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Parental incarceration and health risks in a population-based study of U.S. early adolescents: Results among racialized groups

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ABSTRACT

Parental incarceration is an adverse childhood experience that inequitably burdens families of color and affects millions of U.S. children and adolescents. Although racialized disparities in exposure to parental incarceration are often acknowledged, researchers have yet to examine whether manifestations of racism may affect the link between parental incarceration and youth outcomes. This study provides a first look at how parental incarceration relates to health vulnerabilities in the Adolescent Brain Cognitive Development (ABCD) study, an ongoing, population-based study of U.S. children born between 2006 and 2008. We start by describing exposure to parental incarceration and then examine how parental incarceration, state-level racial prejudice, and discrimination relate to health risks among 9191 White (66%), Black (19%), or Hispanic (15%) youth. Consistent with what we know about pervasive racialized disparities in the U.S. criminal legal system, we find that 19.3% of Black children in our sample have experienced parental incarceration, followed by 7.8% of Hispanic children, and 4.8% of White children. Results of multilevel mixed models further indicate that parental incarceration was associated with increased health risks among White children whereas family economic hardship and discrimination experiences were more robustly associated with health vulnerabilities among Black and Hispanic children. Additional analyses explored whether parental incarceration was associated with other outcomes among Black and Hispanic children, revealing increased risk for behavior problems contingent upon parental incarceration and discrimination for Black children and Hispanic boys. Among Hispanic girls, parental incarceration was associated with increased risk of behavior problems in states with higher levels of racism. Results suggest that parental incarceration contributes to risk among early adolescents across racialized groups, but that the specific toll it takes depends on outcomes assessed and the context in which it occurs.

1. Introduction

The United States has one of the highest incarceration rates in the world and recent trends indicate that U.S. prison populations are once again on the rise after an anomalous period of marginal decline between 2010 and 2020 (Nellis, 2024). Incarceration poses serious health risks, not only to the millions of U.S. adults who are incarcerated each year, but also to their children and families (Provencher & Conway, 2019; Schnittker et al., 2022; Wildeman & Lee, 2021). At a population level, parental incarceration increases risk for adverse child outcomes via a cascade of disadvantages driven by factors such as economic hardship, trauma, and social stigma (Johnson & Arditti, 2023; Poehlmann-Tynan & Turney, 2021). In addition to robust connections between parental incarceration and child behavioral outcomes, there is also mounting evidence that parental incarceration can take a physiological toll on children. Parental incarceration and specific incarceration-related traumas have now been linked to biomarkers of chronic stress including accelerated telomere length shortening, allostatic load, and cortisol/cortisone concentrations (Del Toro et al., 2022; Muentner et al., 2021; Niño & Cai, 2020). Unaddressed, these neurobiological vulnerabilities may heighten risk for later health morbidities that are costly to individuals, families, and society.

Parental incarceration is also an inequitably distributed form of childhood adversity that reflects and reinforces other social determinants of health (Muentner et al., 2022, 2023). Contact with the U.S. criminal legal system (CLS) has been conceptualized as a racialized

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chronic stressor that disproportionately burdens people of color. Individuals racialized as Black,[1] for example, are subject to greater surveillance, higher rates of arrest, and more punitive sentences than individuals racialized as White (Najdowski & Stevenson, 2022). By extension, there are also profound disparities in children's exposure to parental incarceration. It has been estimated that one in 14 White children have had a residential parent go to jail or prison, compared to one in 9 Black children (Annie E. Casey Foundation, 2016), figures that do not include non-residential parents or other forms of parental contact with the CLS that may also be important for child health including police stops, arrests, and community supervision.

