



Mental health burden in a national sample of American Indian and Alaska Native adults: differences between multiple-race and single-race subgroups

Nancy L. Asdigian¹ · Ursula Running Bear¹ · Janette Beals¹ · Spero M. Manson¹ · Carol E. Kaufman¹

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Abstract

Purpose Research on American Indian and Alaska Native (AIAN) mental health disparities is based largely on either tribal populations or national samples of adults that do not account for multiracial AIANs, even though over 40% of AIANs identify with multiple racial groups. The present investigation extends this research by assessing mental health status in a national sample of multiracial AIAN adults relative to adults who identify exclusively as either AIAN or White.

Methods 2012 BRFSS data were used to conduct multinomial logistic regression analyses comparing mental health outcomes among respondents who identified as either AIAN and one or more other races (AIAN-MR), AIAN-Single Race (AIAN-SR), or White-SR.

Results After demographic adjustment, the AIAN-MR group reported a higher lifetime prevalence of diagnosed depressive disorder, more days of poor mental health, and more frequent mental distress compared to both the AIAN-SR and White-SR groups. AIAN-MR individuals also had higher levels of Kessler 6 (K6) non-specific psychological distress compared to White-SR individuals but not AIAN-SR adults. Differences between AIAN-SR and White-SR adults were found in days of poor mental health, frequent mental distress, and total K6 scores.

Conclusions These findings help gauge the magnitude of mental health disparities in the U.S. AIAN population and pinpoint AIAN subgroups for whom mental health is particularly problematic. As such, they raise concerns about restrictions that limit the identification of national survey respondents who report multiple race designations. Such restrictions will thwart efforts to understand the causal mechanisms and pathways leading to mental distress among AIAN individuals.

Keywords American Indian and Alaska Native · Multiracial · Mental health · Psychological distress · Multinomial logistic regression

Introduction

Although not entirely consistent, there is a substantial evidence base suggesting that the burden of psychological disorder and distress is high in American Indian and Alaska Native (AIAN) communities [1–17]. Much of this evidence is based on data collected in specific tribal settings. While important to inform specific sub-populations

and contributing to a larger picture of AIAN mental health, it may not be readily generalizable to other AIAN subgroups [1–10]. In contrast, national-level estimates of mental illness or other conditions for broad racial groups have long been critiqued as overly inclusive—subject to what Trimble and Bhaya label “ethnic gloss,” or the attribution of the average to the diversity of experiences across myriad distinct tribal cultures [18]. The relevance of publicly available national data is further jeopardized by practices and policies that limit racial categories to single-race designations, with all others subsumed into a “mixed-race” category [11–17, 19, 20]. Such narrow definitions may be especially problematic for health disparities research involving AIAN individuals, as 44% of the 5.2 million AIANs in the U.S. identify with one or more additional racial groups [21]. Thus, categories that focus on single-race AIAN identification exclude almost

✉ Nancy L. Asdigian
nancy.asdigian@ucdenver.edu

¹ Department of Community and Behavioral Health, Centers for American Indian and Alaska Native Health, Colorado School of Public Health, University of Colorado Anschutz Medical Campus, 13055 East 17th Avenue, Aurora, CO 80045, USA

half of that population; in sharp contrast, only 3% of Whites, 7% of African Americans, and 15% of Asians identify as multiracial [22]. Despite their limitations, use of these data is often still necessary as many tribes and AIAN urban communities have few alternatives to draw upon except national surveys.

Systematic differences reflecting variations in historical and social experiences may exist between AIAN individuals who identify as multiracial (MR) and those who identify as AIAN-Single Race (SR), making their distinction potentially crucial to mental health research [16]. AIAN-MR designees are comprised largely (63%) of individuals who identify as both AIAN and White [21]. Compared to AIAN-SR individuals, the former are more geographically dispersed, more likely to live outside of federally- or state-designated AIAN reservations, trust lands, or statistical areas (67 vs. 92%, respectively) [21], more highly educated, earn higher incomes, and less likely to live below the poverty level [23, 24]. Since such geographic and socioeconomic variations are associated with mental health status differentials, national data providing only SR estimates may incorrectly reflect the mental health status of AIANs. AIAN-MR and AIAN-SR individuals might also express and/or report psychological distress differently, further complicating the profile of AIAN mental health. Specifically, they may differ in their beliefs about mental illness and wellness, expressions of mental distress, access to health services, and/or patterns of help seeking and utilization [25, 26]. Identifying these potential differences is important for advancing the study of AIAN mental health disparities, including gaining insight into apparent inconsistencies across self-reported symptom, diagnostic, and service utilization indicators of mental health status [6, 14]. It is also consequential for health system planning. If national data under- or over-estimate mental health status and its associated service use or treatment rates, substantial misalignment of need and services may result.

