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Depressive symptoms and work in Indigenous people

Brett Shannon^{a,*}, Kirsten S. Almberg^a, Courtney Ryder^b, Tessa Bonney^a, Linda Forst^a, Lee S. Friedman^a

^aDivision of Environmental and Occupational Health Sciences, School of Public Health, University of Illinois Chicago, Chicago, IL, United States

^bCollege of Medicine and Public Health, Flinders University, Adelaide, Australia

Abstract

Background: Adverse social and environmental factors outside of the health system play an important role in disparate mental health (MH) outcomes, including access to quality employment. American Indian/Alaskan Native (AIAN) workers are at risk but have been left out of research.

Aim: To describe the characteristics of AIAN adults with depressive symptoms and to examine their sociodemographic, health, functional and disability characteristics by work status.

Methods: Utilizing the National Health Interview Survey (NHIS) data for years 2020 and 2022, we evaluated differences in MH symptoms, diagnoses, and treatment between working and non-working AIAN adults. We undertook a descriptive analysis of socio-demographic and health characteristics. Three sets of multivariable logistic regression models were undertaken to (1) evaluate the association between employment status and MH outcomes, (2) associations with MH outcomes in working AIAN adults, (3) associations with mental health outcomes in non-working AIAN adults.

Results: AIAN adults not currently employed had higher odds (1.55, 95%CI:1.03–2.33) of reporting weekly/daily depressive symptoms and ever being diagnosed with depression (1.50, 95%CI:1.02–2.21) compared to employed AIAN adults. Predictors of MH health outcomes differed between working and non-working AIAN adults, including age, education level, location, health care usage and delay of MH treatment.

*Corresponding author at: Environmental and Occupational Health Sciences, School of Public Health, University of Illinois Chicago, 1603 W. Taylor Street, Chicago, IL 60612, United States. bshann3@uic.edu (B. Shannon).

Declaration of competing interest

The authors have no conflicts of interest in regard to this study.

IRB approval

University of Illinois Chicago (UIC) IRB (#2023–0959) has approved this work.

CRediT authorship contribution statement

Brett Shannon: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Kirsten S. Almberg:** Writing – review & editing, Validation, Supervision, Project administration, Methodology. **Courtney Ryder:** Writing – review & editing, Validation, Supervision, Methodology. **Tessa Bonney:** Writing – review & editing, Validation, Supervision, Resources, Methodology. **Linda Forst:** Writing – review & editing, Validation, Supervision, Resources, Methodology. **Lee S. Friedman:** Writing – review & editing, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Conclusions: There is evidence of the impact of work on the MH of indigenous people. An occupational health agenda should include better survey tools, and engagement with AIAN communities, workers, employers and health services to build on the evidence and support local level strategies.

Keywords

Indigenous health; Depression; Occupational health; American Indian; Alaskan native; Mental health

1. Introduction

A global increase in the prevalence of anxiety, depression and major depressive disorder (MDD) has been associated with the SARS-CoV-2 (severe-acute-respiratory-syndrome-related coronavirus) pandemic (World Health Organization, 2022). This increase has also presented an inequitable pattern with 26.6 % of American Indian/Alaskan Native (AIAN) adults experiencing mental illness compared to 22.8 % of all U.S. adults in 2021 (National Alliance on Mental Illness (NAMI), 2023). Major depressive disorder increases suicide risk (Cai et al., 2021) and is a chronic condition that can cause serious functional impairment, substantially interfering with activities of daily living and health related quality of life (Cambridge et al., 2018). The prevalence of major depressive episodes (MDE) in young AIAN adults (18–25 years) quadrupled from 3.6 % in 2016 to 15.4 % in 2019, during the onset of the SARS-CoV-2 pandemic (2019 National Survey on Drug Use and Health: American Indians and Alaska Natives (AI/ANs), 2020). Though depression and other mental health symptoms were well studied during the SARS-CoV-2 pandemic (Ettman et al., 2023), little research has examined impacts on AIAN populations, especially as a comparator group. Of the limited literature published, one nationally representative cross-sectional survey (December 2020 and February 2021, $n = 5500$) did distinguish AIAN from other racial and ethnic groups and found significantly higher ($p < 0.05$) moderate/severe levels of anxiety-depression symptoms (32.1 % vs 25.6 %) and moderate/severe levels of stress (40.9 % vs 33.7 %) in this group compared to non-Hispanic Whites (Nápoles et al., 2023).

Indigenous Social Determinants of Health (SDoH) represent a broader understanding of physical, mental, social, spiritual and cultural components that are couched in local personal and community context (Milroy, 2006) with Indigenous specific SDoH include self-determination, cultural attachment, relationship with land, social capital, racism and justice systems (Gracey and King, 2009). Other SDoH include socioeconomic status, education, income, employment, housing, social supports, access to health care and adverse SDoH play an important role in disparate mental health outcomes (Alegría et al., 2018; Deferio et al., 2019), however there remains a paucity of research characterizing the associations between broader social and structural determinants and mental health outcomes among AIAN.