Although racialized disparities are often acknowledged and used to motivate research on parental incarceration (Bruns & Lee, 2019; Haskins & Lee, 2016), race and racism are often insufficiently interrogated in social research (Williams, 2024) and in studies on the health consequences of mass incarceration for children and families (Bruns & Lee, 2019; Haskins & Lee, 2016). The few studies that do exist suggest evidence of racial-ethnic variation in the effects of parental incarceration on children's behavioral outcomes. Some of these studies indicate that effects are stronger among children who are Black and Hispanic, which have been interpreted as supporting a "double jeopardy" hypothesis whereby parental incarceration compounds pre-existing racialized disadvantages (Bruns & Lee, 2019). Other studies find that effects may be weaker for Black children, perhaps due to their greater access to networks of family and social support (Haskins & Lee, 2016). There is also likely important within-group variability in terms of risks and resources that have been masked in previous studies that model race using statistical interaction terms or that control for race. An essential next step is to move beyond treating race as an ahistorical, demographic characteristic by examining how specific manifestations of racism affect the relationship between parental incarceration and child health (see Neblett, 2019; Williams, 2023). Racism may not only influence why Black youth, for example, are disproportionately exposed to potentially traumatic events such as parental incarceration but may also potentiate the effect of parental incarceration on youth outcomes (Bernard et al., 2021) in ways that have yet to be investigated.

The purpose of this study is to advance scholarship on parental incarceration and health by (a) examining exposure to parental incarceration and health vulnerabilities among racialized groups of early adolescents in an ongoing, population-based U.S. study; and (b) considering whether two manifestations of racism, state-level racial prejudice and discrimination, modify risk associated with parental incarceration. Seeking to identify early indicators of health risk, we focus on three variables that have been conceptualized as markers of physiological wear and tear in adolescents that are sensitive to adverse life events and may portend future health conditions: higher BMI, accelerated pubertal development relative to age, and sleep disturbances (Christensen et al., 2022; Joos et al., 2018; Whelan et al., 2021). Using data from the Adolescent Brain Cognitive Development (ABCD) study, we examine exposure to parental incarceration and then identify how parental incarceration, state-level racial prejudice, and discrimination independently or interactively relate to health risks among White, Black, and Hispanic youth.

2. Data and methods

2.1. Data and participants

Data were derived from the Adolescent Brain Cognitive Development (ABCD) study, an ongoing longitudinal study of U.S. children that is following an initial cohort of 11,875 9-10-year-olds throughout adolescence (https://abcdstudy.org). Participants were recruited from across the United States and are in the process of undergoing annual assessments of social and physical environments, adverse life events, and mental health, as well as biennial brain imaging. Measures included in the study have evolved, and questions about parental incarceration and discrimination experiences were added at year-one follow-up. The sample, designed to reflect the sociodemographic diversity of the United States, was recruited through a multistage process whereby probability sampling was used to select schools within each of the 21 nationally distributed data collection catchment areas in 17 states followed by recruitment of age-eligible children in each school. Sociodemographic sample size targets for the baseline cohort were focused on age, gender, race and ethnicity, socioeconomic status, and urbanity, and came from the American Community Survey (ACS) and the National Center for Education Statistics (NCES) (Garavan et al., 2018). Participant demographics were carefully monitored as the sample accumulated, and, when necessary, recruitment strategies were adjusted to ensure adherence to the desired sociodemographic diversity and representativeness of the birth cohorts in the U.S. that comprise the study population. Efforts to minimize attrition, particularly uneven attrition across sociodemographic groups, have been largely successful to date and contributed to extremely low study withdrawal rates (Feldstein Ewing et al., 2022).

Our study leverages data from the baseline (T0) and year-one follow-up (T1) assessments on 9191 youth who are White (66%), Black (19%), or Hispanic (15%). Participants in our sample were 10–11 years-old at the T1 assessment ($M = 10.93$ years; $SD = 0.64$ years). Comparisons of White, Black and Hispanic youth included in our sample versus those who were only in T0 ($n = 244$), indicate that the sample used in current analyses had responding caregivers who had completed slightly more years of education (16.74 vs. 14.33 total years of education, $p < 0.001$), reported higher family incomes (range $50,000–74.999 vs. $35,000-$49,999, $p < 0.001$), had lower overall hardship scores (mean score 0.60 vs0.45, $p < 0.001$) and were less likely to report their race as Hispanic ($p < 0.001$).

2.2. Measures

Parental incarceration was assessed at T1 as part of a life events inventory administered to children and their responding caregivers. Children and caregivers were asked to report whether one of the child's parents or caregivers had ever been to jail. Affirmative responses from either children or caregivers were counted as evidence of parental incarceration.