The social and economic consequences of unmet mental health needs are substantial and include increased health care expenditures, lower educational attainment, reduced labor force participation, loss of productivity, suicide, comorbid substance use disorders, violence, incarceration, and morbidity and mortality due to chronic medical conditions [27–32]. Therefore, it is imperative to accurately assess the magnitude and distribution of the mental health burden in AIAN populations, including individuals who identify as multiracial.

The present investigation represents an initial step toward these goals by characterizing mental health status in a national sample of adults who identified as AIAN-MR and assessing how this status differs from that of adults who identified as either AIAN-SR or White-SR. Specifically, we drew upon data from the 2012 Behavioral Risk Factor Surveillance System (BRFSS) Survey to examine

the self-reported prevalence of having been diagnosed with depression by a health care provider and other standardized measures of mental distress in a national sample of adults who identified as AIAN-SR, AIAN-MR, or White-SR. The BRFSS is an important source of health and health risk data for AIAN populations; unlike other national health data sets, its samples sizes allow for comparative analyses between distinct subgroups of AIAN adults and those of other race/ethnicity groups. Moreover, it includes indicators that reflect mental health burden as identified in the health care system (self-reported provider-identified depression) and indicators that are symptom-based, including: the perceived impact of mental distress on health-related quality of life and levels of psychological distress associated with generalized mood and anxiety disorders. The 2012 data provide the most recent estimates of mental health status for respondents who identify exclusively as AIAN and those who identify as AIAN-MR. After 2012, detailed race data with which to determine AIAN-MR status are not publicly available.

Methods

The BRFSS is an annual, state-based surveillance system that uses complex telephone survey sampling methodology to collect self-reported data on preventive health practices, health risk behaviors, and chronic health conditions from a national probability sample of non-institutionalized adults age 18 and older living in households [34, 35]. Both landline and cellular telephone surveys were used for data collection in 2012, yielding an overall response rate of 45.2%. A raking weighting methodology, which accounts for sample design and non-response, increases the representation of population subgroups that are underrepresented in the sample [36].

Given our focus on AIAN health, we limited our BRFSS analysis to respondents who resided in either one of the 50 states or the District of Columbia and who self-identified as either exclusively White (White-SR) or as AIAN alone (AIAN-SR) or in combination with one or more other racial designations (AIAN-MR). Data from racial groups other than those described above were excluded due to the focused scope of the current analysis. This analysis was designated as “non-human subjects” research by the Colorado Multiple Institutional Review Board.

Measures

Five BRFSS measures were examined to address different aspects of mental health status. We used self-reported lifetime history of diagnosed depression as a measure of provider-identified mental health disorder which was based on data from the question: “Has a doctor, nurse, or other health professional ever told you that you have a depressive

disorder, including depression, major depression, dysthymia, or minor depression?” (0 = no, 1 = yes). We derived two measures of mental health-related quality of life from the BRFSS question “Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?” The first, days of poor mental health, ranged from 0 to 30 and the second, frequent mental distress (FMD), was defined as 14 or more days of poor mental health in the past 30 days (0 = 0–13, 1 = 14–30). Days of poor mental health is a measure of impaired quality of life due to mental distress and FMD is a measure of serious impairment comparable to that seen in the clinical presentation of depression and anxiety disorders [11–14, 37, 38]. The construct validity of the poor mental health days and FMD measures is well established [11, 13, 38, 39] and both show moderate test–retest reliability (0.67 and 0.58, respectively) [40].

