Adverse Childhood Experiences and Indigenous Identity: Testing for Aggregation Fallacy in the Multiracial Category

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Abstract: *Adverse childhood experiences (ACEs) predict poor adulthood health. ACEs are most common among American Indian/Alaska Native (AI/AN) and Multiracial groups, two groups that overlap substantially in population. We aimed to determine if the Multiracial population's high mean ACE score differs by those who do and do not identify as AI/AN. We analyzed Waves 1, 3, and 4 (1994-2009) of the National Longitudinal Study of Adolescent to Adult Health (N = 12,372), estimating race-specific mean ACE scores and component prevalence, and disaggregating the Multiracial group by AI/AN identity. We compared means and prevalence ratios using Bonferroni-corrected Tukey's honestly significant tests of differences. Mean scores on a 10-point scale were higher among AI/AN (mean = 3.21, 95% CI: 2.54, 3.97), Multiracial AI/AN (2.95, 95% CI: 2.71, 3.18), Multiracial non-AI/AN (2.88, 95% CI: 2.57, 3.19), and Black (2.84, 95% CI: 2.65, 3.02) groups than White (2.35, 95% CI: 2.26, 2.44) and Asian/Pacific Islander (2.32, 95% CI: 2.09, 2.54) groups. Tests of mean and prevalence differences between the AI/AN and two Multiracial groups were all insignificant. The Multiracial population's high mean ACE score does not differ by those that do and do not identify as AI/AN. ACEs prevention strategies should be tailored to meet the specific needs of groups at higher risk of exposure to improve health equity.*

INTRODUCTION

Adverse childhood experiences (ACEs) are traumatic events occurring before age 18 and are associated with increased risk of developing physical, psychological, and behavioral health problems later in life (Hughes et al., 2017; Kalmakis & Chandler, 2015). The first study of ACEs and adulthood health, conducted in 1995-97 by Kaiser Permanente, surveyed a relatively high socioeconomic status (SES) and commercially-insured population in San Diego, CA, finding that over half of respondents reported one ACE and a quarter reported two or more (Felitti et al., 1998). Disparities in the prevalence of ACEs by race, SES, gender, sexual orientation, and other characteristics persist, with populations in socially-privileged positions consistently reporting fewer ACEs than socially-marginalized groups (Giano et al., 2020). Like many population health studies, studies of ACEs frequently omit results for smaller populations such as the Multiracial (two or more races) and American Indian/Alaska Native (AI/AN) groups. However, the few studies that do present results for these two groups find that they have higher mean ACE scores than other racially-defined groups (Giano et al., 2020; Hall et al., 2020; Merrick et al., 2018; Weller et al., 2021).

Current Centers for Disease Control and Prevention (CDC) ACEs prevention guidance advocates generally for strengthened social and economic supports for families, but does not discuss racial disparities in ACEs or targeted strategies for reducing disparities (CDC, 2019). However, disparities in ACEs result from the inequitable distribution of the social and structural determinants of health, which are in turn a product of structural racism (i.e., "the totality of ways in which societies foster racial discrimination, via mutually reinforcing inequitable [social] systems") (Bailey et al., 2017; Harper et al., 2023). Examples of these processes include targeted overpolicing leading to mass incarceration of communities of color, racially discriminatory lending practices leading to racial residential segregation and persistent racial wealth gaps, and racialized treatment standards in health care delivery leading to disparities in treatment access and outcomes. Structural racism has subordinated minoritized groups in different ways across space and time through what Omi and Winant call *racialization*, with certain processes differentially targeting specific groups (e.g., genocide of AI/AN tribes, chattel enslavement and later mass incarceration of Black people, or exclusion of Asian immigrants) (Kim, 1999; Omi & Winant,

2014). However, because of the consistent spatiotemporal patterning of racial stratification across numerous social, educational, economic, and health outcomes in the US, structural racism is widely considered a "fundamental cause" of health inequities (Phelan & Link, 2015).

Among the most enduring and severe examples of structural racism are the historic and continued dispossession and colonization of Indigenous lands; forced resettlement of AI/AN peoples into reservations; substandard health care, educational, and employment opportunities on those reservations; and the wholesale erasure of language, culture, knowledge, and identity impacting generations of AI/AN communities, families, and individuals (Cross, 2014). These historical and ongoing processes are hypothesized to link to biological and behavioral expressions of embodied trauma via overlapping socioeconomic, psychopathological, and pathophysiological mechanisms, ultimately leading to population health disparities (Walters et al., 2011). The collective stress resulting from coping with trauma has facilitated adverse familial and developmental environments and exposure to parental separation, substance use, mental illness, and neglect (e.g., ACEs) (Goodkind et al., 2012; Strickland et al., 2006). Thus, while ACEs are an individual-level measure, their disproportionate prevalence among the AI/AN population compared to other groups may reflect a deeper history of collective cultural trauma and structural racism specifically affecting AI/AN communities (Giano et al., 2021).

The majority of literature on structural racism focuses on monoracial groups; thus, its influence on the distribution of risk factors – including ACEs – in the Multiracial population remains relatively less clear. Increasingly, however, social scientists recognize that Multiracial peoples' experience of racialization are unique, and that the links between structural racism, risk factors, and health disparities for this group may differ from others. A growing body of research highlights the impact of psychosocial processes resulting from structural racism on Multiracial peoples' health and well-being, including anti-Multiracial discrimination (i.e., *monoracism*); links between identity formation, racial categorization systems, and health; and the importance of racially diverse contexts in supporting healthy psychological adjustment (Franco & Carter, 2019; Franco & O'Brien, 2020; Gabriel et al., 2022; Grilo et al., 2022; Jones & Rogers, 2022; Lam-Hine et al., 2023). It is plausible that the Multiracial group's high mean ACE score could reflect unsupportive environments shaped by structurally racist forces that adversely impact social and developmental trajectories of Multiracial youth.

Compounding the challenges of studying Multiracial peoples' experiences of structural racism is the sheer diversity encompassed within a catch-all Multiracial category. Some have

argued that a Multiracial category is so broad that its use leads to aggregation fallacy (i.e., misclassification arising from aggregating dissimilar groups) (Song, 2021). From this perspective, an alternative explanation for the group's unexpectedly high ACE scores could then be that it is biased upward by potentially high scores among the approximately two-thirds of Multiracial people that identify as AI/AN (Pew Research Center, 2015). If this were true, reporting data in an aggregate Multiracial category would be an example of *data genocide*, an information bias that distorts statistics for AI/AN or Native Hawaiian or Pacific Islander (NHPI) groups because of the large proportion of people in these groups that are Multiracial (Friedman et al., 2023; Quint et al., 2023). However, to the extent that Indigenous Multiracial people prefer to be identified with their Indigenous heritage, as Multiracial, or as both, assignment into any one single category may reflect a form of erasure, underscoring the importance of theory in guiding aggregation and disaggregation decisions (Becker et al., 2021; Khanna, 2012). Unfortunately, large, nationally representative health surveys frequently report race in collapsed categories, making disaggregation of the Multiracial population in population health research challenging.