State-level racial prejudice was operationalized in terms of aggregated levels of racial prejudice, endorsement of racial stereotypes, and the impact of discrimination on the lives of individuals racialized as Black in each of the 17 states in which study participants lived at T0. Measures of these constructs were compiled and analyzed by Hatzenbuehler et al. (2022), who contributed their factor score to the ABCD data repository. The factor score was based on 31 items obtained from Project Implicit, the General Social Survey, and the American National Election Survey that assessed aggregated attitudes related to race and racial prejudice and converged around a single construct with high reliability ($\alpha = 0.97$).

Discrimination was operationally defined as being treated unfairly or feeling unaccepted in society due to racial or ethnic background and assessed at T1 using Phinney's Perceived Discrimination Scale (Phinney et al., 1998). The Perceived Discrimination Scale consists of seven items that ask participants to rate how frequently they are treated unfairly or negatively because of their ethnic background by teachers, other adults outside of school, and other students, and to assess how frequently they feel unaccepted in society (e.g., "I feel that I am not wanted in American society") ($\alpha = 0.81$). Items were rated on five-point scales (1 = never; 5 = very often) and averaged.

Health risks were defined as variables that may increase the likelihood of experiencing later health conditions. We developed a health risk

[1] We conceptualize race as a socio-political construct and use the phrase "racialized as Black" to connote this. Hereafter, we use "Black", "White", and "Hispanic" to described racialized groups and ethnicities.

index that combines T1 data on body mass index (BMI), sleep disturbances, and accelerated pubertal development, variables that have been conceptualized as early markers of physiological wear and tear in adolescents that can increase risk for later health conditions (Christensen et al., 2022; Joos et al., 2018; Whelan et al., 2021). Youth height and weight were measured two times during the study visit, and the average of the two measurements was used as raw height and weight data. Raw BMI was then calculated using the standard equation (kg/m^2). Parents/caregivers rated youth sleep disturbances over the past 6 months using the Sleep Disturbance Scale for Children (SDSC; Bruni et al., 1996). The 26-item SDSC asks reporters to rate child sleep disturbances on 5-point Likert-type scales and consists of six common sleep disorder subscales (e.g., disorders of arousal or nightmares, disorders of initiating and maintaining sleep, disorders of excessive somnolence). The total score is the sum of the subscale scores and ranges from 26 to 130 points, with higher scores indicating poorer sleep quality.

Parents/caregivers rated their child's pubertal development and youth reported on their own development using the Pubertal Development Scale (PDS; Petersen et al., 1988), a questionnaire measure designed to assess secondary sex characteristics of puberty on a 4-point Likert-type scale ("had not begun" to "already complete"). Sample items include growth spurts, body hair growth, skin changes, breast development and menarche in females, and voice changes and growth of testes in males. The PDS has high inter-rater reliability between parent and self-rated assessment and correlates highly with pubertal hormone measures (Cheng et al., 2021). We averaged across parent and youth total pubertal development scores, with higher scores indicating more advanced pubertal status.

We constructed a score summarizing the three health vulnerability items by first regressing age and sex out of calculated BMI, sleep, and pubertal status scores. In doing so, each individual score is reflective of physiological health risks relative to their same age and sex peers. The resulting three standardized residuals were then averaged to create an overall health risk index whereby higher scores indicate higher risk toward health vulnerabilities.

Sociodemographic controls included the responding parent/caregiver's marital status (married/cohabiting or not), educational attainment, family economic hardship, neighborhood socioeconomic disadvantage, and history of parental substance use or mental health problems in all models. Neighborhood socioeconomic disadvantage was assessed using the Area Deprivation Index (ADI), a composite index of U.S. Census tract-level data on poverty, education, employment, and housing (Kind et al., 2014; Singh, 2003). Economic hardship was measured via seven items that assessed whether the responding caregiver or anyone in their immediate family had difficulty meeting basic needs pertaining to food, utilities, housing, medical care, and/or dental care in the past year (Diemer et al., 2013). Pre-packaged summary scores from the baseline family history assessments were used as controls for lifetime occurrence of substance use or psychological problems among either of the children's biological parents.