In 2020, AIANs had the highest unemployment rate in the U.S. (11.7 % vs 7.3 % for non-Hispanic Whites), coinciding with the lowest labor force participation rate (59.3 %) and employment-population ratio (52.4 %) in the country (U.S. Bureau of

Labor Statistics, 2021). Employment has been associated with positive social identity and status, psychological wellbeing, improved physical health, and reduced mortality (Waddell and Burton, 2006). Long-term unemployment can result in symptoms of isolation and depression, as well as family and social disruption and declines in physical and psychological health (Paul and Moser, 2009; Wanberg, 2012). Discrimination during the job seeking and on-the-job experiences also impact psychological well-being. A nationally representative, probability-based telephone survey found approximately three in ten AIAN adults reported being personally discriminated against because of their race when applying for jobs (31 %), in circumstances involving equal pay, and when being considered for promotions (33 %) (Findling et al., 2019). Despite this, there is a lack of information surrounding the health benefits of good work for Indigenous peoples, and specifically on the association between depression, depressive symptoms and mental health outcomes and employment and employment characteristics, in part due to limitations of race/ethnicity definitions and small samples in available data sources.

Using the social determinants of health theoretical framework, we aim to evaluate the relationship between depressive symptoms, diagnoses and treatment and employment status and related social determinants of health in AIAN adults. Utilizing the National Health Interview Survey (NHIS) data for years 2020 to 2022, we aim to evaluate the relationship between employment status and depressive symptoms, diagnoses and treatment in AIAN adults.

2. Methods

2.1. Data sources

NHIS data for years 2020–2022 are used in these analyses. NHIS is a cross-sectional household survey with a multistage area probability design (Centers for Disease Control and Prevention (CDC), 2023). Because the survey was restructured in 2019, we limited our sample to only the three subsequent years of combined data (Centers for Disease Control and Prevention (CDC), 2023). We used variables from the sample adult files, merged by year. We then divided the weight variable by three to account for this merge. All participants in NHIS were asked all applicable survey questions with skip patterns. Response options for “refuse to answer”, “don’t know”, or “not ascertained” were recoded and treated as missing data in the analysis. This data is de-identified and not considered to be human subjects research. A claim of exemption was approved by UIC IRB protocol # 2023–0959.

2.2. Case definition

We aggregated the following Indigenous groups from the survey into a single Indigenous group: (1) non-Hispanic American Indian Alaskan Native (2) Hispanic American Indian and Alaskan Native and (3) American Indian Alaskan Native and other Race. Ages were limited to adults 18 to 65 years old. Current work status was defined by whether participants worked during the previous week. The total unweighted sample was 88,701; there was a 1165 unweighted count of persons reporting Indigenous status (weighted count $n = 3,938,506$). Persons were considered to have depressive symptoms if they self-reported either daily or weekly depressive symptoms, with the question stated as ‘How often do you feel

depressed?'. If the survey respondent asks whether they are to answer about their depression state after taking mood-regulating medications, the person administering the survey was instructed to say: "Please answer based on your usual use of medication." Information on depressive symptoms was missing in 30 AIAN adults, therefore, where reporting on depressive symptoms the unweighted count is 1135 Indigenous adults (weight counted $n = 3,833,947$).

2.3. Statistical analysis

We examined the industry, occupation, and availability of employer-sponsored health benefits and/or paid sick leave for those currently working. Industry and occupation for 2020 and 2021 were reported based on the major codes of 2007 North American Industry Classification System and 2010 Standard Occupational Classification coding systems (U.S. Census Bureau, 2023; U.S. Department of Labor, Bureau of Labor Statistics, 2018). We used occupation codes to classify workers into blue-collar, white-collar, or service roles based on Bureau of Labor Statistics (BLS) occupational groups (U.S. Department of Labor, Bureau of Labor Statistics, n.d.). The white- and blue-collar occupational series were discontinued in 2007 by the BLS. The white-collar category consists of occupations (such as accountants and sales occupations) with disparate wage and total employee compensation rates (e.g., including bonuses). These categorizations were used because prior research has shown higher psychological demands and work stress in white collar workers compared to blue collar workers (Schreuder et al., 2008; Myrtek et al., 1999), yet this has never been examined in Indigenous workers. State and community residence of adults are not provided within the NHIS sampling frame due to unstable estimates and potential violation of confidentiality; however, region (South, West, Midwest and Northeast) is included (Rose, 2010). Remoteness is classified using the 2013 Urban-Rural Classification Scheme for Counties that separates the scheme into four groups predominantly based on population size (Centers for Disease Control and Prevention (CDC), 2019).

Statistical Analysis Software (SAS) 9.4 (SAS Institute Inc., Cary, NC) was used to conduct survey procedures to account for the complex survey design (strata, PSUs and weights; PROC SURVEYFREQ, PROC SURVEYMEANS, and PROC SURVEYLOGISTIC). Descriptive analysis of demographic variables included age, sex, education, U.S. region, remoteness marital status, family size and country of birth stratified by working status and self-reported depressive symptoms. A descriptive analysis was conducted comparing work variables including occupation type and employment benefits and specific health variables related to health status, comorbidities, pain, disability status, mental health diagnosis and healthcare utilization. For all descriptive statistics, 95 % confidence intervals for the estimate are provided. Following CDC guidelines, an estimate with a coefficient of variation (CV) of 0.3 or above was noted as an unstable estimate (Centers for Disease Control and Prevention (CDC), 2019a) and any estimate with a CV above 0.5 was suppressed.