In this study, we explore whether the Multiracial group's high mean ACE score reflects the effects of aggregating data from Multiracial participants identifying as AI/AN with those that do not, two groups with potentially distinct social experiences and health needs. To do so, we rely on a dataset that reports all of the races self-identified by participants and test the hypothesis that Multiracial participants identifying as AI/AN will report significantly higher mean ACE scores and prevalence of individual ACE components than those that do not. Support of this hypothesis would suggest that lumping all Multiracial subgroups together when reporting ACEs data is inappropriate and that data on the Multiracial AI/AN group should potentially be reported separately or in an aggregated AI/AN "alone or in combination" category. This information may be especially valuable for informing the currently recommended CDC ACEs prevention strategies, which are universal in nature and not tailored for the specific needs of racial, ethnic, or Indigenous groups.

MATERIALS AND METHODS

Data and Analytic Sample

The National Longitudinal Study of Adolescent to Adult Health (Add Health) is a longitudinal, nationally representative study following 20,745 individuals from grades 7-12 in 1994-

95 through four waves of follow up (1996, 2001-02, 2008-09, 2016-18) (Harris, 2013). Add Health is the largest US-based longitudinal health study that has consistently allowed study participants to select more than one racial category, making it an important source of research on Multiracial people (Charmaraman et al., 2014). From a database of all 26,666 high schools in the United States, Add Health selected 80 public and private high schools with probability based on enrollment size, stratifying schools by type, grade range, setting, demographics, and geographic location. Investigators matched high schools to associated feeder middle schools, and sampled students in grades 7-12 without stratification from school enrollment rosters, purposely oversampling certain demographic groups. Students received invitations to complete an at-home interview during Wave 1 (N = 20,745 participants). This interview included detailed questions about the adolescent's demographics and family background, social networks, home and school environments, and health behaviors. Wave 4 was conducted 14 years later (2008-09) when the participants were in their late 20's and included measurements of the participants' metabolic and cardiovascular function. More details about the study design can be found elsewhere (Harris, 2013).

Classification of Race

Add Health participants were asked to self-identify their race and ethnicity in Waves 1 and 3. In Wave 1, there were five choices: White, Black, American Indian/Native American, and Asian or Pacific Islander (API), and Other, with the option to select multiple categories. We recoded American Indian/Native American to AI/AN to align with wording in other Add Health survey questions and federal standard racial group nomenclature; however, Add Health's survey instruments prevent separating the API group into Asian and NHPI categories as is current practice. In a separate question, participants were asked if they identified as Hispanic or Latino. At Wave 3, the "Other" option was removed, still with the option to select multiple categories. If a participant selected multiple categories in both waves, we used their Wave 3 races. If a participant only identified as Multiracial in Wave 1 (but not in Wave 3), we used their Wave 1 race. We further split the Multiracial group into those reporting and not reporting AI/AN ancestry. The final racial categories were White, Black, API, AI/AN, Multiracial AI/AN, and Multiracial non-AI/AN. Post-hoc analysis led us to exclude the "Other alone" category due to the lack of meaningful interpretation, large confidence intervals, and smaller sample size relative to other groups (n = 24).

Despite official attempts to separate race and Hispanic ethnicity, a majority of Hispanic/Latino people consider *Latinidad* to be a core part of their racial identity (Pew Research

Center, 2015). When race and Hispanic ethnicity are assessed separately, it becomes impossible to differentiate between monoracial or Multiracial Hispanic/Latino people. Given these challenges, we align our methods with other studies using Add Health data (Udry et al., 2003) and exclude participants identifying as Hispanic/Latino in Wave 1 or 3.

Measurement of ACEs

The original ACEs questionnaire included seven question categories, each corresponding to a domain of adverse experiences related to abuse or household dysfunction. The abuse categories included (1) emotional, (2) physical, and (3) sexual abuse; the household dysfunction categories included (4) substance abuse, (5) mental illness, (6) domestic abuse (mother treated violently), and (7) incarceration history in the household (Felitti et al., 1998). Later versions of the ACEs questionnaire added a neglect domain covering emotional and physical neglect, as well as a parental divorce category in the household dysfunction domain for a total of ten categories. These ten categories are still reflected in the current adult ACEs screener recommended by the California Surgeon General's ACEs Clinical Advisory Committee and the ACEs Aware initiative (ACEs Aware, 2020). We used a modified version of the widest set of questions available in Add Health data to construct ten variables approximating the components of the ACEs Aware adult screener, coding variables as binary and then summing them (minimum of zero and maximum of ten) (Lee et al., 2020). Further details on the questions and variables used to construct the ACEs score in Add Health are available in Appendix A.

Statistical Analyses

We compared crude mean ACE scores (e.g., the mean number of ACEs experienced) and prevalence ratios of reporting each ACE component across racial groups. We chose to present unadjusted figures as our goal is to describe actual disparities, not present an artificially-constructed alternative reality (Fox et al., 2022; Lesko et al., 2022). Because Add Health's design purposely oversampled certain groups based on demographic characteristics, we used complex survey weights to produce nationally representative estimates and standard errors. We assessed differences in group mean scores and prevalence of individual ACE components using Tukey's honestly significant difference test, adjusted p values using Bonferroni correction for multiple testing and compared resulting values to alpha = 0.05, and incorporated design effects in analyses using complex survey weights. We used Markov chain Monte Carlo multiple imputation (M=20)

to adjust for high missingness in ACE components (frequencies presented in Appendix B). Our imputation models specified all ACE components, participant demographic information, and variables hypothesized to be associated with missingness as imputation predictor variables. We conducted all data analyses using R software. The University of California, Berkeley Office for Protection of Human Subjects determined that this study was exempt from review.

