play in living with a disability. With differences in population by location, a closer look at those states with a larger population of people affected by specific disabilities may allow for education and adjustment to other programs based on the success and outcomes of their state program versus other state's programs. In addition to federal and state program improvement, the healthcare approach can be individually tailored to the diverse

populations requiring care in varied areas of the nation. One such consideration would be offering mental health services in particular to this population of people. Another would be the specific disease risks that both differ and remain similar between men and women living with disabilities, such as cardiovascular disease and depression. In order to best serve people, it is important to understand them and their needs. Once we understand those needs, we are better suited to assist in improving their health outcomes through early intervention, appropriate epidemiological considerations, and improved access to care.

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US State	Female Cognitive Disability Prevalence (%)	Male Cognitive Disability Prevalence (%)	Z Score Female Cognitive	Z Score Male Cognitive
Alaska	8.40	9.10	-1.57	-0.54
Alabama	16.90	14.50	1.49	1.80
Arkansas	17.40	13.70	1.67	1.46
Arizona	12.30	10.00	-0.17	-0.15
California	10.90	9.30	-0.67	-0.45
Colorado	9.70	8.80	-1.10	-0.67
Connecticut	9.00	7.90	-1.35	-1.06
District of Columbia	10.70	9.00	-0.74	-0.58
Delaware	14.20	13.00	0.52	1.15
Florida	14.20	12.50	0.52	0.94
Georgia	12.70	10.80	-0.02	0.20
Guam	11.80	9.60	-0.35	-0.32
Hawaii	9.00	8.30	-1.35	-0.88
Iowa	11.00	8.20	-0.63	-0.93
Idaho	11.10	7.90	-0.60	-1.06
Illinois	9.60	7.60	-1.14	-1.19
Indiana	12.70	11.20	-0.02	0.37
Kansas	11.70	9.50	-0.38	-0.36
Kentucky	17.50	14.60	1.70	1.85
Louisiana	17.50	13.70	1.70	1.46
Massachusetts	12.70	7.70	-0.02	-1.14
Maryland	10.70	6.90	-0.74	-1.49
Maine	11.90	10.20	-0.31	-0.06
Michigan	15.80	11.80	1.09	0.63
Minnesota	10.90	8.50	-0.67	-0.80
Missouri	16.90	9.60	1.49	-0.32
Mississippi	17.90	13.40	1.85	1.33
Montana	13.00	9.50	0.08	-0.36
North Carolina	12.50	9.80	-0.09	-0.23
North Dakota	9.50	6.20	-1.17	-1.79
Nebraska	9.70	8.20	-1.10	-0.93
New Hampshire	11.10	8.80	-0.60	-0.67
New Jersey	9.80	10.90	-1.07	0.24
New Mexico	14.00	11.90	0.44	0.68
Nevada	12.10	9.90	-0.24	-0.19
New York	9.70	9.50	-1.10	-0.36
Ohio	13.10	11.90	0.12	0.68
Oklahoma	17.40	12.80	1.67	1.07
Oregon	12.40	11.00	-0.13	0.29
Pennsylvania	12.40	10.60	-0.13	0.11
Puerto Rico	15.00	15.80	0.80	2.36
Rhode Island	13.40	11.80	0.23	0.63
South Carolina	13.70	11.20	0.34	0.37
South Dakota	10.90	8.30	-0.67	-0.88
Tennessee	16.10	12.50	1.20	0.94
Texas	13.90	9.60	0.41	-0.32
Utah	12.40	8.70	-0.13	-0.71
Virginia	10.50	8.80	-0.81	-0.67
Vermont	12.10	8.90	-0.24	-0.62
Washington	12.20	9.10	-0.20	-0.54
Wisconsin	11.60	8.30	-0.42	-0.88
West Virginia	21.40	16.90	3.11	2.84
Wyoming	11.50	9.80	-0.45	-0.23