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RESEARCH ARTICLE

Adverse Childhood Experiences, Race, and Health Outcomes: Examining a Synergistic Relationship

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ABSTRACT

Background: Adverse childhood experiences (ACEs) are potentially traumatic incidents occurring before age 18 years. Adverse childhood experiences include physical or mental abuse, financial stress, home or community violence, substance misuse, familial turmoil, and other factors. Adverse childhood experiences are associated with negative health outcomes in adulthood.

Methods: Numerous research studies and systematic reviews were reviewed to assess the breadth and depth of racial and ethnic inclusivity in ACE research.

Results: A wide range of ACEs have been investigated, and ample state-level data is publicly available. Early, fundamental ACE studies typically recruited White, educated, and insured participants; racial and ethnic diversity were often neglected.

Conclusion: Adverse childhood experiences and race have been found exerting synergistic effects on adult health outcomes. Further evaluation of race is warranted to improve health outcomes. Scrutiny of racial and ethnic equity in health research is paramount for achieving health equity.

Keywords: Adverse childhood experiences; ACEs; Race; Equity; Health outcomes

INTRODUCTION

In the past few decades, health researchers began examining the impacts of childhood adverse experiences on adult health outcomes. Adverse experiences in childhood have been linked to health risk behaviors and subsequent disease.[1-3] Many of the leading causes of death in the United States are related to individual health behaviors and lifestyle,[3-6] prompting the necessity of identifying these events early in life for long-term health outcomes.

The Adverse Childhood Experiences (ACE) Study[1] was one of the first large-scale studies to examine the long-term relationship between childhood experiences and major health concerns. The adverse childhood experiences (ACEs) addressed in the study included psychological abuse, physical abuse, sexual abuse, and household dysfunction. The assessed health risk factors included smoking, severe obesity, depressed mood, suicide attempts, physical inactivity, alcohol abuse, drug abuse, STI history, and having a high number of sexual partners. All of the aforementioned risk factors contribute to the leading causes of morbidity and mortality in the United States. A total of 9508 adult patients at a large HMO completed the ACE questionnaire containing yes or no questions about the occurrence of the aforementioned ACE types and a health survey assessing health behaviors and diseases.

The prevalence and risk for all risk factors investigated increased as the number of ACEs increased. Additionally, the breadth of ACEs experienced was found to have a graded relationship with a variety of disease conditions, including cancer, chronic lung disease, and liver disease. The linking mechanism between ACEs and adult diseases was suggested to primarily involve increased engagement

in health risk behaviors such as smoking, alcohol or drug abuse, sexual behaviors, and overeating as coping mechanisms for the stress of adversity experienced by each individual. Overall, the findings suggested a strong and cumulative impact of ACEs on negative adult health outcomes.

Several subsequent studies further investigated health outcomes, finding links between ACEs and unintended pregnancy, depression, obesity, liver disease, heart disease, and a variety of other health conditions in adulthood.[7-10] These investigations led to the development of a widely adopted cumulative risk model, which states that childhood adverse experiences accumulate over time to give rise to disadvantages in adult health.[11,12] However, although the relationship between ACEs and health outcomes is well-documented, many of these studies factor out race and ethnicity in their analyses. The original ACE study factored out race in their statistical analyses in order to control for its "confounding effects" on the relationship between the number of ACEs experienced and adult health. Additionally, the study sampled mostly White, educated, employed, insured participants.[13]

Disparate health among groups in a variety of health conditions has been widely documented throughout the years. These include conditions such as diabetes, cardiovascular heart disease, obesity, hypertension, and overall mortality.[14,15] One of the major pathways through which these discrepancies arise is through ACEs. Black, Hispanic, or Asian youth are often at a greater risk of being exposed to ACEs, due to a complex blend of cultural, environmental, and socioeconomic factors.[16] The types of ACEs experienced by minority youth may also differ from those experienced by White youth. Minority youth may experience covert and overt forms of discrimination and racism on a daily basis. Compared to Whites of low socioeconomic status, a significantly greater proportion of minority groups of low socioeconomic status, especially Black youth, live in communities of concentrated poverty.[17] Consequently, minority youth who live in these communities face a higher risk of exposure to community-level ACEs such as witnessing neighborhood violence, experiencing neighborhood adversity (eg, feeling unsafe, lack of support from community members), and peer victimization.