RESULTS

Table 1 presents unweighted counts and weighted frequencies of participant sex, age, component ACE scores, and summary ACE scores by racial group. Total sample size was 12,372 after removing Hispanic/Latino participants, "Other alone" participants, and those missing complex survey weights for design-based analysis. Of these, the majority (93.6%) were monoracial, with monoracial White (74%) and Black (17%) participants forming the largest groups. Among the Multiracial group, a majority identified as AI/AN (61%). In the overall sample, prevalence of emotional abuse and physical neglect were strikingly high (47% and 43%, respectively); racial group prevalence estimates ranged between 45-54% and 42-53%, respectively. Prevalence of sexual abuse (5.9%) and mother treated violently (6.4%) were lowest among ACE components, with race-specific prevalences ranging from 4.6-9.4% and 3-12.4%, respectively. Overall sample prevalences ranged from 16-30% for physical abuse, emotional neglect, parental divorce or separation, household substance abuse, household mental illness, or parental incarceration.

Table 2 presents pairwise tests of differences in mean ACE scores between racial groups and associated 95% CIs. Among all racial groups, AI/AN (mean = 3.21, 95% CI: 2.54, 3.97), Multiracial AI/AN (2.95, 95% CI: 2.71, 3.18), Multiracial non-AI/AN (2.88, 95% CI: 2.57, 3.19), and Black (2.84, 95% CI: 2.65, 3.02) participants reported the highest mean ACE scores. Despite appreciable differences in point estimates, tests of difference in mean scores were not significant comparing the two Multiracial groups, nor in any pairwise comparisons between these groups and the AI/AN or Black groups. The mean scores of these four groups were all significantly higher than those of the White or API groups.

Table 3 summarizes the statistically significant pairwise tests of ACE component score prevalence ratios and associated 95% CIs (results from all tests available in Appendix C). Prevalence ratios were insignificant for all comparisons between AI/AN, Multiracial AI/AN, and

Multiracial non-AI/AN groups. Prevalence ratios were largest for the household substance abuse, household mental illness, and parental incarceration components. In these comparisons, AI/AN, Multiracial AI/AN, and Black participants had much higher prevalence than the API or White groups. Prevalence ratios of reported household substance abuse were 2-5 times higher for the AI/AN group compared to White (2.59, 95% CI: 1.79, 3.75), Black (2.31, 95% CI: 1.58, 3.37), or API (5.33, 95% CI: 2.84, 9.99) participants and about 1.5-3 times higher for the Multiracial AI/AN group compared to White (1.46, 95% CI: 1.18, 1.79) and API (3.00, 95% CI: 1.69, 5.31) groups. Household mental illness was twice as prevalent for Black compared to White participants (2.03, 95% CI: 1.71, 2.41) and approximately 3.5-4 times as prevalent for AI/AN compared to White (3.65, 95% CI: 2.22, 6.02) and API (3.96, 95% CI: 2.10, 7.48) participants. Parental incarceration was almost twice as prevalent for Black compared to White (1.83, 95% CI: 1.56, 2.15), 4.5 times compared to API (4.54, 95% CI: 1.96, 11.1) participants, and 1.5 times for Multiracial AI/AN compared to White participants (1.54, 95% CI: 1.23, 1.93). White participants generally were the least likely to report any of the ACE components.

Table 1.
Participant characteristics and ACE components[a] stratified by race, Add Health 1994-2008

Characteristic	AI/AN	Multiracial AI/AN	Multiracial non-AI/AN	API	Black	White	Overall
	76 (0.6%)	484 (3.9%)	313 (2.5%)	805 (3.2%)	2,915 (17%)	7,742 (74%)	12,372 (100%)
Male sex	41 (64%)	230 (50%)	150 (50%)	418 (53%)	1,267 (50%)	3,672 (51%)	5,778 (51%)
Mean age, (years)	28.8	28.8	28.8	29.2	29.2	28.9	29.0
Emotional abuse	33 (45%)	268 (52%)	172 (54%)	406 (51%)	1,329 (51%)	3,571 (45%)	5,779 (47%)
Physical abuse	22 (36%)	164 (37%)	98 (37%)	264 (37%)	603 (28%)	1,674 (26%)	2,825 (28%)
Sexual abuse	4 (8.4%)	34 (9.4%)	7 (4.6%)	37 (5.8%)	133 (8.2%)	246 (5.2%)	461 (5.9%)
Emotional neglect	27 (36%)	186 (39%)	109 (33%)	281 (35%)	903 (32%)	2,209 (28%)	3,715 (30%)
Physical neglect	29 (46%)	212 (48%)	119 (47%)	330 (53%)	954 (47%)	2,453 (42%)	4,097 (43%)
Parental divorce or separation	17 (34%)	149 (31%)	93 (35%)	64 (14%)	774 (34%)	1,922 (30%)	3,019 (30%)
Mother treated violently	0 (3.6%)	6 (3.6%)	10 (12%)	6 (3.0%)	61 (12.4%)	148 (5.2%)	231 (6.4%)
Household sub-stance abuse	23 (48%)	118 (32%)	49 (26%)	49 (13%)	408 (23%)	1,302 (21%)	1,949 (22%)
Household mental illness	14 (31%)	54 (18%)	30 (14%)	70 (14%)	313 (24%)	706 (14%)	1,187 (16%)
Parental incarcera-tion	24 (32%)	124 (25%)	72 (26%)	48 (6.3%)	726 (29%)	1,212 (16%)	2,206 (19%)
Mean ACE score	3.21	2.95	2.88	2.32	2.84	2.35	2.46

ACE = adverse childhood experience; AI/AN = American Indian/Alaska Native; API = Asian or Pacific Islander

[a] Counts are crude non-missing values; proportions (for categorical variables) and means (for continuous) are pooled estimates from 20 survey-weighted imputations

Table 2.
Mean ACE scores by race and mean difference test[a] results, Add Health 1994-2008

Comparison	Mean ACE score (95% CI)	Reference	Mean difference[b] (95% CI)	*p* value
AI/AN	3.21 (2.54, 3.97)	Multiracial AI/AN	0.19 (-0.08, 0.46)	0.164
		Multiracial non-AI/AN	0.10 (-0.18, 0.38)	0.486
		API	0.50 (0.25, 0.76)	< 0.001
		Black	0.10 (-0.12, 0.32)	0.390
		White	0.43 (0.22, 0.64)	< 0.001
Multiracial AI/AN	2.95 (2.71, 3.18)	Multiracial non-AI/AN	0.09 (-0.15, 0.33)	0.470
		API	0.69 (0.49, 0.89)	< 0.001
		Black	0.29 (0.11, 0.46)	0.001
		White	0.62 (0.46, 0.78)	< 0.001
Multiracial non-AI/AN	2.88 (2.57, 3.19)	API	0.60 (0.36, 0.84)	< 0.001
		Black	0.18 (-0.01, 0.40)	0.062
		White	0.53 (0.33, 0.73)	< 0.001
API	2.32 (2.09, 2.54)	Black	-0.40 (-0.56, -0.25)	< 0.001
		White	-0.07 (-0.21, 0.07)	0.325
Black	2.84 (2.65, 3.02)	White	0.33 (0.25, 0.42)	< 0.001
White	2.35 (2.26, 2.44)			

