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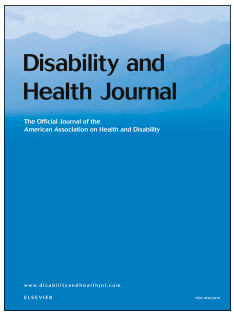

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Psychological Distress and Mental Health Diagnoses in Adults by Disability and Functional Difficulty Status: Findings from the 2021 National Health Interview Survey

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Psychological Distress and Mental Health Diagnoses in Adults by Disability and Functional Difficulty Status: Findings from the 2021 National Health Interview Survey

Abstract

Background: Evidence suggests that disabled people have worse mental health than non-disabled people, but the degree to which disability contributes to mental health is unclear.

Objective: This paper uses 2021 National Health Interview Survey (NHIS) data to estimate the association between disability and depression and anxiety diagnoses as well as psychological distress among adults.

Methods: We calculated disability population prevalence and mental health diagnoses and associated symptoms among 28,534 NHIS respondents. Logistic regressions estimated the odds of depression or anxiety diagnoses and recent psychological distress, controlling for disability and mental health diagnoses. We measured disability using binary and continuum measures of functional disability with the Washington Group Short Set on Functioning.

Results: Disabled people have significantly greater odds of both depression and anxiety diagnoses compared to non-disabled people. Those with high functional disability have 552% greater odds of an anxiety diagnosis (95% CI: 5.61 – 7.58; $p<0.01$) and 697% greater odds of a depression diagnosis (95% CI: 6.97 – 9.12; $p<0.01$) compared to those with no functional disability. Similarly, those with any level of functional disability are more likely to have elevated psychological distress in the past 30 days compared to those with no functional disability.

Conclusions: Findings support the idea that mental health is worse for disabled people compared to non-disabled people, with increasing functional disability associated with worse mental health. This suggests that mental health is not being adequately addressed for those with the greatest functional disability. Future work should seek to better understand the systemic causes of disparities.

Keywords: functional disability, depression, anxiety, distress

Introduction

Mental health can be defined as "a dynamic state of internal equilibrium which enables individuals to use their abilities in harmony with universal values of society" (pp. 231-232).[1] This includes the capabilities necessary for individuals to fully participate in their communities and to fulfill the social roles of their choosing. Adopting such a definition makes clear the importance of mental health for all people to optimally and effectively support well-being. Disability, however, can interfere with one's ability to function in society according to societal norms due to inaccessible and ableist systems.[2] These obstacles to social participation can be damaging to mental health.

Conceptualization of Disability

How disability is defined and conceptualized can have profound impacts on findings and their interpretation.[3] This paper uses both the social model of disability and the biopsychosocial framework of the International Classification of Functioning, Disability and Health (ICF). The social model of disability contends that disability is primarily the result of inaccessible barriers in society, rather than the physical or mental impairment itself. While disability is also uniquely experienced by each individual, research considering a broad range of disability types can help inform interventions at the societal level which have the potential for greater and more effective impact.[4] The biopsychosocial framework of the ICF similarly conceptualizes disability as shaped by both individual medical or health problems and the ability to function within the environment. Considering disability in terms of functional disability, or difficulty with daily activities, rather than diagnosis, thus allows for a broader consideration of how both individual diagnoses and societal structures intersect to construct disability.[5] Conceptualizing disability in terms of functioning, rather than solely based on diagnosis, is an approach that contextualizes disability

broadly within the social context, allowing for identification of overarching trends. Importantly, within the US policy context, disability definitions that are used for benefit determinations by the Social Security Administration are primarily based on functional disability rather than diagnostic status.

Studying specific diagnoses and disabilities is essential for providing useful, specific insights, however, using functional disability instead allows for the evaluation of disparities at the national level of a group that is typically treated as homogenous within systems and by policy. Reduced group specificity is compensated for with understanding of national-level trends using disability constructs that mirror how policy often identifies disability and greater feasibility.

Measurement of Mental Health

There are similarly many methods for measuring mental health symptoms and concerns. National surveys tend typically use validated psychological distress scales due to their ability to identify prevalence of common psychological symptoms that are often associated with an impact on social functioning and additional health care use and costs.[6] Such scales are often preferred to self-report of mental health status as validated scales like the Kessler 6 and the Patient Health Questionnaire have stronger associations with limitations fulfilling one's emotional or physical role.[7] These symptom-based measures allow better identification of symptom prevalence in the population than diagnostic counts as they reflect current mental health status.[8]

The Association between Disability and Mental Health

Previous research into the association between disability and mental health largely finds that mental health symptoms are elevated in disabled people.[i] Studies of mental health and