Respondents from 13 states (Illinois, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, Oregon, and Washington) completed the Kessler-6 (K6) Scale [41, 42] as part of the optional Mental Illness and Stigma module administered in the 2012 BRFSS. Together, the AIAN population in the 13 participating states represents 26% of the total U.S. AIAN population [21] and 2012 BRFSS respondents from those states account for 20.8% of the analysis sample in the present study. The K6 asks about the frequency in the past 30 days of feeling nervous; hopeless; restless or fidgety; so depressed that nothing could cheer you up; that everything was an effort; and worthless. As a unidimensional measure of non-specific psychological distress associated with depression and anxiety, it is broader than the other BRFSS mental health measures used here. Its validity as a measure of psychological distress in AIAN populations was established by Mitchell and Beals [43]. Responses to the K6 are recorded on a five-point Likert scale ranging from ‘none of the time’ to ‘all of the time.’ Per protocol, scores were recoded to range from 0 to 24, with higher scores reflecting greater distress [42, 44]. Finally, we also created a flag for ‘serious psychological distress’ (SPD) based on K6 scores of 13 or higher (0–12 = 0/13–24 = 1). SPD has been validated as a screener for psychological distress severe enough to meet diagnostic criteria for clinical disorders that cause moderate to serious impairment in functioning and require treatment [42, 44, 45].

Respondent race was assessed by asking: “Which one or more of the following would you say is your race?” Response options included: White, Black or African American, Asian, Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native, and Other (specify). We used the data from this question, which allowed for multiple responses, to classify respondents as either: (a)

‘AIAN-SR’ if respondents identified exclusively as American Indian or Alaska Native; (b) ‘AIAN-MR’ if respondents identified as American Indian or Alaska Native in combination with any other race; or (c) ‘White-SR’ if respondents identified exclusively as White. Additional demographic covariates included: Hispanic ethnicity (non-Hispanic = 0, Hispanic = 1), sex (female = 0, male = 1), age group (18–24 = 1, 25–44 = 2, 45–64 = 3, 65+ = 4), marital status (married/cohabitating = 1, separated/widowed/divorced = 2, never married = 3), educational attainment (less than high school = 1, high school graduate = 2, some college = 3, college graduate, or higher = 4), current employment status (0 = unemployed, 1 = employed), annual household income (less than \$15K = 1, \$15–24.9K = 2, \$25–34.9K = 3, \$35–49.9K = 4, \$50+ K = 5), census region (Northeast = 1, Midwest = 2, South = 3, West = 4), and Metropolitan Statistical Area (MSA) status (not in an MSA or county with an MSA = 0, in the center city of an MSA, outside the center city of an MSA but inside the county containing the center city, inside a suburban county of the MSA, or in an MSA that has no center city = 1).

Statistical analysis

We used IBM SPSS Statistics v. 23.0 (IBM, 2015) to create analysis variables. Missing data on analysis variables were rare (<2%) except for income (13.6% missing) and MSA status (18.9% missing) which was available for the landline sample only. Missing data on both variables were coded as a separate response category and included in all analyses [46, 47].

To account for the probability of selection within strata and to adjust for the complex survey design of the BRFSS, we used Stata 14.1 [48] *svy* commands to compare demographic characteristics and scores on mental health measures across races. We used multinomial logistic regression (MNL) methods, combined with Long and Freese’s post-estimation procedures [49], to statistically evaluate pairwise differences on outcome variables between each race group. In the present analysis, MNL fits a series of simultaneous binary logit models to evaluate the degree to which a predictor variable (e.g., male sex) influences the odds of being in one race group vs. another (i.e., AIAN-MR vs. White-SR; AIAN-SR vs. White-SR; and AIAN-MR vs. AIAN-SR). The resulting odds ratios (ORs) reflect the change in the odds of group membership associated with a given characteristic. Analyses of the mental health measures were conducted with and without adjustment for all demographic covariates described above and were performed for males and females combined as well as for each sex subgroup separately. Sex-specific results were largely consistent with those of the overall models, and are available upon request from the corresponding author.

Results

Among the 475,687 respondents in the 2012 BRFSS, 393,681 (82.7%) met the inclusion criteria for this study based on race designation and geography of residence. Of those, 7976 (2.0%) identified as AIAN-SR, 5512 (1.4%) identified as AIAN-MR, and 380,193 (96.6%) as White-SR. Just under two-thirds of AIAN-MR respondents (64%, $n=3548$) chose White as their preferred race; 15% ($n=818$) chose AIAN; and the remaining 21% ($n=1236$) chose one of the other races.