2.3. Statistical analysis

Data were analyzed using the SAS *Proc Mixed* procedure to conduct multilevel mixed models. Models utilized maximum likelihood estimation to account for missing data (Enders, 2008; Singer, 1998; Singer & Willett, 2003); there was <6% missing data for any variable. Analyses, which were conducted separately for racialized and gendered groups, included focal predictors for parental incarceration, state-level racial prejudice, and perceived discrimination as well as their interactions on health risk scores. To minimize concerns about selection bias (Johnson & Easterling, 2012), we covaried for the responding parent/caregiver's marital status (married/cohabiting or not), educational attainment, family economic hardship, neighborhood socioeconomic disadvantage, and history of parental substance use or mental health problems in all models. We also controlled for youth age at T1 and accounted for the nesting of youth within the 17 states where ABCD data collection took place.

3. Results

Given that primary analyses predicting youth health risks were stratified by racialized and gendered groups, we present sample descriptive statistics in Table 1 in the same manner. Consistent with what we know about pervasive racialized disparities in the U.S. criminal legal system (Najdowski & Stevenson, 2022), we find that 19.3% of Black children in our sample experienced parental incarceration, followed by 7.8% of Hispanic children, and 4.8% of White children. Descriptive data further indicate that Black children were exposed to the highest levels of state-level racial prejudice and discrimination experiences, followed by Hispanic children, and then White children. Among each group, mean levels of discrimination experiences were slightly higher for boys than for girls. There was also evidence that Black and Hispanic children were exposed to greater socioeconomic disadvantages than White children.

Regression estimates for stratified multilevel models that accounted for nesting of children within states and included controls for several theoretically relevant selection variables are presented in Tables 2–4. Among boys and girls who are White, parental incarceration was associated with higher scores on the health risk index. There was also evidence that perceived discrimination, family economic hardship, and parental history of mental health difficulties were associated with higher levels of health risk among both boys and girls. Parent educational attainment and having parents who were married or cohabiting were inversely associated with health risk. Effects for neighborhood disadvantage and substance use were gendered among White youth, with neighborhood disadvantage being associated with elevated risk for boys only, and parental substance use increasing risk for girls but not boys.

Among Black children, there were no main or interactive effects of parental incarceration or state-level racial prejudice on health risk scores for either boys or girls. There was, however, evidence of gendered effects of economic hardship and discrimination experiences on health risks. Family economic hardship was positively and significantly associated with health risks among boys, but not girls. For girls, discrimination experiences were positively and significantly associated with increased health vulnerabilities.

Similar to findings for Black youth, there were no main or interactive effects of parental incarceration on Hispanic children's health risk scores. Discrimination experiences and economic hardship were, however, positively associated with health risks for boys and girls. Additionally, for boys, living in a state with higher aggregated levels of racism was associated with greater health risks. For Hispanic girls, history of parental mental health difficulties appeared to elevate risk for health vulnerabilities.

To assess whether parental incarceration was associated with other outcome variables for children racialized as Black and Hispanic, we conducted a series of parallel models that related parental incarceration to problem behaviors assessed using the externalizing scale of the Child Behavioral Checklist (CBCL; Achenbach, 2009). These analyses revealed significant interactions between parental incarceration and discrimination for Black children and for Hispanic boys. The interaction for boys racialized as Black is graphically displayed in Fig. 1; a similar pattern was observed for Black girls and Hispanic boys. Among Black children and Hispanic boys, parental incarceration was associated with elevated risk for behavior problems at low (but not high) levels of discrimination. Addtionally, we found a significant interaction between parental incarceration and state-level racial-prejudice for Hispanic girls. Plotting this interaction revealed that parental incarceration appears to increase risk for externalizing problems among Hispanic girls who live in states with high (but not low) aggregated levels of racism (Fig. 2).

Table 1
Descriptive data by racialized and gendered groups.