[i] Throughout this paper, we frequently use Identity-First Language (IFL) rather than Person-First Language (PFL) as disability is a normal and often central identity. For more information, see Ladau.[9]

disability in the United States using national data have used different measures of disability and mental health and/or were conducted prior to the COVID-19 pandemic. When disability was defined using functional disability, disabled adults were found to be at greater risk of both depression and anxiety, with frequent mental distress at a rate about 4 times greater than non-disabled adults. This disparity was even greater for disabled adults who are low-income.[10] Another study used mental health to examine the association between functional disability and mental distress and found significant positive associations between almost all functional difficulty categories and mental distress.[11]

Existing studies about mental health and disability from the COVID-19 pandemic have found that the mental health impact of the COVID-19 pandemic was greater for those with disabilities than those without when defining disability with functional difficulties[12] (e.g., functional disability) or using specific diagnoses.[13-14] Prior to the pandemic, studies of specific diagnoses, rather than studies of functional disability, found positive associations between depression and intellectual disability, autism, chronic pain, limb amputation, and self-reported physical disabilities, though this list is not comprehensive.[15-19] In addition to increased odds of depression in individuals with chronic medical conditions, depression concurrent to such chronic medical conditions has been found to be associated with increased functional disability and lowered productivity.[20] Sareen et al. further found significant associations between anxiety and numerous physical health problems often identified with disability and co-occurrence of anxiety and such diagnoses was associated with worse scores on quality of life assessments.[21]

Some research suggests that the elevated rates of mental health problems in the disabled population are likely more attributable to environmental factors than disability itself. In a study of British adults with intellectual disabilities, the elevated risk of mental health problems was

almost entirely eliminated when controlling for age, gender, and socioeconomic indicators.[22] Honey et al. found that there are minimal mental health differences for young people with a long-term, disabling health condition when controlling for level of social support and financial hardship.[23]

Further research is needed, however, to better understand this connection between mental health and disability at a population level. While some of the existing research about mental health and disability uses a functional definition of disability, the majority of existing research uses specific diagnoses or categories of diagnoses to understand the connection. While doing so allows study of clearly defined groups and disabilities, it neglects many of the more ubiquitous and pervasive experiences of disability related to policy. Furthermore, much prior research was qualitative or used a smaller sample size, limiting generalizability, and many prior studies occurred outside the United States.

The Current Study

This study adopts a broad conceptualization of disability by using a measure based on functional disability which can perhaps provide a more systems- or policy-level understanding of the daily experience of this group. This paper seeks to estimate the incidence of depression, anxiety, and psychological distress across disability groups using the National Health Interview Survey (NHIS) and the United Nations Washington Group Short Set on Functioning (WG-SS). We employed two measures of disability to demonstrate how different operationalizations of disability can yield different results. The WG-SS identifies disability based on functional difficulties or the lack thereof with six universal basic activities (e.g. functional disability). The WG-SS allows for creating both a binary and continuum measure of disability.[24] While such a measure limits the ability to look at specific disability types, it allows for cross-national

comparison and provides a nationally representative sample of the community-dwelling population in the US.

Given that disability diagnoses are often associated with more mental health symptoms, we hypothesized that greater functional disability would be associated with a higher frequency of mental health symptoms and psychological distress, regardless of formal diagnosis of either depression or anxiety. By using NHIS data, we have access to a larger sample than prior work and this allows for prevalence estimates for the United States.

Methods

Data Source

Data for this paper are public use files from the 2021 National Health Interview Survey (NHIS) of the adult sample and were accessed with IPUMS.[25] The NHIS is an annual cross-sectional survey about the health of the civilian, noninstitutionalized population in the United States and is conducted by the Centers for Disease Control and Prevention. One adult from each randomly selected household is randomly selected to participate. The sample is geographically clustered to be nationally representative. Given the COVID-19 pandemic, interviews were conducted via phone from January to April 2021, before regular in-person interviews were resumed. Telephone interviews continued as needed. Sample adults self-report, though proxies can be used if the respondent is physically or mentally unable to do so.[26]

The 2021 NHIS included questions about how frequently various aspects of psychological distress were experienced in the last 30 days. The data include survey weights, strata, and PSUs that must be employed to make results generalizable.[26] NHIS data have previously been used in disability research, for example, with questions of disability prevalence,[27-28] work disability,[29] and mental health.[11]

Sample

This study uses the adult sample of 29,482 adult respondents to the 2021 NHIS. To preserve sample size, multiple imputation using chained equations was conducted for missing values for control variables, increasing usable sample from 25,007 complete cases to 28,534. No variables were missing in more than 10% of the data. The NHIS data include weights to account for each individual's probability of selection based on age, race/ethnicity, and sex based on Census Bureau population controls.