Multivariable logistic models were developed to evaluate the association between employment status and the following mental health outcomes among AIAN adults: depression symptoms, antidepressant use, previous diagnosis of depression and mental health therapy within the prior 12 months. We controlled for a priori confounders of age,

gender, education, marital status, self-reported health status, and self-reported pain level. In a second series of multivariable logistic regression models we stratified the multivariable models by work status to examine specific factors associated with the following mental health outcomes: depression symptoms, antidepressant use, previous diagnosis of depression and mental health therapy within the prior 12 months. Additionally, the models evaluating non-working population predictors included family structure, disability status and income 200 % below the poverty threshold. A two-sided p -value <0.05 was considered statistically significant. ORs in the adjusted models are presented, including the 95 % confidence intervals (95 % CI).

3. Results

Of working age AIAN adults, an estimated 605,040 persons reported depressive symptoms, or 15.8 % (95%CI:13.4–18.1) of adults (in the weighted sample) aged 18 to 65. Of Indigenous adults working, 13.1 % (95%CI:9.7–16.5) reported depressive symptoms, compared to 20.6 % (95%CI:16.6–24.6 %) of non-working Indigenous adults. For comparison, depressive symptoms in working age adults were reported in 12.0 % (95%CI:11.6–12.5) of non-Hispanic White, 7.9 % (95%CI:7.2–8.5) of Hispanic, and 9.8 % (95%CI:8.8–10.7) of African-American adults. Table 1 presents the demographic characteristics of Indigenous adults by work status and depressive symptoms. Among individuals reporting depressive symptoms, working persons were more educated, had a higher family income and were more likely to be living in urban areas than non-working persons. Non-working AIAN adults with depressive symptoms were significantly older (mean age 46.2, SE 3.2) than all other groups. Both working and non-working groups reporting depressive symptoms were predominantly female. Among working Indigenous adults only, those reporting depressive symptoms were more likely to be divorced, less likely to have completed a bachelor's or graduate degree, and more likely to have a family income 200 % below the poverty line. Non-working Indigenous adults with and without depressive symptoms were similar across most demographic traits; however, non-working adults with depressive symptoms disproportionately reported family income 200 % below the poverty line with rural residency in the South and West of the U.S. Service workers made up nearly one-third (32 % 95%CI:16–48) of the AIAN workforce that reported depressive symptoms. Comparatively, service workers only made up 16 % of the AIAN workforce that was not reporting depressive symptoms (16.3 % 95 % CI:12.2–60.3). The prevalence of depressive symptoms in workers differed significantly by sick leave benefits, with higher depressive symptoms in workers without paid sick leave. Table 2 presents health characteristics of Indigenous adults by working status and depressive symptoms, demonstrating working adults with depressive symptoms had significantly lower self-reported health status and higher proportions of workers with any disabilities or delays in healthcare due to cost compared to workers without depressive symptoms.

AIAN adults who reported depressive symptoms were more likely to report their general health status as good, fair or poor; have two or more comorbidities; have been diagnosed with anxiety and/or depression; have a disability; have difficulty with remembering/ concentrating, vision, hearing, and mobility; experience pain daily; have pain that limits life or work activities at least some days and pain that affects their families and significant

others at least some days regardless of work status. Nearly half of non-working AIAN adults with depressive symptoms experienced daily pain. Health care utilization was higher among those reporting depressive symptoms, regardless of work status.

Of the working AIAN group with depressive symptoms, 60 % (95% CI:47.5–73.3) were taking either anti-depressant medications or had received mental health therapy in the past 12 months; this reduced to 10 % (95% CI:7.3–13.3) of the AIAN working adults who did not report current depressive symptoms. Of the non-working AIAN group with depressive symptoms, there were 56 % (95 % CI 44.3–68.0) currently taking depression medications or who had received mental health therapy in the past 12 months; this reduced to 17.5 % (95 % CI:11.0–24.0) of the AIAN non-working adults who didn't report current depressive symptoms.

In the first set of models (Table 3) we compare working and non-working AIAN adults to evaluate differences in mental health-related outcomes. In the multivariable logistic regression models controlling for age, sex, marital status and education, AIAN adults who were not working when compared to working adults had significantly higher odds of depressive symptoms (aOR = 1.55; 95 % CI: 1.03–2.33), taking a medication for depression (aOR = 1.73; 95% CI:1.15–2.59), receiving mental health therapy in the last 12 months (aOR = 1.75; 95% CI:1.19–2.58), and ever being diagnosed with depression (aOR = 1.50; 95% CI:1.02–2.21) or anxiety (aOR = 1.75; 95% CI:1.25–2.44). Table 4 presents a second set of multivariable models outlining predictors associated with mental health-related outcomes among working Indigenous adults only. Female workers had significant higher odds of current medication use for depression and having a previous diagnosis of depression (p value < 0.05). Adults without a university degree and adults aged 30–39 years (reference older than 50 years) had significantly higher odds of receiving mental health counselling in the prior 12 months. Self-reported pain on most or all days was a significant predictor of all mental health outcomes. No sick leave benefits from employee's current workplace were included as an indicator of poor employment quality and was significantly associated with having a prior diagnosis of depression. Occupation type was included in models shown in Table 5. Occupation and industry data were only included in 2020 and 2021 in NHIS, therefore restricting use of 2022 data reducing the sample size in these models. Blue collar jobs were used as the reference group as we found that service jobs had significantly higher odds for depressive symptoms and previous diagnosis of depression and white-collar jobs had significantly higher odds of previous diagnosis of depression and mental health therapy in the past 12 months.

Table 6 presents a third set of multivariable models outlining predictors associated with mental health-related outcomes among non-working AIAN adults only. Adults without a university degree had significantly lower odds of current depression medication use. Females had a significant higher odds of current depression medication use and adults self-reporting any disability had significantly higher odds of current depressive symptoms and previous diagnosis of depression.