	White; n (%) or Mean (SD)		Black; n (%) or Mean (SD)		Hispanic; n (%) or Mean (SD)	
	Total N: 6092		Total N: 1760		Total N: 1339	
	Boys (n = 3228)	Girls (n = 2864)	Boys (n = 876)	Girls (n = 884)	Boys (n = 710)	Girls (n = 629)
Experienced Parental Incarceration	157 (4.9%)	137 (4.8%)	158 (18.0%)	182 (20.6%)	52 (7.3%)	53 (8.4%)
Racism & Discrimination						
State-level racial prejudice	−0.29 (0.79)	−0.30 (0.81)	0.06 (0.67)	0.12 (0.67)	−0.01 (0.60)	−0.03 (0.62)
Discrimination experiences	1.15 (0.34)	1.11 (0.31)	1.45 (0.67)	1.32 (0.57)	1.27 (0.48)	1.19 (0.45)
Health Risks[a]						
Total health risks	−0.12 (0.52)	−0.14 (0.60)	0.26 (0.68)	0.38 (0.72)	0.13 (0.59)	0.06 (0.65)
BMI (continuous, z-scored)	−0.19 (0.78)	−0.25 (0.79)	0.35 (1.19)	0.56 (1.27)	0.30 (1.02)	0.18 (1.03)
Sleep disturbance	−0.02 (0.97)	−0.00 (0.92)	0.01 (1.10)	0.02 (1.12)	−0.06 (1.04)	−0.09 (0.93)
Pubertal development score	−0.15 (0.67)	−0.18 (0.98)	0.43 (0.84)	0.58 (0.99)	0.16 (0.75)	0.08 (1.07)
Sociodemographic Controls						
Parent married or cohabiting	2645 (82.3%)	2340 (81.7%)	319 (36.4%)	295 (33.4%)	487 (68.6%)	419 (66.6%)
Parent educational attainment [b] (median; range)	College degree; (6th grade to Doctorate)	College degree; (7th grade to Doctorate)	Some college; (5th grade to Doctorate)	Some college; (4th grade to Doctorate)	Associate's (3rd grade to Doctorate)	Associate's (1st grade to Doctorate)
Family economic hardship sum	0.27 (0.88)	0.26 (0.87)	0.92 (1.41)	0.93 (1.45)	0.49 (1.01)	0.53 (1.13)
Neighborhood disadvantage	89.67 (23.70)	89.03 (24.82)	105.81 (23.13)	108.79 (20.97)	94.80 (22.69)	95.96 (20.78)
Parental substance problem	1240 (38.4%)	1102 (38.5%)	288 (32.9%)	292 (33.0)	209 (29.4%)	218 (34.7%)
Parental mental health problem	708 (21.9%)	651 (22.7%)	217 (24.8%)	201 (22.7%)	153 (21.5%)	138 (21.9%)

Notes.
[a] Age and sex were regressed out of health risk variables, so all are standardized residuals.
[b] Parent educational attainment was based on the participating parent's highest grade or level of school completed. Given the underlying ordered continuum of this variable, it was treated as continuous in the analyses but is presented categorically here for descriptive purposes. Not all numbers add up to total N for each variable due to random missingness.

Table 2
Multilevel models predicting health risk (HR) scores: Youth racialized as White.

	Boys' HR Score	Girls' HR Score
	Estimate (SE)	Estimate (SE)
Parental Incarceration (PI)	0.11 (0.05)[a]	0.13 (0.05)[a]
Racism & Discrimination		
State-level racial prejudice	−0.00 (0.02)	0.01 (0.03)
Discrimination experiences	0.03 (0.01)[a]	0.05 (0.02)[b]
PI * state-level racial prejudice	−0.05 (0.04)	0.07 (0.05)
PI * discrimination	−0.04 (0.03)	0.03 (0.06)
Sociodemographic Controls		
Youth age (months)	−0.01 (0.00)[b]	0.01 (0.00)[b]
Parent married or cohabiting	−0.08 (0.03)[b]	−0.09 (0.03)[b]
Parent educational attainment	−0.02 (0.01)[b]	−0.03 (0.01)[b]
Family economic hardship	0.07 (0.01)[b]	0.07 (0.01)[b]
Neighborhood disadvantage	0.00 (0.00)[b]	0.00 (0.00)
Parental substance use problem	0.03 (0.02)	0.07 (0.03)[b]
Parental mental health problem	0.09 (0.03)[b]	0.10 (0.03)[b]

Notes.
[a] $p < .05$.
[b] $p < .01$.

Table 3
Multilevel models predicting health risk (HR) scores: Youth racialized as Black.