Measures

***Disability*.** Disability was identified with the WG-SS. This set of 6 questions asks about different categories of universal basic activities: vision, hearing, mobility, cognition, self-care, and communication. Response options are "No difficulty," "Some difficulty," "A lot of difficulty," and "Cannot do at all." The WG-SS results in a binary measure of disability, where those who respond as having "A lot of difficulty" or a complete inability to do one or more of the activities are coded as disabled. All other respondents are coded as non-disabled per WG-SS guidelines. This measure is intended to provide a measure for disability that can be feasibly assessed in surveys and interviews.[24] For this study, we did not conduct analysis on responses to individual items in the WG-SS, instead looking at the overall indicator of disability.

While we use this standard binary in analysis, we also used the WG-SS questions to create a continuum measure of functional disability, reflecting no difficulty, mild or moderate difficulty (reporting some difficulty in at least one category, but not a lot of difficulty in any category), and a lot of difficulty or inability (reporting a lot of difficulty or inability in at least one category). This approach is consistent with previous work[30] and allows for greater nuance in the identification of disability compared to the standard binary which would not consider

someone with mild or moderate disability as disabled. While the WG-SS can be a useful tool for comparing disability prevalence, the typical dichotomization counts only those with a lot of difficulty or complete inability to do a task as disabled. Since we conceptualize disability as a spectrum which would include those reporting some difficulty as disabled, we wanted to also use a continuum measure to better delineate how level of functional disability relates to mental health. As such, we estimate models with both methods of disability categorization. Within our sample, Cronbach's alpha for the WG-SS is acceptable at 0.64. For clarity in discussion of results, we refer to the binary as disabled/not disabled and the continuum measure according to the level of functional disability, reflecting the functional difficulties identified in the WG-SS.

Mental Health. Three measures related to mental health were used. Participants were asked "have you ever been told by a doctor or other health professional that you had any type of anxiety disorder?" and "have you ever been told by a doctor or other health professional that you had any type of depression?" These questions were dummy coded to represent whether the respondent has ever had an anxiety or depression diagnosis. For both, 0 is used for no diagnosis and 1 for a diagnosis. The third measure of mental health is the Kessler 6 (K6) scale of nonspecific psychological distress. The six questions of the scale ask respondents how frequently in the past month they experienced certain symptoms of psychological distress, including: (1) nervousness; (2) hopelessness; (3) restlessness; (4) depression; (5) how much of an effort everything felt; and (6) feelings of worthlessness. For example, "during the past 30 days, about how often did you feel restless or fidgety?" and "how often did you feel so depressed that nothing could cheer you up?" Responses range from "none of the time" (coded as 0) to "all of the time" (coded as 4). These responses are then summed (possible range of 0-24), with 13 and above considered severe psychological distress.[31] For severe psychological distress, the K6 has

high reliability (α=0.89).[32] This scale has been further validated for scores greater than or equal to 5 but less than 13 to be considered moderate psychological distress, with AUC=0.82.[33] In our sample, there was high reliability of the K6 scale, with a Cronbach's alpha of 0.85.

***Demographic characteristics*.** Sex was dummy coded with 1 indicating female and 0 indicating male. Race was coded categorically as white, Black, Asian, and other. Additionally, a dummy variable was coded with 1 for Hispanic and 0 for non-Hispanic. Age is a continuous variable. Education was coded with the categories "Less than High School," "High School or GED," "Some College," and "College Degree or Greater." The "Less than High School" category is used as the reference group. Employment was coded with 1 indicating employed and 0 indicating unemployed. A continuous measure of income to the poverty line was used. This variable ranges from 0 to a top-coded 11 and measures the ratio of the respondent's family's income to the Official Poverty Measure. The Official Poverty Measure is a federally determined income threshold for poverty status based on basic need. This measure accounts for family size and thus provides a more nuanced representation of a family's overall socioeconomic status compared to the individual income ranges available within the NHIS public use files.

Analysis

Using person-level weights, strata, and primary sampling units, we calculated population prevalence of disability, anxiety, depression, and psychological distress. For population prevalence, only the standard WG-SS binary was used as this is the measure commonly used for national comparisons of disability prevalence. Then, we employed logistic and ordinal logistic regression models to estimate odds ratios of having depression or anxiety diagnoses by disability status (using both the binary and continuum measures) as well as odds ratios of having mild, moderate, or severe psychological stress with and without controlling for anxiety or depression

diagnoses. We controlled for these mental health diagnoses as we would expect heightened psychological distress among those with such diagnoses and we hoped to gain insight into the disparity in psychological distress between those with and without disabilities regardless of diagnosis. We controlled for education, poverty status, race, ethnicity, sex, employment, and age. We checked the assumptions of binary and ordinal logistic regressions, including multicollinearity and parallel slopes, and the results were satisfactory. We used a Wald test to evaluate which model best fit the data and determined that only age-squared sufficiently improved fit to merit inclusion in some models. The interaction between disability status and mental health diagnosis was not statistically significant. To compare how results differ based on how disability is defined, two conceptualizations of disability – a binary and a continuum – were used to create a more complex understanding of mental health symptoms in the disabled population. A 95% confidence level was used throughout.