AI/AN = American Indian/Alaska Native; API = Asian or Pacific Islander
[a] Tukey's honestly significant difference pairwise tests
[b] Mean difference = comparison mean – reference mean

Table 3.
Significant[a] Bonferroni-corrected[b] tests of ACE component prevalence ratios, Add Health 1994-2008

Comparison	Reference	ACE component	Prevalence ratio[c] (95% CI)	p value
AI/AN	API	Household substance abuse	5.33 (2.84, 9.99)	< 0.001
		Household mental illness	3.96 (2.10, 7.48)	< 0.001
	Black	Household substance abuse	2.31 (1.58, 3.37)	< 0.001
	White	Household substance abuse	2.59 (1.79, 3.75)	< 0.001
		Household mental illness	3.65 (2.22, 6.02)	< 0.001
Multiracial AI/AN	API	Household substance abuse	3.00 (1.69, 5.31)	< 0.001
	White	Physical abuse	1.42 (1.19, 1.69)	< 0.001
		Emotional neglect	1.37 (1.18, 1.59)	< 0.001
		Household substance abuse	1.46 (1.18, 1.79)	< 0.001
		Parental incarceration	1.54 (1.23, 1.93)	< 0.001
API	White	Physical abuse	1.45 (1.18, 1.77)	< 0.001
		Physical neglect	1.35 (1.16, 1.56)	< 0.001
Black	API	Parental incarceration	4.54 (1.96, 11.1)	< 0.001
	White	Sexual abuse	1.64 (1.27, 2.13)	< 0.001
		Mother treated violently	2.33 (1.47, 3.69)	< 0.001
		Household mental illness	2.03 (1.71, 2.41)	< 0.001
		Parental incarceration	1.83 (1.56, 2.15)	< 0.001

AI/AN = American Indian/Alaska Native; API = Asian or Pacific Islander
[a] Results from all Tukey's honestly significant difference tests available in Appendix C
[b] Bonferroni-corrected *p* values compared to alpha = 0.05
[c] Prevalence ratio = comparison prevalence / reference prevalence

DISCUSSION

This study tested our hypothesis that the mean ACE score and prevalence of ACE score components is significantly higher among Multiracial participants with AI/AN ancestry than those without AI/AN ancestry. Our results refuted this hypothesis, as there were no significant differences between either the mean score or prevalence of components between Multiracial groups with and without AI/AN ancestry, suggesting that reporting ACE scores combining AI/AN and non-AI/AN Multiracial people may not constitute data genocide. Tests of mean difference in scores and prevalence ratio of ACE components were also insignificant for all comparisons between the AI/AN group and the two Multiracial groups. However, when considering point estimate magnitudes alone, the AI/AN group had an appreciably higher mean ACE score than either of the two Multiracial groups, supporting previous studies suggesting that this group may be particularly vulnerable to ACEs. The elevated score for this group has been reported in previous studies but to our knowledge has not been put in direct comparison with Multiracial groups (Giano et al., 2021; Kenney & Singh, 2016).

The distribution of ACE components in the Add Health sample differed somewhat from those reported in the Giano et al. (2020) study of ACEs, which used pooled 2011-2014 data from the Behavioral Risk Factor Surveillance System (BRFSS) (Giano et al., 2020). Prevalence of emotional (47% vs. 34%) and physical abuse (28% vs. 18%) and parental incarceration (19% vs. 8%) were substantially higher in the overall Add Health sample, while prevalence of sexual abuse (6% vs. 12%) and household substance abuse (22% vs. 28%) were lower. Prevalence of household mental illness (16% vs. 17%) and parental separation or divorce (30% vs. 28%) were similar across the two samples (neglect measures and mother treated violently were not assessed in Giano et al., 2020). Giano and colleagues also found that Multiracial participants were more likely to report each of the ACE components than any other racial group except for parental separation or divorce and parental incarceration, which Black participants were most likely to report. That study did not report estimates for the AI/AN group; however, the authors pooled more years (2009-2017) of BRFSS data to provide stabilized estimates for the AI/AN population in a follow-up study (Giano et al., 2021). ACE component prevalences from the 2021 follow-up study of the AI/AN group showed similar prevalence across all components to results for the Multiracial population from their 2020 study. This study's findings confirm that prevalence of many ACE components (other

than household dysfunction components) are similar between the AI/AN group and Multiracial groups with and without AI/AN ancestry.

The insignificance of differences in ACE scores and component prevalence across both Multiracial groups may be related to the unique social experiences Multiracial people as a whole face – experiences which are not reflected in Add Health data. For example, implicit and explicit racism cited by interracial couples as a source of relationship stress could lead to elevated rates of intimate partner violence, divorce, and household dysfunction among interracial families (Bratter & Eschbach, 2006; Martin et al., 2013; Qian & Lichter, 2007; Rosenthal & Starks, 2015; Skinner & Hudac, 2017). However, it is important to acknowledge that the source of such social stressors is exogenous to interracial couples and not an inherent feature of interracial relationships. Beyond traditional forms of racism, evidence suggests monoracism is a feature of many interracial and Multiracial families, and may be especially harmful when perpetrated by family members (Atkin et al., 2022; Atkin & Jackson, 2021; Franco & Carter, 2019). It is thus plausible that certain ACEs such as abuse or neglect could reflect manifestation of monoracist beliefs or attitudes among parents of Multiracial children. Monoracism has received limited attention in public health literature, but could help explain other concerning cardiovascular, respiratory, and mental health disparities between monoracial and Multiracial people (Lam-Hine et al., 2023). Additional research is needed to describe disparities in exposure to monoracism and ACEs by Multiracial subgroups disaggregated beyond just AI/AN identity, which was not possible in Add Health data due to small sample sizes.

Another potential explanation for the lack of significant difference across the two Multiracial groups' ACE scores could be the fact that most Multiracial AI/AN people identify as Biracial AI/AN-White. Among this group, 61% report stronger affinity with White people than others, 81% report stronger ties to White relatives than AI/AN relatives, 66% live in predominantly White neighborhoods, and 88% report being mostly perceived as White (Pew Research Center, 2015). Social proximity to White communities and distance from AI/AN communities could thus be reflected in a social and health risk factor profile for this group that more closely resembles that of Whites. However, further nuance and differences in this group would likely arise following additional disaggregation across intersectional categories such as residence in urban or reservation areas, socioeconomic status, gender, sexuality, etc.