Demographic characteristics

Weighted demographic characteristics for each race group are shown in Table 1, along with the results of unadjusted MNL tests comparing characteristics between each pair of race groups. Hispanic ethnicity, male sex, never married, living in the Western region of the U.S., and missing MSA status (likely due to being in the cell phone sample) increased the odds of identifying as either AIAN-MR or AIAN-SR compared to White-SR. Higher educational levels, current employment, and higher or missing income levels were associated with a lower odds of identifying as either AIAN-MR or AIAN-SR compared to White-SR. In addition, older age and living in/around an MSA reduced the odds of identifying as AIAN-SR compared to White-SR. Hispanic ethnicity and residence in the Western U.S. reduced the odds of identifying as AIAN-MR compared to AIAN-SR, whereas being age 45 and older, previously married, more highly educated, higher income, and living in/around an MSA increased the odds.

Lifetime history of diagnosed depression

As shown in Table 2, 28% of respondents in the AIAN-MR group reported that a health care provider ever told them they had a depressive disorder compared to approximately 20% of AIAN-SR and 18% of White-SR respondents. After adjusting for differences in demographic characteristics, lifetime history of depression was associated with an increased odds of identifying as AIAN-MR compared to both White-SR and AIAN-SR. A similar pattern was observed for the AIAN-SR group compared to the White-SR group, but the difference was not statistically significant after controlling for demographic covariates. Race differences were nearly identical in separate analyses of male and female participants (data not shown).

Mental distress

Respondents in the AIAN-MR group reported an average of nearly 7 days of poor mental health in the past month compared to respondents in the AIAN-SR and White-SR groups who reported approximately 6 and 4 days, respectively (see

Table 2). With and without adjustment for demographic covariates, more poor mental health days in the past month were associated with an increased odds of identifying as either AIAN-MR or AIAN-SR compared to White-SR and as AIAN-MR compared to AIAN-SR. FMD followed a similar pattern with 22% of respondents in the AIAN-MR group meeting the criterion for FMD compared to 20% in the AIAN-SR group and 12% in the White-SR group. FMD classification was associated with a higher adjusted odds of being in the AIAN-MR or AIAN-SR groups compared to the White-SR group and being in the AIAN-MR group compared to the AIAN-SR group.

K6 psychological distress

Among the 393,681 BRFSS participants included in this study, 82,074 resided in one of the 13 states that administered the K6 in 2012. Of those, 1.9% identified as AIAN-SR, 1.2% as AIAN-MR, and 96.8% as White-SR. Prior to analyzing the K6 measures of psychological distress, we first evaluated whether the distribution of race, demographic characteristics, and core mental health measures varied among respondents from states that did and did not administer the K6 measure. We also examined race group differences on the three core mental health measures separately for the subgroup of respondents from the 13 K6 states to determine whether the patterns were consistent with those observed in the full national sample. K6 respondents were more likely than those in other states to be White-SR (96.8% vs. 96.4%) and less likely to be either AIAN-SR (1.9 vs. 2.4%) or AIAN-MR (1.2 vs. 1.3%) ($p < 0.05$). They were also significantly less likely to identify as Hispanic, male, a younger age, from the southern U.S., or to have missing MSA data. They were more likely to be married, to have attained higher educational levels, and to earn higher incomes (all p 's < 0.05 ; data not shown). There were no significant differences in lifetime prevalence of reported depression diagnosis between respondents who did and did not complete the K6 (18.4 vs. 18.0%, respectively, $p = 0.25$), although the former reported significantly fewer days of poor mental health in the past month (3.65 vs. 3.92, respectively, $p < 0.001$) and were less likely to meet the criterion for FMD (10.9 vs. 12.2%, respectively, $p < 0.001$).