	Boys' HR Score	Girls' HR Score
	Estimate (SE)	Estimate (SE)
Parental Incarceration (PI)	0.00 (0.08)	0.00 (0.08)
Racism & Discrimination		
State-level racial prejudice	0.03 (0.04)	−0.07 (0.04)
Discrimination experiences	0.02 (0.02)	0.05 (0.03)[a]
PI * state-level racial prejudice	−0.10 (0.08)	0.03 (0.08)
PI * discrimination	0.03 (0.04)	−0.01 (0.05)
Sociodemographic Controls		
Youth age (months)	−0.00 (0.00)	0.01 (0.00)[a]
Parent married or cohabiting	0.01 (0.05)	−0.08 (0.06)
Parent educational attainment	−0.00 (0.01)	−0.00 (0.01)
Family economic hardship	0.05 (0.02)[b]	0.03 (0.02)
Neighborhood disadvantage	0.00 (0.00)	0.00 (0.00)
Parental substance use problem	0.11 (0.06)	0.08 (0.06)
Parental mental health problem	0.12 (0.07)	0.09 (0.07)

Notes.
[a] : $p < .05$.
[b] $p < .01$.

4. Discussion

Direct and vicarious contact with the criminal legal system can pose serious health risks to individuals, families, and communities. Understanding the circumstances under which parental incarceration occurs and confers risk for adverse youth outcomes is important for both basic and applied reasons. In the United States, racism is an essential yet often unmeasured consideration in empirical studies on parental incarceration. The purpose of this study was to describe exposure to parental incarceration across racialized groups in the ABCD study and to examine

Table 4
Multilevel models predicting health risk (HR) scores: Youth racialized as Hispanic.

	Boys' HR Score	Girls' HR Score
	Estimate (SE)	Estimate (SE)
Parental Incarceration (PI)	0.11 (0.10)	−0.02 (0.10)
Racism & Discrimination		
State-level racial prejudice	0.08 (0.03)[a]	−0.01 (0.04)
Discrimination experiences	0.07 (0.02)[b]	0.06 (0.03)[a]
PI * state-level racial prejudice	−0.20 (0.11)	0.01 (0.11)
PI * discrimination	−0.05 (0.06)	0.13 (0.13)
Sociodemographic Controls		
Youth age (months)	−0.01 (0.00)	0.01 (0.00)[b]
Parent married or cohabiting	−0.03 (0.06)	−0.01 (0.06)
Parental educational attainment	−0.00 (0.01)	−0.01 (0.01)
Family economic hardship	0.07 (0.02)[b]	0.09 (0.03)[b]
Neighborhood disadvantage	0.00 (0.00)	0.00 (0.00)
Parental substance use problem	0.10 (0.06)	0.11 (0.07)
Parental mental health problem	0.05 (0.07)	0.21 (0.07)[b]

Notes.
[a] $p < .05$.
[b] $p < .01$.

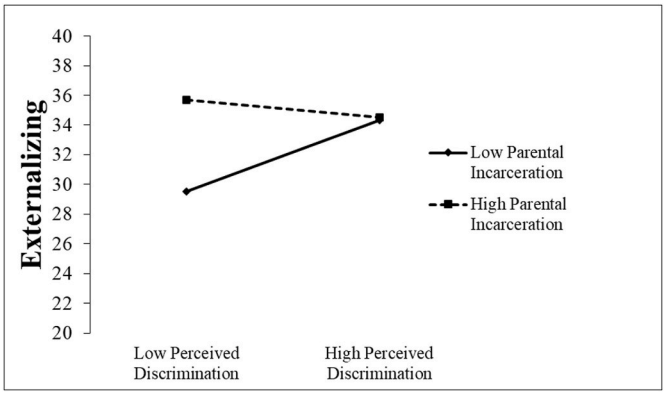

Fig. 1. Parental incarceration * discrimination interaction for externalizing behaviors: Boys racialized as Black.

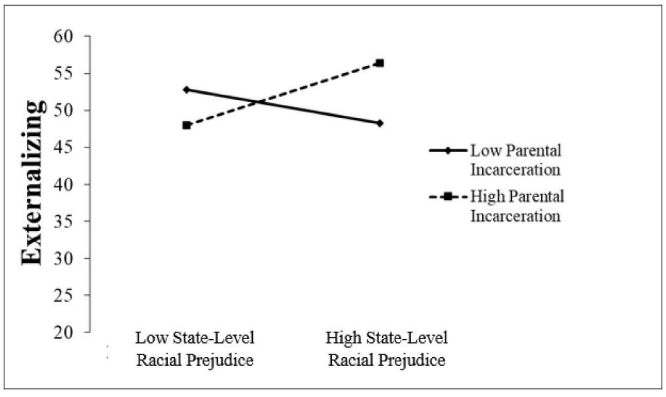

Fig. 2. Parental incarceration * state-level racial prejudice interaction for externalizing behaviors: Girls racialized as Hispanic.

how parental incarceration, aggregated state-level racial prejudice, and discrimination independently or interactively relate to early indicators of health risks among early adolescents.