4. Discussion

Using a nationally representative sample, we found that AIAN adults who were not currently employed during the previous week in any capacity had higher odds of reporting weekly/daily depressive symptoms and ever being diagnosed with depression compared to employed AIAN adults. Stratified models showed that predictors of mental health outcomes differed between working and non-working AIAN adults, including age, education, location, health care usage, and delay of mental health treatment.

Factors contributing to depressive symptoms in older adults may include life stressors, medical illness and functional disability, trauma, lower income and education, bereavement, lack of social support, and loneliness (Aziz and Steffens, 2013). Negative influences on mental health in AIAN adults may include detrimental impacts of land dispossession (Moreton-Robinson, 2015), while protective factors may include culture, social supports and self-regulation (Vecchio et al., 2022).

The working AIAN adult depressive group had the highest proportion with delays in care, medications, and counselling due to cost. Many AIANs still live in rural areas, but only 22 % live on reservations or land trusts where the Indian Health Service (IHS) is located, and as of 2010, 60 % of AIANs lived in metropolitan areas outside of IHS areas, creating significant barrier in access to health care (U.S. Department of Health and Human Services, Office of Minority Health, n.d; Forquera, 2001).

Gender disparities are consistent with findings in the general U.S. population, where women were nearly twice as likely than men to have taken medication for their mental health (21.2 % and 11.5 %, respectively) and more likely to have received counselling or therapy from a mental health professional (12.1 % and 7.9 %, respectively) (Terlizzi and Norris, 2020). The significantly higher rates of depressed symptoms for service workers could be related to the SARS-CoV-2 pandemic, with very high rates (74–78 %) of depressive and anxiety symptoms reported in large convenience samples of essential workers during the pandemic (Amsalem et al., 2023). International research has also demonstrated that service workers experience of depressive and anxiety symptoms are incrementally related to the frequency in engagement with complaints and suppression of workers' emotions (Yoon et al., 2017). Service-related occupations (e.g. retail) are also characterized by poor social benefits, lower wages (Allegretto et al., 2013), shift work and work that is precarious in nature (Choper et al., 2021).

Younger AIAN workers were also significantly more likely to have received mental health therapy which was consistent with reporting on all U.S. adults (Terlizzi and Zablotsky, 2020). National data demonstrates higher use of mental health medications in older adults (>44 years) and higher use of therapy and counselling modalities in younger adults (<45 years) (Terlizzi and Zablotsky, 2020). Modality and efficacy of specific mental health treatments by age group may be an important consideration in future Indigenous research.

Discrimination among AIAN adults is an indicator of depressive symptoms, and traditional practices is a protective factor (Whitbeck et al., 2002). Poor employment quality including low wage jobs, discrimination and removal from traditional ties (Masotti et al., 2020)

contribute to negative mental health among Indigenous individuals, while personal achievement, decent work and social benefits can bolster mental health. Community level interventions that consider these factors have yet to be studied.

Generally, it is known that decent work is good for an adult's mental health and this collides with a growing focus worldwide on corporate, community and public organizations' development of Indigenous employment strategies (Illinois Department of Central Management Services, 2023). These strategies are important as a tool for implementing changes, monitoring targets and improving accountability for inclusion, retention, and career progression of Indigenous workers. Cultural safety at work - an environment absent discrimination based on a person's identity (Williams, 1999), is particularly important, given the potential of a culturally unsafe work environment to synergize with other aspects of low quality work to adversely affect mental health; those with a preexisting diagnosis or susceptibility to depression and other mental health conditions are at particular risk. Improving the burden of depression and related mental health outcomes experienced by the AIAN workforce requires a stronger evidence base to inform policy and practice. Baseline information on working conditions that would promote the physical and psychosocial health of Indigenous workers, as well as the barriers to quality employment and related staff satisfaction, are needed; this is particularly important for AIAN adults with comorbid conditions. Further, appropriate tools to assess psychosocial risk in the workplace through a cultural lens, and the collection of race/ethnicity data against a range of occupational health measures, are required. Such evidence will be critical to addressing barriers and enablers of cultural safety and reduction of the risk of work-related depression. This has been impeded by small numbers of Indigenous employees in specific workplaces and/or occupations, but could be remedied by studies intentionally designed to address work and health among AIAN workers. These would include oversampling in surveys, application of community based participatory research, research advisory boards, and targeted intervention studies (i.e., translational research). Importantly, future research should carefully consider cultural safety, privacy protection and confidentiality of AIAN workers. The authorship has developed a framework for consideration of future Indigenous occupational health indicators that requires further feedback from AIAN occupational health stakeholders to develop key indicators made by and relevant to Indigenous people prior to publication.

This study has several limitations. First, NHIS estimates are based on self-reported employment status, with 62.5 % of AIAN adults 18–65 years reporting current employment. For comparison, BLS provides aggregated estimates from 2019 to 2021 that report only 55 % of AIAN adults 16 years and over are employed; this lower percentage is expected lower percentage when including those 16–18 years and those >65 years (Brundage, 2023), likely associated with social, structural and health barriers to employment based on age. Secondly, there are numerous important factors not queried in the survey, specifically more rigorous information on depressive symptoms, treatments and protective factors related to mental health, and factors specific to Indigenous adults. Thirdly, indicators of quality of work, including work-time arrangements, employment stability, length of current employment, current worker rights, cultural safety at work, training and promotion are missing from NHIS and other national surveys. Finally, national survey designs are

problematic for sampling very small minority subpopulations, particularly AIAN adults, who are geographically clustered in some areas, such as rural Indian reservations, and dispersed and geographically invisible in areas such as urban centers. Another limitation is that the NHIS study design limits causal inference. There is a need for investing in longitudinal studies that appropriately include representation of indigenous people in order to further elucidate the relationships identified in this analysis.