Average K6 scores among respondents in the 13 state subsample were 4.72, 5.36, and 2.99 in the AIAN-MR, AIAN-SR, and White-SR groups, respectively, and nearly 8% of AIAN-MR respondents met SPD criteria, as did 11% of AIAN-SR and 3% of White-SR respondents (Table 2). In both unadjusted and adjusted analyses, higher K6 scores were associated with an increased odds of identifying as either AIAN-MR or AIAN-SR compared to White-SR, but did not differentiate AIAN-MR from AIAN-SR. In the unadjusted analyses, SPD classification increased the odds

Table 1 Weighted demographic characteristics by respondent race, 2012 Behavioral Risk Factor Surveillance System Survey

Characteristic	Respondent race						Odds ratio		
	AIAN ^a MR ^b (n = 5512)		AIAN ^a SR ^c (n = 7976)		White SR ^c (n = 380,193)		AIAN ^a MR ^b vs. white SR ^c	AIAN ^a SR ^c vs. white SR ^c	AIAN ^a MR ^b vs. AIAN ^a SR ^c
	%	CI ^d	%	CI ^d	%	CI ^d			
Hispanic	16.2	13.6–19.1	41.3	38.4–44.3	12.5	12.2–12.8	1.35 ^f	4.92 ^g	0.27 ^g
Male	51.3	48.3–54.4	55.0	52.3–57.7	48.3	48.0–48.6	1.31 ^e	1.31 ^g	0.86
Age group									
18–24	11.6	9.7–13.8	16.4	14.2–19.0	11.9	11.6–12.2	1.00	1.00	1.00
25–44	35.2	32.1–38.4	39.7	37.0–42.5	31.6	31.3–31.9	1.14	0.91	1.26
45–64	35.1	32.4–37.9	33.3	31.0–35.7	35.8	35.6–36.1	1.00	0.67 ^g	1.50 ^f
65+	18.1	16.0–20.5	10.6	9.4–11.9	20.7	20.5–20.9	0.90	0.37 ^g	2.43 ^g
Marital status									
Married/cohabiting	46.9	43.9–50.0	48.9	46.1–51.6	59.0	58.7–59.3	1.00	1.00	1.00
Separated/divorced/widowed	26.5	24.1–29.1	22.8	20.7–25.0	19.7	19.5–19.9	1.70 ^g	1.40 ^g	1.21 ^e
Never married	26.6	23.6–29.7	28.4	25.8–31.1	21.3	21.0–21.7	1.56 ^g	1.60 ^g	0.98
Education									
Less than high school	17.8	15.1–20.8	31.7	28.9–34.5	12.9	12.6–13.2	1.00	1.00	1.00
High school	28.3	25.6–31.2	33.3	30.8–35.9	29.2	28.9–29.5	0.70 ^f	0.46 ^g	1.51 ^e
Some college	36.0	33.2–38.9	25.8	23.5–28.2	31.1	30.8–31.4	0.84	0.34 ^g	2.49 ^g
College graduate	17.9	16.0–20.0	9.3	8.3–10.3	26.8	26.6–27.0	0.49 ^g	0.14 ^g	3.45 ^g
In labor force	46.8	43.8–49.9	49.0	46.3–51.8	55.9	55.6–56.3	0.69 ^g	0.76 ^g	0.91
Income									
Less than \$15K	18.0	15.5–20.9	23.7	21.5–26.1	9.4	9.2–9.6	1.00	1.00	1.00
\$15–\$24.9K	18.5	16.4–20.7	20.8	18.7–23.1	14.3	14.0–14.5	0.68 ^g	0.58 ^g	1.17
\$25–\$34.5K	10.6	8.9–12.5	11.8	10.3–13.6	9.3	9.2–9.5	0.59 ^g	0.50 ^g	1.18
\$35–49.9K	11.9	10.1–14.0	10.4	8.8–12.3	12.8	12.6–13.0	0.49 ^g	0.32 ^g	1.50 ^e
\$50+ K	27.7	25.1–30.4	18.3	16.4–20.2	41.4	41.1–41.7	0.35 ^g	0.18 ^g	1.99 ^g
Missing	13.4	11.2–15.9	15.0	12.8–17.5	12.8	12.6–13.1	0.54 ^g	0.46 ^g	1.17
Geography									
Northeast	12.6	10.6–15.0	11.9	9.9–14.4	18.2	18.0–18.3	1.00	1.00	1.00
Midwest	18.4	16.5–20.5	15.0	13.4–16.7	23.9	23.7–24.1	1.11	0.95	1.16
South	38.1	35.0–41.2	27.5	25.3–29.9	35.1	34.9–35.3	1.56 ^g	1.19	1.31
West	30.9	28.3–33.7	45.6	42.9–48.3	22.8	22.6–23.0	1.95 ^g	3.04 ^g	0.64 ^f
Metropolitan statistical area (MSA)									
Outside of MSA or county with MSA	11.3	10.1–12.6	14.1	12.9–15.3	14.0	13.8–14.1	1.00	1.00	1.00
Within MSA or county with MSA	47.6	44.5–50.7	42.3	39.5–45.2	53.0	52.7–53.2	1.11	0.79 ^g	1.40 ^g
Missing	41.1	38.2–44.1	43.7	41.0–46.3	33.1	32.9–33.3	1.54 ^g	1.31 ^g	1.17