Results

Descriptive Findings

Sample and population-level descriptive statistics are in Table 1. Column one presents sample descriptive statistics while columns two through four present populations level statistics overall, among those identified as disabled using the binary measure, and among those identified as non-disabled using the binary measure, respectively. The sample was more likely to be white, female, and employed, with a college education or greater. Average age was 52 with an average ratio to the Official Poverty Measure of 4.26. In the sample of 28,534, 10.0% (2,850) are identified as disabled using the binary measure, though only 53.5% (15,277) report no functional disability on the continuum measure and 36.5% (10,407) report moderate functional disability. The sample's mean psychological distress score is 2.61 (95% CI: 2.57-2.66; possible range 0-

24), with 3.5% (1,008) reporting severe psychological distress in the preceding 30 days. The Chi-square analysis of the distribution of disability status and psychological distress confirms there is a statistically significant association between disability status and level of psychological distress ($p<0.01$). Additionally, 18.3% (5,213) of the sample had a depression diagnosis at some point, while 16.5% (4,702) had an anxiety diagnosis.

Moving to the population-level descriptives, using the binary measure, 8.5% of the population is classified as disabled. The disabled population is more likely to be white and female compared to the non-disabled population. The disabled population is also more likely to be unemployed, has lower average education, is older, and poorer. With the continuum measure of functional disability, 56.8% report no functional disability, 34.6% report some functional disability, and 8.5% report a lot of functional disability. The population mean score on the non-specific psychological distress scale is 2.65 (95% CI: 2.59-2.71; possible range: 0-24), with a mean score of 5.75 for the disabled subgroup (95% CI: 5.46-6.03) and 2.36 for the non-disabled subgroup (95% CI 2.30-2.42). The weight-corrected Chi-square confirms that statistically significant association between disability status and level of psychological distress within the population estimates. Looking at the distribution of the severity of psychological distress across these groups, only 54.0% of the disabled subgroup have scores indicating no or mild distress compared to 82.0% of the non-disabled subgroup.

While 17.4% of the entire population reports a depression diagnosis at some point, 39.9% of the disabled population and 15.3% of the non-disabled population report such a diagnosis. A similar pattern appears for anxiety, with 16.5% of the entire population reporting an anxiety diagnosis compared to 35.1% of the disabled population and 14.6% of the non-disabled

population. For both diagnoses, the difference in diagnosis across groups is statistically significant at the $p<0.001$ level.

[Insert Table 1 about here.]

Mental Health Diagnoses

The odds ratios from the logistic regressions predicting anxiety and depression diagnoses by disability status are presented in Table 2.

***Anxiety*.** Using the binary measure of disability, those who are disabled have 3.63 times greater odds of having an anxiety diagnosis than those who are non-disabled (95% CI: 3.18 – 4.14; $p<0.01$). For the continuum measure of functional disability, those with some functional disability have 2.77 times greater odds of having an anxiety diagnosis (95% CI: 2.52 – 3.05; $p<0.01$) while those with a lot of functional disability have 6.52 times greater odds of having an anxiety diagnosis (95% CI: 5.61 – 7.58; $p<0.01$) compared to those with no functional disability. The difference between odds ratios associated with some functional disability and a lot of functional disability is significant at the $p<0.01$ level.

***Depression*.** Using the binary measure of disability, those who are disabled have 3.82 times greater odds of having a depression diagnosis than those who are non-disabled (95% CI: 3.15 – 3.77; $p<0.01$). For the continuum measure of functional disability, those with some functional disability have 3.45 times greater odds of having a depression diagnosis than those with no functional disability (95% CI: 3.15 – 3.77; $p<0.01$) while those with a lot of functional disability have 7.97 greater odds of having a depression diagnosis (95% CI: 6.97 – 9.12; $p<0.01$). The difference between odds ratios associated with some functional disability and a lot of functional disability is significant at the $p<0.01$ level.

[Insert Table 2 about here.]

Psychological Distress

***Binary Measure of Disability*.** Table 3 displays models estimating severity of psychological distress using the binary measure of disability. Model 1 presents odds ratios of different psychological distress severity levels without controlling for depression and anxiety diagnoses. Model 2 expands from the previous model by including depression and anxiety diagnoses as independent variables. In Model 1, being disabled is associated with 417% greater odds of placing in the next highest category (95% CI: 4.60 – 5.80; $p<0.01$). We then controlled for mental health diagnoses to better identify the association between disability and recent psychological distress, absent common co-occurring mental health diagnoses we would expect to be associated with elevated psychological distress. With these controls, presented in Model 2, the odds ratio decreases to approximately 239% greater odds of being in the next category (95% CI: 3.01 – 3.81; $p<0.01$). A depression diagnosis is associated with 437% greater odds of higher symptom severity (95% CI: 4.87 – 5.92; $p<0.01$) while an anxiety diagnosis is associated with 209% greater odds (95% CI: 2.77 – 3.45; $p<0.01$).

