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ORIGINAL PAPER

Parental Arrest and Child Behavior: Differential Role of Executive Functioning among Racial Subgroups

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Abstract

This study examines relations among parental arrest, child executive functioning (EF), and problem behaviors among youth who participated in the baseline assessment of the Adolescent Brain Cognitive Development (ABCD) study ($N = 11{,}875$). Participants ranged in age from 9 to 10 ($M = 9.91$) years, and approximately half were girls (47.9%). Results of regression analyses that controlled for sociodemographic risk factors indicated that children who experienced parental arrest exhibited more internalizing and externalizing behaviors than comparison youth, particularly when their mother vs. father had been arrested. Results of analyses that were disaggregated by child race further revealed that EF appeared to play a differential role among White ($n = 5851$) and Black ($n = 1451$) children. Among White children, EF was associated with fewer internalizing and externalizing behaviors regardless of whether or not a parent had been arrested. Among Black children, low levels of EF were associated with more internalizing behaviors in the context of parental arrest vs. no arrest, but high levels of EF did not appear to confer benefits. EF was not significantly related to externalizing behaviors among Black children. Taken together, results suggest that parental arrests have adverse implications for child well-being that warrant continued theoretical and empirical attention. Findings also suggest that, although EF may be broadly beneficial among White children, there appear to be constraints on the extent to which high EF benefits Black children, a finding that is discussed through the lens of racial stratification and that has important implications for future theory, research, and practice.

Keywords Parental arrest · Executive functioning · Externalizing problems · Internalizing problems · Racial stratification

Highlights

- Parental arrests were associated with increased risk for problem behaviors among 9–10-year-old children.
- Executive functioning was broadly beneficial among White children, whereas effects were more limited among Black children.
- Racial stratification appears to affect the benefits of executive function for child behavior.
- Results have implications for work with youth who have experienced parental arrests and for research on executive functioning.

Parental contact with the U.S. criminal legal system is a significant, unequally distributed form of childhood disadvantage that affects millions of children (Murphey & Cooper, 2015) and increases their risk for developing emotional and behavioral problems (Arditti, 2016; Wildeman et al., 2018). Although research on the intergenerational consequences of parental contact with the criminal legal system has focused on incarceration, researchers have increasingly emphasized the need to document child well-being at other points of parental contact, including arrest, detainment, and probation and parole (Wakefield & Apel, 2018). In addition, there is an ongoing need for research that can illuminate sources of heterogeneity among children and that considers how risk and resilience processes intersect with child race (Johnson et al., 2020 and Poehlmann-Tynan & Eddy, 2019; Bruns & Lee, 2019). Identifying variables

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that offset risk and promote resilience is an important complement to broader, more systemic efforts to reduce children's exposure to parental arrests and incarceration (Arditti, 2016; Arditti & Johnson, 2020). Executive functioning has been identified as one child-level variable that appears to offer transdiagnostic protection against adverse childhood experiences (Masten & Barnes, 2018; Masten et al., 2021) and that warrants attention in relation to adversities that are at the intersection of racial, social, and economic inequality such as parental contact with the criminal legal system (Raver & Blair, 2020). The goal of the current study is to merge these lines of inquiry by examining relations among parental alcohol- and drug-related arrests, youth executive functioning, and behavioral outcomes in a sample of 9–10-year-olds who participated in the baseline assessment of the Adolescent Brain Cognitive Development (ABCD) study and by considering how these relations intersect with child race.

Parental Contact with the Criminal Legal System and Youth Development

Research on the nature, scope, and impact of parental contact with the U.S. criminal legal system on child development has largely focused on parental incarceration. Both maternal and paternal incarceration are associated with general environmental risk factors (e.g., material hardship, parental substance abuse) as well as incarceration-specific risk factors (e.g., witnessing a parent's arrest, changes in caregivers because of parental incarceration) (Dallaire et al., 2015; Zeman et al., 2018) that may adversely impact child and adolescent development. Although a small minority of children may benefit from parental incarceration in the context of violent parental behavior or severe substance abuse (Wakefield & Powell, 2016), a robust body of research indicates that parental incarceration is a significant risk to children's socioemotional and behavioral development (for reviews see Foster & Hagan, 2015; Turney & Haskins, 2019). Comparatively little empirical attention has been devoted to identifying the ways in which parental arrests, rather than incarceration, may affect child outcomes.