^aAmerican Indian/Alaska Native

^bMultiple Race

^cSingle Race

^dConfidence Interval

^ep < 0.05

^fp < 0.01

^gp < 0.001

of identifying as AIAN-MR compared to White-SR and as AIAN-SR compared to White-SR, but those differences were eliminated when sociodemographic characteristics were controlled in adjusted analyses.

Discussion

The present investigation extends the previous research demonstrating mental health disparities between AIAN

Table 2 Mental health outcomes by respondent race, 2012 Behavioral Risk Factor Surveillance System Survey

Mental health outcomes	Respondent race			Odds ratios								
				Unadjusted			Adjusted for sociodemographics					
	AIAN ^a MR ^b	White SR ^c	AIAN ^a SR ^c	AIAN ^a MR ^b vs. White SR ^c	AIAN ^a SR ^c vs. White SR ^c	AIAN ^a MR ^b vs. AIAN ^a SR ^c	AIAN ^a MR ^b vs. White SR ^c	AIAN ^a SR ^c vs. White SR ^c	AIAN ^a MR ^b vs. AIAN ^a SR ^c	AIAN ^a MR ^b vs. AIAN ^a SR ^c		
Ever diagnosed with depression (%; CI ^d)	28.4	25.6–31.3	19.8	18.0–21.7	17.9	17.7–18.1	1.82 ^j	1.13 ^h	1.60 ^j	1.59 ^j	1.11	1.43 ^j
Days poor mental health (0–30) (M, CI ^d)	6.91	6.19–7.63	5.76	5.20–6.33	3.78	3.73–3.84	1.04 ^j	1.03 ^j	1.01 ^h	1.03 ^j	1.01 ^j	1.01 ⁱ
Frequent mental distress ^e (%; CI ^d)	22.2	19.6–25.0	19.6	17.5–21.9	11.6	11.4–11.9	2.16 ^j	1.85 ^j	1.17	1.77 ^j	1.42 ^j	1.25 ^h
Kessler 6 score (0–24) ^f (M, CI ^d)	4.72	3.97–5.48	5.36	4.46–6.26	2.99	2.93–3.05	1.09 ^j	1.12 ^j	0.98	1.07 ^j	1.06 ^j	1.01
Serious psychological distress ^{f,g} (%; CI ^d)	7.5	5.1–10.9	10.8	6.6–17.0	3.4	3.2–3.7	2.28 ^j	3.39 ^j	0.68	1.56	1.66	0.94

Note: Covariates included in adjusted analyses include: Hispanic ethnicity, sex, age, marital status, educational attainment, employment status, income, region, and MSA status

^aAmerican Indian/Alaska Native

^bMultiple race

^cSingle race

^dConfidence interval

^e14+ days of poor mental health

^fN = 82, 074

^g13+ Kessler 6 Score

^hp < 0.05

ⁱp < 0.01

^jp < 0.001

and White adults [1–17, 20]. In a large national sample of U.S. adults and using standardized measures of clinical and sub-clinical psychological distress, individuals who self-identified as AIAN in combination with one or more other races (AIAN-MR) generally reported more mental health problems and psychological distress than those who self-identified as exclusively AIAN (AIAN-SR). Both AIAN groups reported more mental health problems on most outcomes compared to individuals who self-identified as exclusively White (White-SR). These patterns persisted after adjusting for differences in demographic characteristics. The AIAN-MR group was more likely than both the AIAN-SR and White-SR groups to report ever being diagnosed with a depressive disorder; to report more days of poor mental health, and more likely to meet the criteria for frequent mental distress. In a select sample of states, higher scores on the Kessler 6 measure of non-specific psychological distress also distinguished the AIAN-MR group from the White-SR group, but not from the AIAN-SR group. After adjustment, differences between the AIAN-SR and White-SR groups were limited to days of poor mental health and frequent mental distress in the full sample, and to total K6 scores in the 13 state subsample.