While tests of differences were insignificant comparing the AI/AN and Multiracial groups, the higher prevalence of household substance abuse, household mental illness, and parental

incarceration for AI/AN, Multiracial AI/AN, and Black participants could directly reflect the effects of specific structurally racist processes. For example, targeted overpolicing and resulting mass incarceration in Black and Indigenous communities directly impact risk of incarceration, which is associated with both substance abuse and mental illness (Baranyi et al., 2022; Warde, 2023). The CDC's ACEs prevention strategies – which are currently universal in nature – could benefit from additional tailoring, for example to disrupt structurally racist processes that differentially shape high-prevalence groups' risk of exposure to specific ACE components (Centers for Disease Control and Prevention, 2019; Lam-Hine et al., 2023). Examples of preventive interventions could include programs addressing racialized disparities in policing and incarceration, increased funding for programs supporting the re-entry process for formerly incarcerated individuals and their families (Draine et al., 2005; Wallace et al., 2016). Additional qualitative and mixed-methods research can help further elucidate the processes leading to these racialized groups' differential exposure to ACE components and effective preventive interventions.

This study had several strengths, including much more detailed race information than is typically available in large population-based datasets, and a uniquely large sample of Multiracial participants. It also had limitations. First, ACEs are defined as events occurring before the age of 18, but several ACEs domains can only be constructed with Add Health data using questions that were only asked during Wave 1, when participants were ages 12-19. Therefore, observations for those ACE domains were censored for any participants that turned 18 after Wave 1. This is particularly problematic for the parental separation or divorce ACE, given the high prevalence of divorce in the United States. Estimated ACE scores may thus be too low, especially for younger participants. Second, if there is indeed an association between mean ACE score and race, the removal of the "Other" race option during Wave 3 of Add Health may have unintentionally introduced differential misclassification that could have affected results in unpredictable ways, particularly those previously endorsing the "Other" racial group. Third, while various subgroups of the Multiracial population (e.g., Asian-White, AI/AN-Black) likely have very different life experiences, we did not further disaggregate the two Multiracial categories due to small sample sizes in Add Health (Charmaraman et al., 2014). This limitation likely masks substantial heterogeneity in ACE scores across subgroups of the Multiracial population. Finally, the AI/AN population of nearly 10 million people is also extremely diverse, comprising of roughly 1,000 federally recognized and unrecognized tribes speaking hundreds of distinct languages, living in

both urban and rural areas in all US states and territories. Add Health's sample size of 76 participants identifying as AI/AN alone is small; thus, inference on the AI/AN population as a whole from this sample should be done with caution. Replicating this analysis in a larger dataset could increase confidence in our estimates; however, multiple race selections are frequently unavailable in large population-based datasets without completing expensive and time-consuming applications, making such analyses difficult (Lam-Hine et al., 2024). Investigators involved with primary data collection should make detailed race variables (i.e., multiple race and ethnicity selections) available in public-use versions of published datasets, which could help advance knowledge on the nature and causes of Multiracial-monoracial and AI/AN disparities in ACEs.

This study is the first to provide preliminary evidence that Multiracial people with and without AI/AN ancestry do not have significantly different ACE scores or prevalence of ACE components, suggesting the high mean ACE score among Multiracial people does not result from aggregation fallacy. These results underscore the potential need to further tailor ACEs prevention strategies to account for group-specific needs and experiences. Regardless of this specific study's results, it is crucial that researchers carefully consider the impact of grouping Indigenous Multiracial people into an aggregate Multiracial category, and to examine if doing so results in an aggregation fallacy leading to data genocide for Indigenous groups. Studies disaggregating the Multiracial group are important for progressing towards health data equity, a prerequisite for health equity (Lam-Hine et al., 2024; Ponce et al., 2023). Population health researchers seeking to describe, monitor, and address racial health disparities should continue to integrate theory and knowledge of the unique health and social experiences of populations holding multiple overlapping social identities to develop effective preventive interventions.

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CONFLICT OF INTEREST

The authors declare they have no known conflicts of interest.

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APPENDIX

Appendix A. Crosswalk of topical domains, questions in Kaiser ACEs questionnaire, and questions in Add Health used to create ACEs score

Domain	ACE Questionnaire	Add Health Measure Coding
Emotional abuse	1. Did a parent or other adult in the household often... Swear at you, insult you, put you down, or humiliate you? Or Act in a way that made you afraid that you might by physically hurt? Yes/No	H4MA1 (Wave 4): Before your 18th birthday, how often did a parent or other adult caregiver say things that really hurt your feelings or made you feel like you were not wanted or loved? 1 = 1-10 times or more 0 = this never happened
Physical abuse	2. Did a parent or other adult in the household often... Push, grab, slap, or throw some- thing at you? Or Ever hit you so hard that you had marks or were injured? Yes/No	H3MA3 (Wave 3): Before the time you started 6th grade, how often had your parents or other adult care- givers slapped, hit, or kicked you? 1 = 1-10 times or more 0 = this never happened
Sexual abuse	3. Did an adult or person at least 5 years older than you ever... Touch or fondle you or have you touch their body in a sexual way? Or Try to actually have oral, anal, or vaginal sex with you? Yes/No	H3MA4 (Wave 3): Before the time you started 6th grade, how often had your parents or other adult care- givers touched you in a sexual way, forced you to touch him or her in a sexual way, or forced you to have sexual relations? 1 = 1-10 times or more 0 = this never happened

Domain	ACE Questionnaire	Add Health Measure Coding
Emotional neglect	4. Did you often feel that… No one in your family loved you or thought you were important or special? Or Your family didn't look out for each other, feel close to each other, or support each other? Yes/No	H1PR8 (Wave 1): How much do you think your family pays attention to you? 1 = quite a bit – very much 0 = not at all – somewhat
Physical neglect	5. Did you often feel that… You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you? Or Your parents were too drunk or high to take care of you or take you to the doctor if you needed it? Yes/No	By the time you started 6th grade, how often had your parents or other adult care-givers: H3MA1 (Wave 3): Left you home alone when an adult should have been with you? Or H3MA2 (Wave 3): Not taken care of your basic needs, such as keeping you clean or providing food or clothing? 1 = 1-10 times or more for either 0 = this never happened
Parental separation or divorce	6. Were your parents ever separated or divorced? Yes/No	PA38 – PA54 (Wave 1 Parent) 1 = parents divorced or separated before participant turned 18 0 = parents not divorced or separated before participant turned 18
Mother treated violently	7. Was your mother or step-mother: Often pushed, grabbed, slapped, or had something thrown at her? Or Sometimes or often kicked, bitten, hit with a fist, or hit with something hard? Or Ever repeatedly hit over at least a few minutes or Threatened with a gun or knife? Yes/No	PB20 (Wave 1 Parent): How much do you fight or argue with your current (spouse/partner)? 1 = a lot 0 = not at all – some