Our findings provide additional evidence of racialized disparities in exposure to parental incarceration and indicate that parental incarceration contributes to risk across racialized groups, but that the specific toll it takes depends on outcome assessed (health vulnerabilities vs. externalizing behaviors) and the context in which it occurs. For example, among White children, there was evidence that parental incarceration was associated with increased health risks – findings that align with previous theory and research on parental incarceration as an adverse childhood experience that can alter physiological stress response systems (Poehlmann-Tynan & Turney, 2021). Among Black and Hispanic children, family economic hardship and discrimination experiences were more robustly associated with health vulnerabilities, perhaps because they are more closely linked to health care access and quality.

Another possible explanation for the lack of association between parental incarceration and health risks among Black and Hispanic children is that they may have had access to wider networks of family and social support that helped buffer them from stressors associated with parental incarceration (Haskins & Lee, 2016). Equally plausible, our outcome measures may have failed to capture the physiological toll that parental incarceration takes on Black and Hispanic children. Research on skin-deep resilience among African American adolescents and young adults, for example, has indicated that the costs of adapting to adversity are not always readily visible. Brody et al. (2020) observed that outward appearances of stress resilience among African American young adults who spent time in poverty during their adolescence belied a physiological toll that was evident in their increased susceptibility to metaboloic syndrome and insulin resistance. Widening the scope of health assessments to include other cardiometabolic risk factors and biomarkers of chronic stress and expanding the developmental scope to include additional waves of data would allow a more complete picture of the physiological toll that parental incarceration takes on youth to emerge.

In this general vein, we conducted an additional set of analyses focused on behavioral outcomes to determine if the pattern of racialized findings was specific to health risks. Results revealed that parental incarceration was associated with increased risk for externalizing problems among Black children and Hispanic boys when perceived discrimination was low. This intriguing pattern of findings may provide important clues as to why previous results regarding racial and ethnic variation have been inconsistent. For Black children and Hispanic boys who experience discrimination across social contexts, parental incarceration may not have discernible health effects above and beyond the effects of racism. In settings characterized by low levels of discrimination, however, the effects of parental incarceration may become more salient. Our additional analyses further revealed that parental incarceration was associated with increased risk for externalizing problems among Hispanic girls who live in states with high (but not low) aggregated levels of racial prejudice.

Given that racism is an ongoing, ever-changing, and multifaceted system of ideologies and structures (Williams, 2024), how racism manifests in children's lives may be contingent upon specific racialized groups due to varying histories and contemporary experiences. Incarceration is one important manifestation of racism, and our findings reflect his reality. For instance, boys racialized as Black who experienced parental incarceration displayed more behavioral problems than those who did not when discrimination was low. This finding may reflect vicarious racism whereby being exposed to racism experienced by others impacts children's outcomes (Heard-Garris et al., 2018). Thus, even when Black children experience lower levels of interpersonal discrimination, having a parent incarcerated reflects a traumatic experience, which, in turn, leads to children's socio-emotional and behavioral problems (Merhi et al., 2024; Poehlmann-Tynan & Turney, 2021).

Children's experiences at school and other settings in which they spend significant portions of their time also likely provide important clues regarding the complex relations between parental incarceration, manifestations of racism, and externalizing behaviors. Data from

experimental vignette studies indicate that teachers expect more behavior problems (Wildeman et al., 2017) and fewer competencies (Dallaire et al., 2010) from children they believe have incarcerated parents than children who are separated from parents for other reasons. Stigma related to parental incarceration may affect not only teachers' expectations, but also their behavior - including disciplinary referrals and behavior reports to parents. These, in turn, may shape how parents rate their children on measures of behavior such as the one utilized here. Relatedly, Jacobsen (2019) has hypothesized that exclusionary school discipline may operate as a form of "intergenerational secondary sanctioning" whereby children with incarcerated parents face more scrutiny (p. 677), a possibility that warrants careful consideration in future research.