These findings are consistent with the previous research showing poorer health outcomes among mixed-race individuals overall [50–52]. Further study is needed to elucidate the reasons underlying the elevated levels of mental health problems among AIAN-MR individuals, overall and in relation to AIAN-SR individuals—over whom they enjoy socioeconomic advantage. Individuals who identify as AIAN-MR may face challenges in bridging multiple ethnic and cultural affiliations or in finding a home between traditional AIAN culture and mainstream western culture [52, 53]. Weaker community and/or cultural connections may adversely impact the mental health status of some AIAN-MR individuals and lead to elevated levels of mental distress relative to individuals who identify exclusively as AIAN. It is possible that some individuals who identify as AIAN-MR suffer the same legacy of oppression and trauma as their AIAN-SR counterparts and encounter the same types of discrimination, but lack the buffering effects of strong traditional cultural, spiritual, and/or social connections. Other AIAN-MR individuals might experience stressors, because they aspire to achieve the same economic and social status as their White counterparts, but are thwarted by discrimination associated with their AIAN heritage. Alternatively, it may be that psychological distress itself weakens social and cultural connections among AIAN individuals, which has the effect of strengthening identifications with other races and/or cultures.

Although additional evidence is needed to address these hypotheses [52], data from a recent survey of multiracial adults in the U.S. are consistent. Only a minority of adults

who identify as both White and AIAN report that they share a lot in common with other AIAN individuals, feel well accepted by other AIAN individuals, have a lot of contact with their AIAN relatives, or identify with other adults who share the same racial mix [54]. Although nearly two-thirds of adults in this multiracial group report that they *do* have a lot in common with and feel well accepted by other Whites, they are more likely than White-SR adults to experience racial discrimination, with nearly 50% reporting having been targets of racial slurs, 30% receiving bad service in restaurants or other businesses, and 15% having been unfairly stopped by police [54]. Gaining further insight into the causal mechanisms and pathways that lead to mental health distress among AIAN-MR individuals as well as other AIAN subgroups, including the role of culture as a potential protective agent [55], is a public health imperative. Understanding this dynamic is an important step toward addressing the ‘ethnic gloss’ that currently clouds our understanding of health disparities among AIAN individuals [18]. Moreover, it represents a necessary precursor to developing effective mental health prevention programs and treatment services in AIAN communities and, ultimately, to eliminating mental health disparities in this group.

The present investigation also raises several important questions about mental health disparities among AIANs. Differences between the AIAN-MR and the White-SR groups were observed with respect to nearly all of the mental health outcomes analyzed in this study, whereas the differences between the AIAN-MR and AIAN-SR groups and between the AIAN-SR and White-SR groups were somewhat less consistent. These patterns may reflect differences in the frequency, but not the severity with which mental distress is experienced, differences in access to mental health screening/treatment services, differences in provider patterns of care, and/or cultural differences in the expression of mental health distress [25, 26, 56–58]. A more complete understanding of the nature and manifestation of mental health disorder in AIAN populations is an important area of future research.

The current findings must be considered in light of several limitations in study methodology. First, in these analyses, we did not further differentiate among AIAN-MR subgroupings (e.g., AIAN and White vs. AIAN and Black [52]). Rather, at this early stage, all AIAN-MR participants were considered in the aggregate. There may be important differences within this group as well as in terms of being multiracial in general. For example, some AIAN-MR respondents may have had parents of different races; others’ grandparents or ancestral relatives may have been different races [52]. It is equally important to understand the phenomenology of AIAN-MR identification. As others have noted, racial identification is influenced by a complex array of factors including geographic location, perceived rewards or costs