Domain	ACE Questionnaire	Add Health Measure Coding
Household substance abuse	8. Did you live with anyone who was a problem drinker or alcoholic or who used street drugs? Yes/No	PC49E_2 (Wave 1 Parent): His/her biological father has alcoholism? Or PC49E_3 (Wave 1 Parent): His/her biological mother has alcoholism? Or H1TO52 (Wave 1): Are illegal drugs easily available to you in your home? 1 = yes to any 0 = no to all
Mental illness in household	9. Was a household member depressed or mentally ill or did a household member attempt suicide? Yes/No	PA20 (Wave 1 Parent): In general, are you (main parent respondent) happy? Or PB16 (Wave 1 Parent): In general do you think (he/she) (main parent respondent's partner or spouse) is happy? Or H1SU6 (Wave 1): Have any of your family tried to kill themselves during the past 12 months? 1 = yes to PA20, yes to PB16, and no to H1SU6 0 = any other combination of responses
Incarceration of household member	10. Did a household member go to prison? Yes/No	H4WP3 (Wave 4): Has/did your biological mother ever spent/spent time in jail or prison? Or H4WP9 (Wave 4): Has/did your biological father ever spent/spend time in jail or prison? Or H4WP16 (Wave 4): Has/did your mother figure ever spent/spend time in jail or prison? Or H4WP30 (Wave 4): Has/did your father figure ever spent/spend time in jail or prison? 1 = yes to any 0 = no to all

Appendix B. Participant characteristics[a] comparing complete case[b], imputations[c], and missingness[d], stratified by race

Characteristic	AI/AN	M. AI/AN	M. non-AI/AN	API	Black	White	Overall
	76 (0.6%)	484 (3.9%)	313 (2.5%)	805 (3.2%)	2,915 (17%)	7,742 (74%)	12,372 (100%)
Male sex							
Complete case	41 (64%)	230 (50%)	150 (50%)	418 (53%)	1,267 (50%)	3,672 (51%)	5,778 (51%)
Imputed	64%	50%	50%	53%	50%	51%	51%
Missing	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Age							
Complete case	28.8	28.8	28.8	29.2	29.2	28.9	29.0
Imputed	28.8	28.8	28.8	29.2	29.2	28.9	29.0
Missing	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Emotional abuse							
Complete case	33 (44%)	268 (52%)	172 (54%)	406 (51%)	1,329 (46%)	3,571 (47%)	5,779 (47%)
Imputed	45%	52%	54%	51%	51%	45%	47%
Missing	3 (9.0%)	10 (1.5%)	5 (1.2%)	8 (1.3%)	63 (2.6%)	92 (1.4%)	181 (1.7%)
Physical abuse							
Complete case	22 (33%)	164 (37%)	98 (37%)	264 (38%)	603 (29%)	1,674 (26%)	2,825 (28%)
Imputed	36%	37%	37%	37%	28%	26%	28%
Missing	13 (21%)	68 (16%)	68 (23%)	141 (16%)	703 (27%)	1,502 (20%)	2,495 (21%)
Sexual abuse							
Complete case	4 (2.4%)	34 (7.8%)	7 (2.4%)	37 (5.4%)	133 (6.5%)	246 (4.0%)	461 (4.5%)
Imputed	8.4%	9.4%	4.6%	5.8%	8.2%	5.2%	5.9%
Missing	11 (19%)	57 (13%)	64 (21%)	125 (13%)	665 (26%)	1,453 (19%)	2,375 (20%)
Emotional neglect							
Complete case	27 (36%)	186 (39%)	109 (33%)	281 (35%)	903 (32%)	2,209 (29%)	3,715 (30%)
Imputed	36%	39%	33%	35%	32%	28%	30%
Missing	2 (1.0%)	4 (0.5%)	0 (0%)	4 (1.6%)	17 (0.8%)	37 (0.6%)	64 (0.7%)
Physical neglect							
Complete case	29 (38%)	212 (28%)	119 (46%)	330 (55%)	954 (45%)	2,453 (41%)	4,097 (42%)
Imputed	46%	48%	47%	53%	47%	42%	43%
Missing	14 (23%)	81 (20%)	74 (25%)	167 (18%)	733 (27%)	1,675 (22%)	2,744 (23%)
Parental divorce or separation							
Complete case	17 (36%)	149 (30%)	93 (35%)	64 (15%)	774 (33%)	1,922 (29%)	3,019 (30%)
Imputed	34%	31%	35%	14%	34%	30%	30%

Characteristic	AI/AN	M. AI/AN	M. non-AI/AN	API	Black	White	Overall
Missing	19 (22%)	72 (12%)	67 (21%)	269 (30%)	605 (23%)	971 (12%)	2,003 (15%)
Mother treated violently							
Complete case	0 (0%)	6 (1.2%)	10 (5.7%)	6 (0.5%)	62 (6.4%)	148 (2.8%)	231 (3.0%)
Imputed	3.6%	3.6%	12%	3.0%	12.4%	5.2%	6.4%
Missing	42 (68%)	169 (29%)	153 (50%)	355 (42%)	1,602 (58%)	2,102 (37%)	4,423 (33%)
Household substance abuse							
Complete case	23 (51%)	118 (29%)	49 (25%)	49 (9.6%)	408 (22%)	1,302 (20%)	1,949 (20%)
Imputed	48%	32%	26%	13%	23%	21%	22%
Missing	21 (15%)	98 (16%)	87 (24%)	309 (37%)	817 (31%)	1,273 (15%)	2,605 (19%)
Household mental illness							
Complete case	14 (46%)	54 (17%)	30 (12%)	70 (12%)	313 (25%)	706 (12%)	1,187 (14%)
Imputed	31%	18%	14%	14%	24%	14%	16%
Missing	37 (64%)	155 (26%)	139 (46%)	334 (41%)	1,473 (53%)	1,982 (25%)	4,120 (31%)
Parental incarceration							
Complete case	24 (33%)	124 (24%)	72 (25%)	48 (6.3%)	726 (29%)	1,212 (16%)	2,206 (18%)
Imputed	32%	25%	26%	6.3%	29%	16%	19%
Missing	10 (9.2%)	33 (5.5%)	29 (5.7%)	34 (3.0%)	187 (6.2%)	436 (4.7%)	729 (5.0%)
Mean ACE score							
Complete case	2.58	2.45	2.15	1.92	2.12	1.89	1.94
Imputed	3.21	2.95	2.84	2.32	2.84	2.35	2.46