In summary, to promote good mental health among AIAN populations, it is critical to build on the evidence regarding the influence of employment conditions and workplaces on mental health, with prioritization of AIAN funding, multisector collaboration, and adequate resourcing for communities to support sustainable local level strategies.

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Table 1

Demographic characteristics of AIAN adults 18–65 by working status and self-reported depressive symptoms, 3 years of data from the National Health Interview Survey 2020–2022.

	Working Indigenous Adults (18–65)		Non-Working Indigenous Adults (18–65)	
	No Depressive Symptoms* (n = 600)	Depressive Symptoms (n = 93)	No Depressive Symptoms (n = 308)	Depression Symptoms (n = 107)
	Percent (95 % CI)	Percent (95 % CI)	Percent (95 % CI)	Percent (95 % CI)
Age				
18–29	28.8 (24, 33.6)	33.6 (20.8, 46.4)	28.3 (46.4, 0.1)	16.1 (0, 35.8)
30–39	21.1 (17.4, 24.7)	22.2 (12.4, 31.9)	10.3 (19.6, 0.2)	17.6 (8.6, 26.7)
40–49	23.7 (19.9, 27.5)	20 (11.7, 28.4)	7.6 (15.5, 0.2)	18.2 (8.4, 28.1)
50–65	26.5 (22.2, 30.7)	24.2 (12.4, 36.1)	31 (41.3, 0.1)	48.1 (31.9, 64.2)
Mean Age	39.97 (SE = 0.68)	38.24 (SE = 1.99)	39.51 (SE = 1.28)	46.15 (SE = 3.17)
Sex				
Male	52.2 (46.6, 57.9)	45 (31.1, 58.8)	47.1 (39.7, 54.5)	45.6 (35.4, 55.8)
Female	47.8 (42.1, 53.4)	55 (41.2, 68.9)	52.9 (45.5, 60.3)	54.4 (44.2, 64.6)
Marital Status				
Married/living with partner	56.8 (52, 61.6)	42.9 (31.1, 54.7)	41.9 (35.6, 48.2)	42.6 (24.4, 60.8)
Divorced, separated or widowed	12.1 (9.6, 14.6)	24.1 (12.2, 35.9)	17.1 (13.3, 20.8)	17.5 (8.4, 26.6)
Single, never married	30.9 (26.3, 35.4)	33 (21.6, 44.5)	40.9 (34.3, 47.5)	39.9 (18.4, 61.4)
Missing	0.2 (0, 0.5)	–	0.1 (0, 0.4)	–
Education				
GED, HS or less than HS	39 (34.6, 43.3)	36.9 (24.6, 49.1)	59.8 (53, 66.7)	60.8 (50.8, 70.8)
Some College; Associate, or Technical degree	39.1 (34.4, 43.8)	48.3 (36.1, 60.5)	31.6 (25.8, 37.5)	33.9 (25.1, 42.6)
Bachelors or Graduate Degree	21.5 (18, 25.1)	13.9 (6.7, 21.1)	7.6 (4, 11.2)	4 (0.7, 7.3)
Missing	0.4 (0, 1.1)	1 (0, 2.9)	1 (0, 2.1)	1.3 (0, 4)
Income				
Family Income <200 % poverty line	34 (27.6, 40.4)	50.8 (37.4, 64.1)	67.5 (57.1, 78)	81.8 (71.7, 91.9)
Remoteness				
Large central metro	25 (18.6, 31.4)	30.9 (18, 43.7)	17.8 (9.7, 25.8)	9.7 (3.6, 15.8) ^a
Large fringe metro	14.4 (10, 18.8)	15.5 (5, 26) ^a	16.8 (8.7, 25)	15.1 (5.6, 24.5) ^a
Medium and small metro	31.8 (23.4, 40.1)	31.9 (19.6, 44.2)	31.8 (19, 44.5)	27.4 (14.3, 40.6)
Non - metro	28.8 (15.5, 42.2)	21.7 (12.6, 30.8)	33.6 (12.6, 54.7) ^a	47.8 (27.4, 68.2)
Region				
Northeast	6.7 (4.2, 9.3)	10.4 (1.8, 19)	9.1 (4.9, 13.2)	8.3 (3.2, 13.3) ^a
Midwest	17.3 (12.8, 21.7)	16 (7.8, 24.2)	21 (12.1, 29.8)	11.7 (3.4, 20) ^a
South	38.5 (29.7, 47.3)	42.6 (30.1, 55)	32.3 (20.1, 44.5)	44.5 (26, 63.1)
West	37.5 (25.7, 49.2)	31 (19.6, 42.4)	37.7 (17.7, 57.6)	35.5 (12.2, 58.8) ^a

	Working Indigenous Adults (18–65)		Non-Working Indigenous Adults (18–65)	
	No Depressive Symptoms* (n = 600)	Depressive Symptoms (n = 93)	No Depressive Symptoms (n = 308)	Depression Symptoms (n = 107)
	Percent (95 % CI)	Percent (95 % CI)	Percent (95 % CI)	Percent (95 % CI)
Occupational Type (2020/2021) Blue Collar	29 (23.4, 34.5)	16.3 (1, 31.6) ^a		
White Collar	54.7 (49.1, 60.3)	51.7 (35.6, 67.8)		
Service Job	16.3 (12.2, 20.5)	32 (16, 48)		
Work benefits – no sick leave	33.5 (29, 38)	54.1 (41.7, 66.5)		
Work benefits – no health insurance	31.9 (27.4, 36.4)	42.8 (6, 54.6)		

^aCV = 0.3–0.5.