Unfortunately, the current ACE model is limited in its assessment of individual ACE experiences. The cumulative risk model for ACEs only measures the frequency of ACEs, assuming that all included adversities influence health outcomes equally and through the same mechanisms. Additionally, ACEs that are experienced in higher frequencies by minority youth (eg, racial discrimination, community violence, and incurring financial stress) were not included in the original ACE assessment. Questions addressing racial discrimination and community-based ACEs have since been included in more recent ACE questionnaires, such as the ACE-IQ from the World Health Organization and the 2020 National Survey of Children's Health. However, research on the moderating effect of race on ACEs and adult health using data from these questionnaires is still limited. These limitations further support the need for analyses of ACEs and adult health outcomes through racial and cultural lenses.

We highlight the relationships between race, ACEs, and health outcomes in an effort to better inform our colleagues of this often overlooked public health concern and emphasize the importance of racial equity in research. Addressing these differences early in life may help diminish health disparities between racial and ethnic minority groups and Whites.

In-Depth Description of Issue

Impacts on Lifespan

Racial disparities between White and minority populations are evident in lifespan measures. According to the 2017 National Vital Statistics report from the Centers for Disease Control (CDC),[18] the average life expectancy at birth is 81 years for non-Hispanic White females, 78.1 years for non-Hispanic Black females, 76.1 years for non-Hispanic White males, and 71.5 years for non-Hispanic Black males. Overall, White people have a higher life expectancy at birth than Black people. Interestingly, Hispanic women and men had higher life-expectancy estimates than both non-Hispanic White and non-Hispanic Black men/women (84.3 years and 79.1 years, respectively).

The observed gap between Black and White life expectancies may be moderated by ACEs. The 1998 ACE Study proposed a cumulative lifetime model for the influence of ACEs throughout life. This model suggested that ACEs would lead to social, emotional, and cognitive impairment during development. These developmental changes could subsequently increase the likelihood of adopting health-risk behaviors, which could cause diseases, disabilities, and social issues, potentially contributing to early death.

Follow-up studies have supported this model, finding that ACEs lead to a reduction of lifespan overall.[19] A strong association exists between the number of ACEs experienced and subsequent reduction in lifespan.[19] Jia and Lubetkin (2020) found that adults who reported multiple ACE types had lower estimated quality-adjusted life expectancies (QALE).[20] Specifically, those with 3 or more types of ACEs experienced a significant loss of quality-adjusted life years (QALYs) compared to those with 0 or 1-2 ACE types. Patterns of QALE estimates across racial groups are consistent with CDC findings.[18] Within any ACE frequency group, Black men and women have lower QALEs than White men and women, respectively.[20] Once again, Hispanic men and women had the highest QALEs.[20] Laditka and Laditka (2018) also found that across all examined racial and ethnic groups, individuals with high adversity had decreased lifespans.[21]

Adults who experienced greater adversity in childhood have been found to spend a greater portion of their life impaired than those with more advantaged upbringings.[22] Despite living longer, Hispanic individuals experience more functional impairment than

White individuals,[23] a phenomenon which may be linked to childhood adversity. This, coupled with the higher frequency of ACEs among Hispanic and Black youth, suggests potential differences in the types of ACEs experienced or the pathways by which these experiences influence health among racial and ethnic groups.

Socioeconomic Status

According to the National Center for Children in Poverty (2016) and the Kids Count Data Center, higher percentages of Black and Hispanic children live in poverty compared to White children.[24,25] Children in poverty are more likely to experience ACEs due to increased stress on family members, environmental hazards, and reduced accessibility to resources. In addition, according to the 2016 National Survey of Children's Health, Black children are disproportionately represented among children with ACEs.[26] Over 6 in 10 Black children have experienced ACEs, comprising 17.4% of all US children with ACEs. These findings suggest that race and socioeconomic status interact in complex ways to influence ACEs.

The effects of socioeconomic status on ACEs may differ by race and ethnicity, as institutionalized systems of racism and classism pose additional challenges for racial minority groups. Since children in poverty are more likely to incur ACEs, the observed higher prevalence of ACEs in Black and Hispanic children may be in part mediated by the racial wealth gap. According to data from the Federal Reserve's Survey of Consumer Finances, Black and Hispanic families have considerably less mean and median net worth than White families.[27] The mean and median net worth of White families in 2016 was $933 700 and $171 000, respectively. The mean and median net worth of Black families was less than 15% of that of White families: $138 200 and $17 600, respectively. The mean and median net worth of Hispanic families was more than Black families, but still significantly less than White families: $191 200 and $20 700, respectively. Additionally, patterns of residential segregation create communities of concentrated poverty in which disproportionate numbers of racial minorities live. A 2014 report from the US Department of Health and Human Services found that 4 out of 5 people living in metropolitan concentrated poverty communities are Black or Hispanic.[28]