[Insert Table 3 about here.]

***Continuum Measure of Disability*.** Table 4 presents similar models to Table 3, but instead employs the continuum measure of functional disability. In Model 1, some functional disability is associated with 266% greater odds of placing in the next highest category (95% CI: 3.34 – 4.01; $p<0.01$) and a lot of functional disability is associated with 1,034% greater odds (95% CI: 9.99 – 12.88; $p<0.01$). When existing diagnoses for depression and disability are also controlled for in Model 2, some functional disability becomes associated with 155% greater odds of greater distress (95% CI: 2.32 – 2.80, $p<0.01$) while a lot of functional disability is associated with 519% greater odds (95% CI: 5.44 – 7.05; $p<0.01$). A depression diagnosis is associated with

371% greater odds of higher symptom severity (95% CI: 4.27 – 5.20; p<0.01) while an anxiety diagnosis is associated with 192% greater odds (95% CI: 2.62 – 3.26; p<0.01).

[Insert Table 4 about here.]

Discussion

The purpose of this study was to explore rates of mental health diagnoses and associated symptoms across groups of individuals based on disability status. We hypothesized that those classified as disabled would have greater rates of depression and anxiety as well as elevated symptoms of psychological distress regardless of whether they had a depression or anxiety diagnosis compared to those without a disability. Similarly, we expected that odds of elevated psychological distress would increase along with level of functional disability. These hypotheses were supported by our findings, which found higher odds of depression and anxiety diagnoses for the disabled group as well as for those with functional disability of any level compared to those with no reported disability. When employing a continuum measure of functional disability rather than binary measure of disability, odds of diagnoses increased as greater functional disability was reported.

In our models focused on psychological distress scores, the binary and continuum measures of disability were associated with greater psychological distress, regardless of anxiety or depression diagnoses. Odds of greater psychological distress increased with functional disability with the least functional disability associated with 155% greater odds of more severe psychological distress while the greatest functional disability was associated with 519% greater odds. The interaction of disability status and mental health diagnosis was not statistically significant, suggesting that the combination of disability and a mental health diagnosis is not additive to or protective for psychological distress.

These findings are largely consistent with previous literature that has found greater mental distress, depression, and anxiety among the disabled population compared to those without a disability.[10,21] While some prior work has found that the impact of disability itself is minimal when controlling for environmental and socioeconomic factors,[22-23] we identified sizable and significant associations for both the binary and continuum measures of disability when controlling for a variety of such factors. This difference could be partially attributable to our focus on disability broadly, rather than a specific subset, or our inability to control for disability onset. Multiple studies find that disability onset is associated with extreme psychological distress, but this is attenuated over time.[34-35] Regardless of the role timing plays in poor mental health, our findings suggest that the mental health needs of disabled adults are not being adequately met. Even with a diagnosis of anxiety or depression, disabled adults, regardless of measurement method, are predicted to have greater symptoms of psychological distress.

Guided by the social and biopsychosocial models of disability, we theorize that a significant portion of the elevated psychological distress rate is attributable to ableism both in daily life and within healthcare practice. Ableism refers to discriminatory practices and attitudes towards disabled individuals. Odds of psychological distress are thus theorized to increase with level of functional disability because those with lower levels of disability face fewer practical and ableist obstacles to fulfilling social roles, healthcare access, and optimal social integration. Given prior work that has found minimal mental health disparity when controlling for environment and over time,[22-23] good mental health is not mutually exclusive with disability. These results suggest that the mental healthcare system is inadequately supporting those with disabilities.

However, these data are from 2021, around the height of the COVID-19 pandemic. Given the greater susceptibility to COVID-19 for many people with disabilities, the size of these disparities could be greater than before the start of the pandemic. However, the impacts of COVID-19 on mental health in this population will likely be long-lasting as COVID-19 has become endemic. As time goes on and more data collected since the start pandemic are released, repeating this analysis may prove useful to better contextualize and understand the size of these disparities.