* Self-reported either daily or weekly depressive symptoms.

Table 2

Health characteristics of AIAN adults 18–65 by working status and self-reported depressive symptoms, 3 years of data from the National Health Interview Survey 2020–2022.

	Working Indigenous Adults (18–65)		Non Working Indigenous Adults (18–65)	
	No Depressive Symptoms* (n = 600)	Depressive Symptoms (n = 93)	No Depressive Symptoms (n = 308)	Depression Symptoms (n = 107)
	Percent (95 % CI)	Percent (95 % CI)	Percent (95 % CI)	Percent (95 % CI)
General Health Status				
Very Good to Excellent	57.8 (51.2, 64.3)	33.5 (21.6, 45.4)	48.1 (40.4, 55.7)	18.3 (5.6, 31) ^a
Good, Fair or Poor	42.2 (35.7, 48.8)	66.5 (54.6, 78.4)	51.9 (44.3, 59.6)	81.7 (69, 94.4)
Multimorbidity index				
No comorbidities	50.6 (45.2, 56.1)	23.7 (14.5, 32.9)	48.7 (41.9, 55.5)	14.3 (6.7, 21.9)
1 comorbidity	30.8 (25.5, 36.1)	38 (25.6, 50.4)	24 (18.8, 29.2)	23.3 (7.7, 38.9)
2+ comorbidities	18.6 (15.1, 22)	38.3 (26.4, 50.2)	27.2 (22, 32.5)	62.4 (42.1, 82.7)
Ever diagnosed with anxiety	13.5 (10.6, 16.5)	66.1 (53.4, 78.9)	19.8 (13, 26.5)	71.5 (61.6, 81.4)
Ever diagnosed with depression	11 (7.9, 14.2)	75.5 (62.9, 88.1)	15.8 (9.8, 21.9)	75.6 (64.2, 86.9)
Missing	.	.	.	0.8 (0.2)
Disability				
Any Disability	4.1 (2.1, 6.1)	22.6 (13.6, 31.6)	20.4 (14.4, 26.4)	39.3 (29.3, 49.2)
Difficulty communicating	4.5 (2.4, 6.5)	8 (1.8, 14.2)	12.2 (7.4, 17)	26.4 (18, 34.8)
Difficulty with vision	21.1 (15.8, 26.3)	35.8 (23.7, 47.8)	26 (19, 32.9)	53.1 (41.9, 64.3)
Difficulty with hearing	13.2 (9.8, 16.5)	19.7 (11.5, 28)	12.9 (8.8, 16.9)	35.1 (23.8, 46.4)
Difficulty walking/climbing stairs	10.4 (7.1, 13.7)	23.3 (13.7, 32.9)	21.8 (17, 26.7)	52.4 (34.7, 70.1)
Difficulty remember/concentrate	17.3 (12.9, 21.8)	48.2 (36.1, 60.3)	24.7 (17, 32.3)	67.2 (56.4, 77.9)
Difficulty with self care	<i>b</i>	<i>b</i>	8.3 (4.2, 12.4)	15.3 (6.7, 23.9)
Pain (2020/2021)				
Never experience pain	38.1 (32.2, 43.9)	22 (9.6, 34.4)	45 (36.3, 53.8)	4.8 (0.9, 8.7) ^a
Experience pain some days	41.2 (35, 47.4)	40.6 (24.6, 56.5)	26.6 (18.4, 34.7)	27.4 (9.5, 45.4) ^a
Experience pain most days	9.1 (5.5, 12.6)	11.9 (3.4, 20.4) ^a	9.4 (4.4, 14.5)	18.8 (10.2, 27.5)
Experience pain every day	11.7 (7.8, 15.5)	25.6 (11.5, 39.6)	19 (11.8, 26.2)	48.9 (30.9, 66.9)
Of those work experience any pain				
pain limits life/work	44 (36.4, 51.5)	77.5 (64.3, 90.7)	62.5 (51.3, 73.7)	89.8 (82.7, 96.8)
pain impacts family	26.2 (18.8, 33.7)	49.6 (32.5, 66.6)	39.5 (21.7, 57.2)	66.5 (55.6, 77.5)
BMI				
Underweight	0.5 (0, 1.2)	<i>b</i>	2.9 (0.4, 5.5) ^a	<i>b</i>
Healthy weight	21.3 (17.1, 25.5)	30.4 (20, 40.9)	25.2 (16.7, 33.8)	37.6 (25.3, 49.9)
Overweight	37 (32.7, 41.3)	32.6 (20, 45.2)	23.9 (18.2, 29.5)	17.2 (9.1, 25.4)
Obese	39 (33.7, 44.4)	34.7 (23.4, 46)	42.5 (33.3, 51.7)	40 (30.1, 50)
Unknown	2.2 (0.4, 4)	2 (0, 4.9)	5.4 (0, 11.8)	2 (0, 4.9)