Children living in these communities may have increased exposure to neighborhood/community-level ACEs such as community violence, peer victimization, perceived racism/discrimination, and lack of neighborhood safety. Individually and in combination with family-level ACEs, neighborhood/community-level ACEs have been associated with childhood and adult health issues. For example, one study found that racial discrimination indirectly increased the risk for insulin resistance among African American youth through elevated body mass index (BMI).[14] Another study found that childhood and adolescent adversities significantly predicted greater risk for adult cardiovascular disease through multiple pathways, including financial stress, educational attainment, lack of medical/dental care, and health behaviors.[15]

The existing findings on socioeconomic status, race/ethnicity, ACEs, and adult health support programs that address financial hardship, housing segregation, community investment, and other conditions that may put children, especially minority youth, at a higher risk for ACEs.

Mental Health/Disorders

ACEs have been found to have profound effects on mental health in adulthood. The original ACE study found a cumulative effect of ACEs and increased risk for developing depression, attempting suicide, and substance abuse.[1] The study also suggested that health-risk behaviors such as smoking, overeating, and sexual behaviors may be interpreted as attempts to better regulate the anger, anxiety, and depression stemming from these adverse experiences. Subsequent studies have found links between ACEs and a variety of other mental conditions, including post-traumatic stress disorder (PTSD), anxiety disorders, bipolar disorder, and cognitive impairment.[29]

As with physical health conditions, racial disparities are also observed in mental health conditions. According to a 2017 report by the American Psychiatric Association, racial and ethnic minorities experience the same mental disorders as Whites, and lower numbers of reported cases are observed in racial/ethnic minority groups compared to Whites (except American Indian/Alaska Natives).[30] However, the report also suggested that racial/ethnic minorities may experience longer-lasting consequences from mental disorders. Rather than a true difference in prevalence of mental disorders between racial/ethnic demographics, the observed disparities in mental health diagnoses likely result from a combination of sociocultural factors and lack of access to mental health primary care services in minority groups. Instead of specialty primary care, racial/ethnic minority youth are more often referred to the juvenile justice system for behavioral issues. Racial and ethnic minority groups are disproportionately represented in the criminal justice system, and 50% to 75% of youth in the juvenile justice system meet criteria for a mental health disorder.[30] Instead of getting the help they need, minority youth may be exposed to further adversity through these practices, further aggravating the negative mental health consequences of ACEs. Lack of cultural understanding by medical providers may also lead to misdiagnoses and/or underdiagnoses of mental disorders in racial and ethnic minority groups. Additionally, cultural stigmas against mental illness and seeking help for mental illness in racial and ethnic minority groups may contribute to the lower numbers of reported mental illness cases in these groups.

Despite the severity of these issues, few studies have examined the relationships between race, mental illness, and ACEs. The studies that have examined the relationships have produced mixed results. In a 2016 study, Zhang et al examined the role of adverse experiences in childhood and other factors in adulthood in observed racial disparities between Black and White older Americans in cognitive impairment.[31] Using data from the Health

and Retirement Study (HRS), the study found that not only was cognitive impairment significantly more prevalent in Black individuals than White individuals, but it also reached high prevalence at earlier years than in White individuals. The odds for experiencing the onset of cognitive impairment for Black individuals were more than double that of White individuals. A significant reduction in these odds was observed for Black individuals after factoring in childhood adversity, childhood health, being born in the South, and education. Comparatively, only a slight reduction in odds was observed when factoring in adult socioeconomic status and wealth. From these results, Zhang et al concluded that at least part of the racial gap in cognitive impairment can be explained by the racial difference in childhood conditions. In another study examining the effect of racial and ethnic differences in the relationship between childhood adversity and mental disorders, however, Ahern et al found that the examined childhood adversities did not play a significant role in racial/ethnic differences in mental disorders.[32]

Health Behaviors

One major pathway by which ACEs lead to reductions in adult health is through health-risk behaviors. Commonly examined risk behaviors include smoking, drug abuse, alcohol abuse, sexual behaviors, exercise, and eating behaviors. The original ACE study found that ACEs increased the prevalence and risk for engaging in health-risk behaviors.[1] A variety of follow-up studies have also found a similar relationship between ACEs and health-risk behaviors.