In this work, the definitions of disability and mental health are crucial. As Grönvik discussed, how disability is defined has profound implications for findings and conclusions.[2] Here, employing the Washington Group measures had clear strengths, but also drawbacks. Importantly, the Washington Group measures focus on functional disability and asks questions that are related to social functioning. As such, the Washington Group measures are highly compatible with a social approach to disability, where disability is not simply a matter of a medical condition but the ways in which societal structures and expectations create disability. Using functional abilities over diagnoses thus gives a sense of how health conditions or disabilities impact how one navigates the world. While diagnoses allow for small, focused groups, the wide range in how conditions can be treated and managed can complicate the ability to understand how a diagnosis manifests in daily life. That said, asking about functional disability can miss people who answer negatively to these questions because of careful health management. Given the potential burden of such practices, measuring current functional disability arguably misses some of the population of interest. Even with well-managed health conditions, this sub-population likely experiences stressors that are at least similar to those reporting current functional disability.

Limitations

The primary limitation of this study is that analyses are correlational and not causal. Our analyses also assume a unidirectional relationship between disability and mental health. It is much more likely that this relationship is bidirectional and in fact, existing work has found that depression and anxiety is associated with worse health and increased functional limitation.[36-37] Future research that can better account for this bidirectional relationship would further strengthen our understanding of how to adequately meet mental health needs.

Additionally, our mental health definitions are not fully comprehensive. While our measure of psychological distress is effective at gaining insight into mental health concerns, it is a non-specific tool. More importantly, using diagnoses (here, disability diagnosis and mental health diagnosis) as both independent and dependent variables is potentially problematic because diagnosis is conditioned upon access to and quality of healthcare. We know that certain groups, particularly racial minorities, may experience disparities in receiving diagnoses for many different types of conditions. As such, there may be latent constructs that are unmeasured in our data. However, diagnoses remain useful for understanding disparities in mental health care among those who are diagnosed.

These measures of mental health diagnosis also fail to account for timing or currentness of diagnosis, meaning that some respondents indicating depression and/or anxiety are not currently experiencing it. This would likely understate disparities in psychological distress. Given the often ongoing and recurring nature of mental health concerns, however, using “ever diagnosed” can at the very least indicate some level of heightened vulnerability to psychological distress. Repeating this analysis with data on the current status of mental health diagnoses would

provide further insight into how mental health diagnoses relate to predicted psychological distress severity.

Conclusion

Disabled adults have significantly and dramatically higher odds of depression and anxiety diagnoses. This population is also estimated to have greater psychological distress regardless of depression and anxiety diagnoses, with such diagnoses predicting greater psychological distress disparities between those with and without disability. Given that these findings suggest inadequate mental health care services for disabled adults, future research should seek to better identify these gaps in services and supports as well as the causes of this disparity. Specifically, future research should seek to better understand how ableism manifests in the mental health system, causing psychological distress to be poorly addressed and treated among those with disabilities compared to the non-disabled population. Better understanding of the root causes of these disparities can inform better mental health interventions for this population.

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Table 1: Population Prevalence

	(1) Sample % (n)/Mean (95% CI)	(2) Entire Population % (n)/Mean (s.e.)	(3) Disabled (using binary measure) % (n)/Mean (s.e.)	(4) Non-Disabled (using binary measure) % (n)/Mean (s.e.)
Kessler 6 Score	2.61 (2.57-2.66)	2.65 (0.03)	5.75 (0.15)***	2.36 (0.03)
Kessler 6 Psychological Distress Severity				
None/Mild	79.9% (22,810)	79.6% (194,853,895)	54.0% (11,267419)***	82.0% (183,586,476)
Moderate	16.5% (4,716)	16.8% (41,019,505)	29.9% (6,242,713)***	15.5% (34,776,792)
Severe	3.5% (1,008)	3.7% (8,993,902)	16.1% (3,347,857)***	2.5% (5,646,042)
Depression				
No Diagnosis	81.7% (23,321)	82.6% (202,317,866)	60.1% (12,529,265)***	84.7% (189,788,621)
Diagnosis	18.3% (5,213)	17.4% (42,549,411)	39.9% (8,328,724)***	15.3% (34,220,667)
Anxiety				
No Diagnosis	83.5% (23,832)	83.7% (204,847,198)	64.9% (13,536,960)***	85.4% (191,310,227)
Diagnosis	16.5% (4,702)	16.3% (40,020,079)	35.1% (7,321,029)***	14.6% (32,699,061)
Binary Disability Status				
Disabled	10.0% (2,850)	8.5% (20,857,991)	100%	0%
Non-Disabled	90.0% (25,684)	91.5% (224,009,286)	0%	100%
Functional Disability (Functional Difficulty Level)				
None	53.5% (15,277)	56.8% (139,176,365)	0%	62.1% (139,176,343)
Some	36.5% (10,407)	34.6% (84,832,946)	0%	37.9% (84,832,945)
A Lot	10.0% (2,850)	8.5% (20,857,991)	100%	0%
Education				
Less than High School	1.9% (531)	2.2% (5,321,284)	3.5% (695,289)	2.1% (4,625,993)
High School or GED	27.5% (7,860)	31.3% (76,838,446)	44.8% (9,351,381)***	30.1% (67,487,077)
Some College	30.2% (8,610)	29.2% (71,475,607)	30.5% (6,382,943)***	29.1% (65,092,664)
College or Greater	40.4% (11,534)	37.3% (91,231,940)	21.2% (4,428,376)***	38.8% (86,803,554)
Ratio to the Official Poverty Measure	4.26 (4.22-4.29)	4.22 (0.04)	2.89 (0.06)***	4.34 (0.04)