4.1. Limitations

Findings should be interpreted relative to several methodological parameters. First, our measure of parental incarceration only captured whether a parent or caregiver had ever been incarcerated. Although we were able to ensure appropriate temporal patterning of parental incarceration relative to our measures of health risks and to control for several theoretically relevant selection factors, our ability to make causal inferences is limited by the fact that we did not have longitudinal data on parental incarceration or detailed information on the timing of parental incarceration. In this vein, our measure of state-level racial prejudice was assessed at baseline, before measures of parental incarceration and perceived discrimination were added to the ABCD study. It is possible that some adolescents moved to states that had different levels of aggregated racial prejudice from T0 to T1, a factor we are unfortunately unable to account for. Second, our measure of state-level racial prejudice captured aggregated levels of racial prejudice, endorsement of racial stereotypes, and the impact of discrimination on the lives of Black individuals in each state (Hatzenbuehler et al., 2022). Moving forward, it will be essential to capture institutional racism via direct or proxy measures of discriminatory policies and practices embedded in our social institutions (Neblett & Neal, 2022; Needham et al., 2023). There is a particularly strong need to examine how structural racism relates to indicators of adolescent health and development; as Neblett and Neal (2022) have noted, most research on structural racism has focused on outcomes during pregnancy, birth, and infancy or on adults. Third, the ABCD study does not currently include assessments of key variables that may affect the lived experiences of adolescents with incarcerated parents such as transitions in care and changes in children's living arrangements. Relatedly, we examined three heath risk variables available in the ABCD study that have been conceptualized as early markers of physiological wear and tear during adolescence but were unable to consider key neuroendocrine and immune biomarkers (e.g., cortisol, C-reactive protein). Finally, although ABCD withdrawal rates have been extremely low, children who withdrew from the study were more likely to have primary Spanish speaking parents and children who missed visits differed from children who did not in terms of race and indicators of socioeconomic status (Feldstein Ewing et al., 2022).

4.2. Implications and conclusions

Findings emphasize that parental incarceration is not a uniform risk factor, but rather one that may affect youth differently depending on outcomes assessed and other experiences, such as exposure to economic hardship, racism, and discrimination. Heterogeneity in the potential effects of parental incarceration on children's physical and behavioral health has important implications for practice, policy, and future research. Children with incarcerated parents can have complex, varied needs that change developmentally and it is important to design interventions that are sensitive to children's contexts while also advocating for alternative visions of safety and justice that reduce their exposure to parental incarceration and for policies that help ensure families can meet their basic economic and health care needs. Health care professionals also play important roles in screening for adverse childhood experiences (ACEs), including those related to parental incarceration, racism, and untreated parental mental health issues. In addition to screening for such exposures, health care professionals can also help facilitate equitable access to culturally valued resources and support for children who experience parental incarceration.

Nuanced considerations of context and specificity in assessments of youth outcomes are essential in subsequent scholarship on parental incarceration, as are quantitative and qualitative explorations of adolescents' networks of social support and their experiences in key developmental settings such as schools and communities. We also recommend that researchers and practitioners continue to interrogate the ways in which manifestations of racism affect children's lived experiences and health in the context of parental incarceration. Critical approaches to heterogeneity and resilience that recognize the strengths that children and families mobilize in the context of parental incarceration while also problematizing a reliance on individual resilience to address complex social problems and manifestations of racism should be a part of such efforts (Johnson & Arditti, 2023).

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The authors declare that they have no conflicts of interest.

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Ethics approval

This manuscript is based on de-identified data from the ABCD study that have been deposited in the National Institute of Mental Health Data Archive (NDA) and made available to the authors via Data Use Certification (DUC) agreements. Work with the data has been certified by the lead author's Institutional Review Board as meeting the NIH criteria for Exemption 4: "study of data if publicly available or recorded such that subjects cannot be identified."

CRediT authorship contribution statement

Elizabeth I. Johnson: Writing – original draft, Conceptualization. **Elizabeth M. Planalp:** Writing – review & editing, Formal analysis, Conceptualization. **Deadric T. Williams:** Writing – review & editing, Conceptualization. **Julie Poehlmann:** Writing – review & editing, Conceptualization.

Data availability

This manuscript is based on de-identified data made available to the authors via Data Use Certification agreements with the NIMH Data Archive (NDA).

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