[a] Unweighted counts

[b] Weighted proportions (for categorical variables) and means (for continuous) reported

[c] Imputations pooled over 20 datasets; imputation models included all regression variables and variables representing status of parental self-rated health, divorce, employment, disability, retirement, happiness, and welfare receipt, interviewer assessments of neighborhood safety and how well-kept the household is, and number of interruptions to interview with parent

[d] Unweighted counts and weighted proportions

Appendix C. Summary of all Bonferroni-corrected[a] Tukey's honestly significance difference tests of ACE component prevalence ratios, Add Health 1994-2008

ACE Component	Comparison	PR (95% CI)	*p* value
Emotional abuse	Black-White	0.98 (0.91, 1.06)	> 0.999
	API-White	1.10 (0.95, 1.27)	> 0.999
	AI/AN-White	0.94 (0.68, 1.30)	> 0.999
	M. AI/AN-White	1.12 (1.00, 1.26)	> 0.999
	M. not AI/AN-White	1.16 (1.02, 1.33)	> 0.999
	API-Black	1.12 (0.97, 1.30)	> 0.999
	AI/AN-Black	0.96 (0.70, 1.32)	> 0.999
	M. AI/AN-Black	1.14 (1.00, 1.30)	> 0.999
	M. not AI/AN-Black	1.18 (1.03, 1.36)	> 0.999
	AI/AN-API	0.86 (0.61, 1.19)	> 0.999
	M. AI/AN-API	1.02 (0.86, 1.21)	> 0.999
	M. not AI/AN-API	1.05 (0.90, 1.24)	> 0.999
	M. AI/AN-AI/AN	1.19 (0.84, 1.69)	> 0.999
	M. not AI/AN-AI/AN	1.23 (0.88, 1.73)	> 0.999
	M. not AI/AN-M. AI/AN	1.03 (0.88, 1.22)	> 0.999
Physical abuse	Black-White	1.09 (0.95, 1.25)	> 0.999
	API-White	1.45 (1.18, 1.77)	< 0.001
	AI/AN-White	1.24 (0.77, 2.00)	> 0.999
	M. AI/AN-White	1.42 (1.19, 1.69)	< 0.001
	M. not AI/AN-White	1.43 (1.10, 1.84)	0.42
	API-Black	1.33 (1.06, 1.66)	0.84
	AI/AN-Black	1.14 (0.70, 1.85)	> 0.999
	M. AI/AN-Black	1.30 (1.07, 1.60)	0.60
	M. not AI/AN-Black	1.31 (0.98, 1.74)	> 0.999
	AI/AN-API	0.86 (0.51, 1.44)	> 0.999
	M. AI/AN-API	0.98 (0.77, 1.26)	> 0.999
	M. not AI/AN-API	0.99 (0.74, 1.31)	> 0.999
	M. AI/AN-AI/AN	1.15 (0.69, 1.91)	> 0.999

ACE Component	Comparison	PR (95% CI)	*p* value
	M. not AI/AN-AI/AN	1.15 (0.67, 1.97)	> 0.999
	M. not AI/AN-M. AI/AN	1.00 (0.76, 1.33)	> 0.999
Sexual abuse	Black-White	1.64 (1.27, 2.13)	< 0.001
	API-White	1.36 (0.59, 3.13)	> 0.999
	AI/AN-White	0.61 (0.09, 4.02)	> 0.999
	M. AI/AN-White	1.98 (1.30, 3.01)	0.12
	M. not AI/AN-White	0.62 (0.20, 1.91)	> 0.999
	API-Black	0.83 (0.35, 1.97)	> 0.999
	AI/AN-Black	0.37 (0.05, 2.54)	> 0.999
	M. AI/AN-Black	1.20 (0.78, 1.85)	> 0.999
	M. not AI/AN-Black	0.37 (0.12, 1.16)	> 0.999
	AI/AN-API	0.45 (0.05, 3.90)	> 0.999
	M. AI/AN-API	1.45 (0.59, 3.58)	> 0.999
	M. not AI/AN-API	0.45 (0.12, 1.78)	> 0.999
	M. AI/AN-AI/AN	3.22 (0.45, 23.3)	> 0.999
	M. not AI/AN-AI/AN	1.00 (0.11, 9.21)	> 0.999
	M. not AI/AN-M. AI/AN	0.31 (0.10, 0.94)	> 0.999
Emotional neglect	Black-White	1.12 (1.01, 1.24)	> 0.999
	API-White	1.24 (1.04, 1.48)	0.96
	AI/AN-White	1.28 (0.84, 1.95)	> 0.999
	M. AI/AN-White	1.37 (1.18, 1.59)	< 0.001
	M. not AI/AN-White	1.16 (0.92, 1.47)	> 0.999
	API-Black	1.11 (0.93, 1.32)	> 0.999
	AI/AN-Black	1.14 (0.75, 1.74)	> 0.999
	M. AI/AN-Black	1.22 (1.03, 1.45)	> 0.999
	M. not AI/AN-Black	1.04 (0.83, 1.31)	> 0.999
	AI/AN-API	1.03 (0.67, 1.58)	> 0.999
	M. AI/AN-API	1.10 (0.89, 1.36)	> 0.999
	M. not AI/AN-API	0.94 (0.71, 1.23)	> 0.999
	M. AI/AN-AI/AN	1.07 (0.69, 1.65)	> 0.999
	M. not AI/AN-AI/AN	0.91 (0.58, 1.43)	> 0.999
	M. not AI/AN-M. AI/AN	0.85 (0.65, 1.11)	> 0.999
Physical neglect	Black-White	1.11 (1.00, 1.22)	> 0.999
	API-White	1.35 (1.16, 1.56)	< 0.001