Race				
White	79.1% (22,579)	78.0% (190,966,455)	80.7% (16,844,151)	77.8% (174,122,308)
Black	11.1% (3,184)	12.3% (30,133,514)	12.8% (2,689,141)	12.2% (27,444,386)
Asian	6.2% (1,770)	6.0% (14,664,979)	2.3% (480,727)***	6.3% (14,184,268)
Other	3.5% (1,001)	3.7% (9,102,304)	4.2% (843,971)	3.7% (8,258,349)
Ethnicity				
Hispanic	13.6% (3,885)	16.7% (40,929,345)	13.5% (18,024,592)**	17.0% (185,913,350)
Not Hispanic	86.4% (24,649)	83.3% (203,937,932)	86.5% (2,833,397)**	83.0% (38,095,938)
Sex				
Female	54.6% (15,593)	51.7% (126,640,924)	58.0% (12,103,075)***	51.1% (114,537,853)
Male	45.4% (12,941)	48.3% (118,226,353)	42.0% (8,754,914)***	48.9% (109,471,435)
Employment Status				
Unemployed	42.1% (12,012)	37.6% (92,102,272)	75.3% (15,710,623)***	34.1% (76,391,647)
Employed	57.9% (16,522)	62.4% (152,765,005)	24.7% (5,147,366)***	65.9% (147,617,641)
Age	52.44 (52.23-52.66)	48.07 (0.17)	60.9 (0.49)***	46.9 (0.17)
N	28,534	28,534	2,850	25,684
Population Size	-	244,867,277	20,857,989	224,009,288

Note. Disability is identified using the Washington Group Short Set on Functioning (WG-SS). Counts may not add up to sample or population size due to rounding following multiple imputation. Asterisks in column 3 convey statistically significant difference between the variable estimates based on disability status.

Table 2: Odds Ratios for Binary Logistic Regressions Estimating Odds of Diagnosis

VARIABLES	(1) Anxiety Model 1	(2) Anxiety Model 2	(3) Depression Model 1	(4) Depression Model 2
Disability Binary				
Non-Disabled (reference)	1	-	1	-
Disabled	3.63 (3.18-4.14)***	-	3.82 (3.40-4.31)***	-
Functional Disability				
None (reference)	-	1	-	1
Some	-	2.77 (2.52-3.05)***	-	3.45 (3.15-3.77)***
A Lot	-	6.52 (5.61-7.58)***	-	7.97 (6.97-9.12)***
Education				
Less than High School (reference)	1	1	1	1
High School or GED	0.87 (0.63-1.20)	0.85 (0.61-1.17)	0.94 (0.68-1.30)	0.92 (0.66-1.27)
Some College	1.04 (0.74-1.45)	1.02 (0.61-1.17)	1.17 (0.84-1.63)	1.16 (0.84-1.61)
College or Greater	0.91 (0.66-1.27)	0.96 (0.69-1.33)	1.00 (0.71-1.40)	1.06 (0.75-1.49)
Ratio to the Official Poverty Measure	0.95 (0.93-0.96)***	0.96 (0.95-0.98)***	0.94 (0.93-0.96)***	0.96 (0.94-0.97)***
Race				
White (reference)	1	1	1	1
Black	0.45 (0.39-0.53)***	0.46 (0.39-0.54)***	0.49 (0.43-0.57)***	0.50 (0.43-0.58)***
Asian	0.24 (0.19-0.31)***	0.27 (0.21-0.34)***	0.27 (0.21-0.34)***	0.30 (0.24-0.38)***
Other	0.89 (0.0.69-1.14)	0.83 (0.64-1.07)	0.99 (0.75-1.30)	0.91 (0.68-1.22)
Ethnicity				
Not Hispanic (reference)	1	1	1	1
Hispanic	0.39 (0.34-0.45)***	0.41 (0.36-0.47)***	0.46 (0.40-0.52)***	0.48 (0.43-0.55)***
Sex				
Male (reference)	1	1	1	1
Female	2.05 (1.89-2.24)***	2.06 (1.89-2.25)***	1.88 (1.73-2.04)***	1.89 (1.74-2.06)***
Employment Status				
Unemployed (reference)	1	1	1	1
Employed	0.60 (0.54-0.66)***	0.63 (0.57-0.70)***	0.57 (0.52-0.63)***	0.60 (0.55-0.66)***
Age	1.04 (1.03-1.06)***	1.04 (1.03-1.05)***	1.05 (1.04-1.07)***	1.05 (1.03-1.06)***
Age squared	1.00 (1.00-1.00)***	1.00 (1.00-1.00)***	1.00 (1.00-1.00)***	1.00 (1.00-1.00)***
Constant	0.21 (0.140-0.33)***	0.15 (0.10-0.23)***	0.16 (0.10-0.25)***	0.10 (0.06-0.16)***