	Working Indigenous Adults (18–65)		Non Working Indigenous Adults (18–65)	
	No Depressive Symptoms* (n = 600)	Depressive Symptoms (n = 93)	No Depressive Symptoms (n = 308)	Depression Symptoms (n = 107)
	Percent (95 % CI)	Percent (95 % CI)	Percent (95 % CI)	Percent (95 % CI)
Health Care Utilization				
Hospital Stay (Y/N), Past Year	6.5 (4.4, 8.7)	8.2 (1, 15.3) ^a	10.7 (7.1, 14.3)	17.5 (7.7, 27.3)
1 or more ER visits in past 12 months	24.1 (18.7, 29.5)	35.4 (23.5, 47.4)	25.5 (19.6, 31.5)	44.3 (34.4, 54.1)
Seen General Doctor in past 12 months	75.4 (70.7, 80.2)	83.4 (73.9, 92.8)	71.7 (62.3, 81.2)	79.7 (68.2, 91.3)
Delay in care due to cost	4.2 (2.3, 6)	16.9 (9.2, 24.6)	2 (0.1, 4) ^a	5.8 (1, 10.6) ^a
Delay in medications due to cost	9.3 (5.6, 13.1)	18.7 (8.7, 28.6)	8.6 (4.4, 12.8)	17.9 (9.3, 26.5)
Delay in counselling due to cost	6.2 (3.9, 8.4)	19.7 (10.5, 28.9)	8.4 (5.2, 11.7)	15.8 (9, 22.6)
Treatment				
Currently take medication for anxiety	7.5 (4.9, 10.2)	44.9 (33.1, 56.7)	9.6 (5.6, 13.7)	45.6 (35.8, 55.4)
Currently take medication for depression	4.5 (2.9, 6.1)	45.3 (34, 56.6)	8 (4.9, 11)	47.6 (36.9, 58.3)
Missing	0.2 (0, 0.5)			
Received therapy/counselling in the past 12 months	7.7 (4.7, 10.8)	39.1 (26.7, 51.5)	14.3 (8.3, 20.2)	36.4 (25.3, 47.5)

^a CV = 0.3–0.5.

^b Estimate suppressed due to CV ≥ 0.5.

* Self-reported either daily or weekly depressive symptoms.

Table 3

Multivariable model results predicting mental health symptoms, history and treatment in relation to working status in Indigenous adults 18–65 years.

Multivariable Models ^a	Working	Not Working	
		OR (95 % CI)	P Value
Model A: Predicting weekly or daily depression symptoms	1.0 (ref)	1.55 (1.03–2.33)	0.0365
Model B: Predicting weekly or daily anxiety symptoms	1.0 (ref)	1.32 (0.94–1.86)	0.107
Model C: Take a medication for depression	1.0 (ref)	1.73 (1.15–2.59)	0.0081
Model D: Take a medication for anxiety	1.0 (ref)	1.50 (1.05–2.16)	0.0262
Model E: Received mental health therapy in the last 12 months	1.0 (ref)	1.75 (1.19–2.58)	0.0049
Model F: Ever diagnosed with Depression	1.0 (ref)	1.50 (1.02–2.21)	0.0411
Model G: Ever diagnosed with anxiety	1.0 (ref)	1.75 (1.25–2.44)	0.0012

^a Models adjusted for sex, age group, education less than university, marital status (not married or living with partner).

Table 4

Multivariable model results predicting mental health symptoms, history and treatment in working AIAN adults 18–65 years.

	Model A: Predicting weekly or daily depression symptoms	Model B: Taking a medication for depression	Model C: Ever diagnosed with Depression	Model D: Treated with mental health therapy last 12 months
Age				
18–29 years	1.44 (0.45,4.58)	0.85 (0.21,3.47)	2.19 (0.84,5.71)	3.17 (1.06,9.51) ^b
30–39 years	2.6 (0.95,7.11) ^a	1.57 (0.5,4.94)	3.07 (1.37,6.85) ^c	6.5 (2.29,18.46) ^c
40–49 years	1.72 (0.68,4.36)	1.05 (0.4,2.8)	1.27 (0.57,2.84)	2.21 (0.86,5.67)
50–65 years	Ref	Ref	Ref	Ref
Male	Ref	Ref	Ref	Ref
Female	1.57 (0.67,3.67)	3.85 (1.56,9.51) ^b	2.4 (1.19,4.84) ^b	1.96 (0.81,4.75)
Marital Status - Not married or living with a partner	1.86 (0.81,4.26)	0.74 (0.27,2)	1.66 (0.83,3.31)	1.95 (0.88,4.34)
Education - Less than university education	1.6 (0.64,3.98)	0.69 (0.34,1.39)	0.69 (0.36,1.31)	0.45 (0.21,0.93) ^b
Work benefits – no sick leave	1.86 (0.71,4.86)	1.56 (0.81,3)	2.67 (1.56,4.57) ^c	1.54 (0.78,3.02)
Self reported pain on most or all days	2.61 (1.24,5.48) ^b	2.88 (1.37,6.07) ^b	3.68 (1.76,7.66) ^c	2.54 (1.24,5.2) ^b
Self reported fair/poor health status	2.37 (0.71,7.89)	1.13 (0.31,4.07)	1.06 (0.37,3.07)	1.7 (0.53,5.44)
Family income below 200 % poverty threshold	1.47 (0.61,3.58)	0.62 (0.25,1.53)	0.97 (0.49,1.91)	0.83 (0.37,1.89)
Family type Adults with children	Ref	Ref	Ref	Ref
No Children	1.47 (0.61,3.52)	1.49 (0.62,3.58)	1.1 (0.56,2.17)	1.04 (0.4, 2.71)

^aP value <0.1.