ACE Component	Comparison	PR (95% CI)	*p* value
	AI/AN-White	0.93 (0.52, 1.64)	> 0.999
	M. AI/AN-White	1.18 (1.04, 1.34)	0.72
	M. not AI/AN-White	1.13 (0.93, 1.38)	> 0.999
	API-Black	1.22 (1.04, 1.44)	> 0.999
	AI/AN-Black	0.84 (0.47, 1.48)	> 0.999
	M. AI/AN-Black	1.07 (0.92, 1.24)	> 0.999
	M. not AI/AN-Black	1.03 (0.84, 1.26)	> 0.999
	AI/AN-API	0.69 (0.38, 1.26)	> 0.999
	M. AI/AN-API	0.88 (0.72, 1.06)	> 0.999
	M. not AI/AN-API	0.84 (0.70, 1.02)	> 0.999
	M. AI/AN-AI/AN	1.27 (0.71, 2.28)	> 0.999
	M. not AI/AN-AI/AN	1.23 (0.68, 2.20)	> 0.999
	M. not AI/AN-M. AI/AN	0.96 (0.77, 1.20)	> 0.999
Parental divorce or separation	Black-White	1.13 (1.02, 1.26)	> 0.999
	API-White	0.50 (0.30, 0.83)	0.42
	AI/AN-White	1.22 (0.72, 2.10)	> 0.999
	M. AI/AN-White	1.03 (0.85, 1.24)	> 0.999
	M. not AI/AN-White	1.20 (0.96, 1.50)	> 0.999
	API-Black	0.44 (0.27, 0.73)	0.06
	AI/AN-Black	1.08 (0.63, 1.86)	> 0.999
	M. AI/AN-Black	0.91 (0.75, 1.10)	> 0.999
	M. not AI/AN-Black	1.06 (0.83, 1.35)	> 0.999
	AI/AN-API	2.44 (1.07, 5.57)	> 0.999
	M. AI/AN-API	2.05 (1.22, 3.43)	> 0.999
	M. not AI/AN-API	2.39 (1.43, 3.98)	0.06
	M. AI/AN-AI/AN	0.84 (0.47, 1.50)	> 0.999
	M. not AI/AN-AI/AN	0.98 (0.54, 1.77)	> 0.999
	M. not AI/AN-M. AI/AN	1.16 (0.87, 1.55)	> 0.999
Mother treated violently[b]	Black-White	2.33 (1.47, 3.69)	< 0.001
	API-White	0.19 (0.04, 0.83)	> 0.999
	AI/AN-White		
	M. AI/AN-White	0.42 (0.15, 1.16)	> 0.999
	M. not AI/AN-White	2.06 (0.93, 4.58)	> 0.999
	API-Black	0.08 (0.02, 0.38)	0.06

ACE Component	Comparison	PR (95% CI)	*p* value
	AI/AN-Black		
	M. AI/AN-Black	0.18 (0.06, 0.55)	0.18
	M. not AI/AN-Black	0.89 (0.36, 2.16)	> 0.999
	AI/AN-API		
	M. AI/AN-API	2.22 (0.37, 13.5)	> 0.999
	M. not AI/AN-API	10.9 (1.98, 60.3)	0.36
	M. AI/AN-AI/AN		
	M. not AI/AN-AI/AN		
	M. not AI/AN-M. AI/AN	4.93 (1.35, 17.8)	0.96
Household substance abuse	Black-White	1.12 (0.98, 1.28)	> 0.999
	API-White	0.49 (0.28, 0.83)	0.54
	AI/AN-White	2.59 (1.79, 3.75)	< 0.001
	M. AI/AN-White	1.46 (1.18, 1.79)	< 0.001
	M. not AI/AN-White	1.28 (0.91, 1.79)	> 0.999
	API-Black	0.43 (0.25, 0.76)	0.18
	AI/AN-Black	2.31 (1.58, 3.37)	< 0.001
	M. AI/AN-Black	1.30 (1.05, 1.60)	0.84
	M. not AI/AN-Black	1.14 (0.79, 1.63)	> 0.999
	AI/AN-API	5.33 (2.84, 9.99)	< 0.001
	M. AI/AN-API	3.00 (1.69, 5.31)	< 0.001
	M. not AI/AN-API	2.63 (1.35, 5.12)	0.24
	M. AI/AN-AI/AN	0.56 (0.37, 0.85)	0.42
	M. not AI/AN-AI/AN	0.49 (0.29, 0.85)	0.66
	M. not AI/AN-M. AI/AN	0.88 (0.59, 1.31)	> 0.999
Household mental illness	Black-White	2.03 (1.71, 2.41)	< 0.001
	API-White	0.92 (0.59, 1.45)	> 0.999
	AI/AN-White	3.65 (2.22, 6.02)	< 0.001
	M. AI/AN-White	1.34 (0.99, 1.81)	> 0.999
	M. not AI/AN-White	0.92 (0.54, 1.59)	> 0.999
	API-Black	0.45 (0.29, 0.71)	0.06
	AI/AN-Black	1.80 (1.08, 2.99)	> 0.999
	M. AI/AN-Black	0.66 (0.47, 0.93)	0.96
	M. not AI/AN-Black	0.46 (0.27, 0.78)	0.24
	AI/AN-API	3.96 (2.10, 7.48)	< 0.001

ACE Component	Comparison	PR (95% CI)	*p* value
	M. AI/AN-API	1.46 (0.85, 2.50)	> 0.999
	M. not AI/AN-API	1.00 (0.52, 1.93)	> 0.999
	M. AI/AN-AI/AN	0.37 (0.21, 0.65)	0.06
	M. not AI/AN-AI/AN	0.25 (0.12, 0.55)	0.06
	M. not AI/AN-M. AI/AN	0.69 (0.37, 1.29)	> 0.999
Parental incarceration	Black-White	1.83 (1.56, 2.15)	< 0.001
	API-White	0.40 (0.17, 0.93)	> 0.999
	AI/AN-White	2.09 (0.90, 4.86)	> 0.999
	M. AI/AN-White	1.54 (1.23, 1.93)	< 0.001
	M. not AI/AN-White	1.59 (1.22, 2.07)	0.06
	API-Black	0.22 (0.09, 0.51)	< 0.001
	AI/AN-Black	1.14 (0.48, 2.72)	> 0.999
	M. AI/AN-Black	0.84 (0.67, 1.06)	> 0.999
	M. not AI/AN-Black	0.87 (0.69, 1.09)	> 0.999
	AI/AN-API	5.26 (1.62, 17.1)	0.36
	M. AI/AN-API	3.87 (1.63, 9.18)	0.12
	M. not AI/AN-API	3.99 (1.67, 9.53)	0.12
	M. AI/AN-AI/AN	0.74 (0.32, 1.67)	> 0.999
	M. not AI/AN-AI/AN	0.76 (0.31, 1.89)	> 0.999
	M. not AI/AN-M. AI/AN	1.03 (0.75, 1.42)	> 0.999

PR = Prevalence Ratio M. = Multiracial; AI/AN = American Indian/Alaska Native

[a] Bonferroni-corrected *p* values compared to alpha = 0.05

[b] Observed and imputed values for AI/AN group were 0, preventing meaningful comparisons

[c] Prevalence ratio = comparison prevalence / reference prevalence