Note. 95% confidence intervals are in parentheses; *** p<0.01, ** p<0.05, * p<0.10; Disability and functional difficulty group are identified using

the Washington Group Short Set on Functioning (WG-SS).

Table 3: Odds ratios of Non-specific Psychological Distress with a Binary Measure of Disability Using Ordinal Logistic Regression

VARIABLES	(1) Model 1	(2) Model 2
Disability		
Non-Disabled (reference)	1	1
Disabled	5.17 (4.60-5.80)***	3.39 (3.01-3.81)***
Mental Health Diagnosis		
No Diagnosis (reference)	-	1
Depression	-	5.37 (4.87-5.92)***
Anxiety	-	3.09 (2.77-3.45)***
Education		
Less than High School (reference)	1	1
High School or GED	0.90 (0.68-1.20)	0.94 (0.71-1.25)
Some College	0.97 (0.72-1.30)	0.90 (0.68-1.20)
College or Greater	0.92 (0.68-1.23)	0.89 (0.66-1.20)
Ratio to the Official Poverty Measure	0.93 (0.91-0.94)***	0.94 (0.93-0.96)***
Race		
White (reference)	1	1
Black	0.79 (0.70-0.90)***	1.13 (0.99-1.28)*
Asian	0.52 (0.43-0.61)***	0.86 (0.72-1.03)
Other	1.36 (1.13-1.63)***	1.46 (1.16-1.84)***
Ethnicity		
Not Hispanic (reference)	1	1
Hispanic	0.60 (0.54-0.67)***	0.86 (0.76-0.97)**
Sex		
Male (reference)	1	1
Female	1.53 (1.41-1.65)***	1.16 (1.07-1.25)***
Employment Status		
Unemployed (reference)	1	1
Employed	0.70 (0.64-0.76***	0.79 (0.72-0.87)***
Age	0.97 (0.97-0.97)***	0.98 (0.98-0.98)***

Note. 95% confidence intervals are in parentheses; *** p<0.01, ** p<0.05, * p<0.10; Disability is identified using the Washington Group Short Set on Functioning (WG-SS).

Table 4: Odds Ratios of Non-specific Psychological Distress with a Continuous Measure of Functional Disabilityy Using Ordinal Logistic Regression

VARIABLES	(1) Model 1	(2) Model 2
Functional Disability		
None (reference)	1	1
Some	3.66 (3.34-4.01)***	2.55 (2.32-2.80)***
A Lot	11.34 (9.99-12.88)***	6.19 (5.44-7.05)***
Mental Health Diagnosis		
No Diagnosis (reference)	-	1
Depression	-	4.71 (4.27-5.20)***
Anxiety	-	2.92 (2.62-3.26)***
Education		
Less than High School (reference)	1	1
High School or GED	0.88 (0.65-1.17)	0.93 (0.69-1.23)
Some College	0.95 (0.71-1.28)	0.90 (0.67-1.20)
College or Greater	0.97 (0.72-1.31)	0.94 (0.70-1.26)
Ratio to Official Poverty Measure	0.94 (0.92-0.95)***	0.95 (0.93-0.96)***
Race		
White (reference)	1	1
Black	0.83 (0.73-0.94)***	1.14 (1.00-1.29)*
Asian	0.59 (0.49-0.70)***	0.92 (0.76-1.11)
Other	1.26 (1.04-1.53)**	1.37 (1.09-1.73)***
Ethnicity		
Not Hispanic (reference)	1	1
Hispanic	0.64 (0.57-0.72)***	0.89 (0.79-1.01)*
Sex		
Male (reference)	1	1
Female	1.52 (1.41-1.65)***	1.17 (1.08-1.27)***
Employment Status		
Unemployed (reference)	1	1
Employed	0.74 (0.67-0.81)***	0.83 (0.75-0.91)***
Age	0.96 (0.96-0.97)***	0.97 (0.97-0.97)***

Note. 95% confidence intervals are in parentheses; *** p<0.01, ** p<0.05, * p<0.10; Functional difficulty group are identified using the Washington Group Short Set on Functioning (WG-SS).