associated with identification with a particular race, residential mobility, discrimination experiences, or changes in marital status or information about family heritage [52, 59] and often varies from one measurement occasion to another [54], especially among AIANs [53, 59]. Because the data used in this study are cross-sectional, it is also possible that psychological distress itself influences racial identification and thereby contributes to the patterns of mental health outcomes observed here. To advance the understanding of mental health distress among AIANs who identify as MR, investigators should consider the meaning that individuals ascribe to MR identification and unpack how diversity within that group is related to mental health outcomes. The current trend of restricting access to multiple race data in national data sets mitigates against our ability to pursue this line of inquiry. It is also critical to recognize the diversity that exists among AIAN individuals who identify as SR, as there are more than 500 federally recognized AIAN tribes with unique historical, social, and cultural backgrounds. Moreover, over 40% of the AIAN-SR group identified as Hispanic, which may reflect the history of shifting geopolitical borders indifferent to indigenous cultural boundaries, migration patterns of Central and South American indigenous populations, or simply an endorsement of Hispanic ancestry, whether indigenous or not. The wide variety of Hispanic traditions and cultures adds to the substantial diversity that characterizes the AIAN-SR group. This variability adds to the difficulty of identifying and addressing the root causes of mental health distress in AIAN populations.

The availability of the K6 measure for only a subset of respondents in the 2012 BRFSS represents another limitation of this study. Analyses involving those measures may have lacked sufficient statistical power to detect differences between the AIAN-MR and AIAN-SR groups. Measurement issues may have also played a part, including the possibility that response to these less direct measures of distress may have varied by level of enculturation or assimilation in mainstream values or experiences. Moreover, the subset of K6 respondents differed from the rest of the sample in a number of ways, including demographic characteristics and mental health status. Both these factors may have contributed to the unique pattern of findings observed for the K6 outcomes, including the failure to find a difference between AIAN-MR and AIAN-SR respondents in total K6 scores and the lack of race differences on the K6-derived measure of Serious Psychological Distress (SPD). Alternatively, the K6 findings might reflect the fact that non-specific psychological distress is similarly apparent across a wide range of AIAN adults. While additional investigation is needed to evaluate these possibilities, the present analysis did reveal differences in total K6 scores between White-SR adults and both AIAN-MR and AIAN-SR adults, suggesting that AIAN individuals experience

higher levels of non-specific psychological distress compared to whites, and demonstrating the utility of a brief, standardized assessment to detect such disparities.

Finally, the BRFSS data set is also subject to several limitations, including use of self-reported psychological disorder and symptoms as well as relying on the availability of a landline or cellular telephone to participate in the survey. Then, too, the BRFSS response rates are not optimal. As noted by others, the BRFSS' telephone methodology is a particular issue in AIAN communities as landline telephones may be shared by multiple families or not present at all in AIAN households [60]. Moreover, because MSA status was only available for the landline sample in 2012 and AIAN respondents were less likely than White respondents to have a landline telephone, AIAN respondents were more likely to have missing MSA data. As a result, race group differences in MSA status may have been inadequately accounted for and, therefore, served to influence the differences observed across race groups in mental health outcomes.

These limitations notwithstanding, the results of this analysis represent an important advance in efforts to gauge the magnitude of mental health disparities in the U.S. AIAN population and to more precisely pinpoint AIAN subgroups for whom mental health issues are particularly problematic. They also highlight the limitations of many previous racial disparities studies that either restricted AIAN samples to individuals who identify exclusively as AIAN [16, 20], combined AIAN-SR and AIAN-MR subgroups [14], or failed to specify the precise composition of the AIAN group [11–13]. In addition, they raise concerns about restrictions that limit the ability to identify respondents in national surveys such as the BRFSS who report multiple race designations. Given that the AIAN-MR group comprised just over 40% of all 2012 BRFSS respondents who identified as AIAN in some capacity, and demonstrated poorer mental health outcomes than the AIAN-SR group, the inability to distinguish AIAN subgroups based on other races reported in the 2013 and subsequent BRFSS data sets represents an important barrier to identifying and addressing the important mental health disparities that characterize AIAN populations. Addressing that barrier is a critical next step in tailoring the development and delivery of mental health prevention and treatments services designed to eliminate mental health disparities among AIAN individuals.

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Compliance with ethical standards

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