Racial disparities for common health-risk behaviors also exist. A 2011 study by Dubowitz et al identified several racial/ethnic differences in health-risk behaviors.[33] Diet differences, such as a higher consumption of fruits and vegetables and a lower percentage of calories from fat in Mexican Americans, were observed. A higher proportion of Blacks and Hispanics were found to lead sedentary lifestyles than Whites. A higher proportion of Mexican American and Black males also engaged in binge-drinking compared to White men. Interestingly, the trend was reversed for females in the same racial/ethnic groups. A higher percentage of Blacks engaged in smoking, compared to Whites (second highest) and Mexican Americans (lowest percentage).

Despite observed differences in health-risk behaviors and diseases associated with these behaviors, few studies have examined the relationship between ACEs, race, and health-risk behaviors. Existing literature connecting the 3 has suggested that race does have some effect on the relationship between ACEs and health-risk behaviors. Lee and Chen (2017) found that the impact of ACEs on heavy drinking differed by race/ethnicity, with ACEs increasing the odds for heavy drinking in some racial/ethnic groups.[34] Specifically, the odds were significantly higher for Hispanics who reported household challenges and abuse as children than Whites with the same adverse experiences.

Further research may be needed to better define the moderating effect of race/ethnicity on the relationship between ACEs and health risk-behaviors. Such information could help better inform intervention programs for alcohol abuse, substance abuse, and programs promoting general healthy habits.

Genetics

Another pathway by which ACEs lead to reductions in adult health is through epigenetic effects. Childhood adversity has been linked to a number of genetic changes affecting proinflammatory genes, genes associated with obesity risk, and the glucocorticoid gene. The observed effect of ACEs on genetics usually involves DNA methylation, leading to blunted expression of genes.[35-38] This may seem counterintuitive, as one might expect an elevated cortisol response in an individual experiencing ACEs, and thus high levels of stress. However, despite initial elevated HPA axis activity, a blunting of the cortisol response occurs over time in response to chronic stress from ACEs.[38] Several studies have reported lower levels of diurnal cortisol secretion in children exposed to early adversity.[35-38] Evidence also suggests that the effect may last into adulthood, manifesting as lower cortisol responses to stress.

The existing body of literature on this topic includes a fair number of studies examining the effects of race on ACEs and epigenetic effects of ACEs. Janusek et al (2017) examined the extent to which ACEs impacted the psychological, cortisol, and proinflammatory response to acute stress in young African American men.[39] Specifically, the study focused on interleukin-6 (IL-6), which acts as a proinflammatory cytokine. Individuals with greater exposure to childhood trauma and neighborhood violence were found to have a blunted cortisol response, greater IL-6 response to the laboratory stress test, and less methylation of the IL-6 promoter. Less methylation of the IL-6 promoter results in a hyperproduction of IL-6 in response to stress, which may contribute to higher levels of anxiety and negative affect in response to stress for those with more ACEs. In a related study, Nikulina and Widom (2014) found that growing up Black predicted elevated levels of C-reactive protein, an inflammatory protein, and hypertension.[40] This effect persisted after controlling for neglect and poverty.

PUBLIC HEALTH IMPLICATIONS

The welfare of our youth strongly influences multiple facets of health as they mature. The effects of race, behavior, community, socioeconomic status, genetics, and mental and physical health in childhood can have severe consequences on adult health outcomes. Ohio youth incur ACEs at an alarming rate, the most common of which are economic hardship (27%), parental divorce (23%), exposure to neighborhood violence (13%), and living with someone who had a problem with alcohol or drugs (12%).[41] Over 400 000 Ohio children reported experiencing ≥2 ACEs between 2017-2018.[42] The crisis of childhood trauma continues to plague many of our communities, which prompted the introduction of

HCR 25 earlier this year urging the governor to declare a state of emergency on childhood trauma in Ohio.[43]

Increased awareness of ACEs experienced by minority youth, as well as early intervention through support structures in schools and health care settings, and informed child welfare programs may help reduce the effects of ACEs on lifespan in racial minority groups. Programs such as parent-focused interventions, home visits, and parent-child psychotherapy have been effective for prevention or reduction of ACEs.[44]

While the risk for incurring ACEs exists among all racial and ethnic groups, some minorities are at a greater risk. These minority youth are subsequently more likely to have worse health outcomes as they mature. Unfortunately, racial disparities persist in health research. Greater emphasis on race in study design, recruitment, and analysis is paramount for achieving health equity.

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