^bP value <0.05.

^cP value <0.01.

Table 5

Multivariable model results predicting mental health symptoms, history and treatment in working AIAN adults 18–65 years with occupational predictors (2020–2021).

	Model A: Predicting weekly or daily depression symptoms	Model B: Taking a medication for depression	Model C: Ever diagnosed with Depression	Model D: Treated with mental health therapy last 12 months
Age				
18–29 years	1.67 (0.5, 5.58)	0.83 (0.2, 3.43)	2.63 (1, 6.97) ^a	4.51 (1.53, 13.3) ^c
30–39 years	2.59 (0.82, 8.13)	1.21 (0.38, 3.82)	3 (1.28, 7.06) ^b	7.31 (2.36, 22.62) ^c
40–49 years	1.93 (0.65, 5.71)	0.95 (0.36, 2.51)	1.22 (0.51, 2.89)	2.71 (0.97, 7.55) ^a
50–65 years	ref	ref	ref	ref
Male	ref	ref	ref	ref
Female	0.92 (0.4, 2.14)	2.99 (1.2, 7.45) ^b	1.59 (0.73, 3.44)	1.42 (0.54, 3.75)
Marital Status - Not married or living with a partner	1.74 (0.68, 4.48)	0.65 (0.23, 1.81)	1.5 (0.72, 3.1)	1.74 (0.75, 4.04)
Education - Less than university education	1.63 (0.61, 4.35)	0.8 (0.38, 1.69)	0.72 (0.36, 1.44)	0.45 (0.2, 1.04) ^a
Occupational Type Blue Collar	ref	ref	ref	ref
White Collar	3.47 (0.97, 12.41) ^a	2.57 (0.95, 6.91) ^a	4.42 (1.67, 11.74) ^c	3.21 (1.01, 10.16) ^b
Service Job	4.22 (1.07, 16.6) ^b	1.58 (0.36, 6.86)	5.72 (2.05, 15.94) ^c	2.77 (0.56, 13.78)
Work benefits – no sick leave	1.8 (0.6, 5.42)	1.96 (0.98, 3.91) ^a	3.02 (1.65, 5.52) ^c	1.6 (0.82, 3.11)
Self reported pain on most or all days	2.57 (1.13, 5.87) ^b	2.85 (1.3, 6.25) ^c	4.22 (2, 8.9) ^c	2.41 (1.12, 5.21) ^b
Self reported fair/poor health status	2.58 (0.57, 11.61)	1.3 (0.32, 5.34)	1.2 (0.35, 4.13)	1.55 (0.45, 5.34)
Family income below 200 % poverty threshold	1.89 (0.8, 4.44)	0.69 (0.28, 1.68)	1.1 (0.56, 2.14)	1.02 (0.41, 2.53)
Family type Adults with children	ref	ref	ref	ref
No Children	1.76 (0.7, 4.39)	1.55 (0.64, 3.77)	1.18 (0.6, 2.34)	1.04 (0.38, 2.86)

^aP value <0.1.

^bP value <0.05.

^cP value <0.01.

Table 6

Multivariable model results predicting mental health symptoms, history and treatment in non-working AIAN adults 18–65 years (2020–2022).

	Model A: Predicting weekly or daily depression symptoms	Model B: Taking a medication for depression	Model C: Ever diagnosed with Depression	Model D: Treated with mental health therapy last 12 months
Age				
18–29 years	0.37 (0.06, 2.37)	0.62 (0.19, 2.02)	0.58 (0.19, 1.81)	1.46 (0.57, 3.73)
30–39 years	0.78 (0.33, 1.83)	0.86 (0.33, 2.25)	1.27 (0.57, 2.8)	1.79 (0.69, 4.64)
40–49 years	1.13 (0.51, 2.52)	1.78 (0.72, 4.4)	0.88 (0.4, 1.91)	1.97 (0.79, 4.91)
50–65 years	ref	ref	ref	ref
Male	ref	ref	ref	ref
Female	0.92 (0.53, 1.57)	1.83 (0.93, 3.63) ^a	1.44 (0.76, 2.73)	1.36 (0.75, 2.46)
Marital Status - Not married or living with a partner	0.91 (0.46, 1.82)	0.82 (0.48, 1.41)	0.86 (0.48, 1.56)	0.95 (0.47, 1.95)
Education - Less than university education	2.47 (0.78, 7.85)	3.62 (1.2, 10.91) ^b	1.73 (0.61, 4.87)	1.73 (0.62, 4.87)
Any self reported disability	1.88 (1.01, 3.5) ^a	1.89 (0.9, 4) ^a	2.73 (1.5, 4.97) ^c	1.3 (0.48, 3.51)
Family income below 200 % poverty threshold	1.7 (0.87, 3.29)	0.86 (0.4, 1.87)	1.71 (0.86, 3.38)	0.9 (0.37, 2.22)
Family type Adults with children	ref	ref	ref	ref
No Children	1.31 (0.67, 2.55)	2 (0.59, 6.81)	1.81 (0.81, 4.03)	2.13 (0.77, 5.88)

^aP value <0.1.

^bP value <0.05.

^cP value <0.01.