Arrests, independent of whether they culminate in jail or prison time, can have both direct and indirect effects on children. Witnessing a parent's arrest has been associated with trauma-related symptoms and distress in children (Kampfner, 1995; Phillips & Zhao, 2010), and arrests may have short and long-term economic implications for families that adversely impact child well-being. Vallas et al. (2015) have documented, for instance, the heavy economic burden of arrests and noted the lasting impact that criminal records have on employment prospects, eligibility for public assistance, and access to education and training. These and other arrest-related strains, which occur in a racially stratified social system that disproportionately harms Black children and families, can reverberate into family processes (Comfort, 2016; Turney & Sugie, 2021; Williams & Perry, 2019) and contribute to adverse child outcomes (Besemer et al., 2018; Nichols & Loper, 2012; Shlafer et al., 2012).

The potential implications of parental arrests for child outcomes are particularly concerning in light of recent trends and racial inequities in arrests. Adult arrests for drug-related crimes have increased in the past several years in the U.S. (FBI, 2019). In 2018, of the 10.3 million arrests made by law enforcement, the highest numbers of arrests were for drug abuse violations (1,654,282 arrests), mostly for possession, and driving under the influence (1,001,329) (FBI, 2019). Mirroring racial disparities in drug sanctions and other discriminatory criminal justice policies and practices (Hinton et al., 2018; Mitchell & Caudy, 2015), Black Americans are disproportionately represented in arrest statistics, and, by extension, Black children are likely to be disproportionately exposed to parental arrests. Whether Black children may also be differentially affected by parental arrests is an important empirical question given the racialized history and context in which contact with the U.S. criminal legal system occurs (Bruns & Lee, 2019; Haskins & Lee, 2016).

There is limited evidence regarding how parental arrests interact with sociodemographic factors to influence children's outcomes, but research on parental incarceration provides important clues. Boys' cognitive and behavioral outcomes appear to be more sensitive to the effects of paternal incarceration than girls' (Geller et al., 2012; Haskins, 2014, 2016; Wildeman, 2010) and some work suggests that children who are the least disadvantaged in terms of exposure to other ecological adversities are often the most adversely affected (Turney, 2017; Turney & Wildeman, 2015). As Bruns & Lee (2019) have recently observed, studies of how child race interacts with parental incarceration remain rare and have yielded inconsistent results. Some studies, they note, suggest that parental incarceration exacerbates other inequitably distributed forms of disadvantage and results in Black children having more pronounced negative responses to parental incarceration than White children. Other studies suggest that White children may exhibit more adverse outcomes than Black children, perhaps due to resilience processes that Black children and families have developed in response to their persistent, pervasive exposure to incarceration and other disadvantages (Haskins & Lee, 2016).

The seemingly conflicting findings regarding race may reflect the fact that there is important within-group variability that has been obscured in past studies focused on differences in outcomes between Black and White youth and underscore the importance of examining how race

intersects with risk and resilience processes. One way that racial stratification in the U.S. may affect risk and resilience is by influencing children's access to protective resources when a parent is arrested or incarcerated (Bruns & Lee, 2019). An additional possibility is that racial stratification influences the benefits of protective factors for Black children and their families. Recent work by Assari et al. (2020), for instance, has revealed that executive functioning is positively associated with White children's school performance, but not Black children's school performance. They interpret this finding through the lens of the Minorities' Diminished Returns framework, which argues that social stratification, racism, discrimination, and other structural inequalities weaken returns to economic and non-economic resources for Black children (Assari et al., 2019; Assari, 2020). Whether decreased returns are also evident for variables hypothesized to be protective in the context of adverse childhood experiences such as parental arrest is an important empirical question that has yet to be investigated.

Family Adversity, Executive Function and Behavior

Neurocognitive variables are central to theoretical models of child development in contexts of accumulated adversity (e.g., Blair & Raver, 2012), and children's executive functioning skills may serve important protective functions (Masten & Barnes, 2018). Executive function (EF) refers to "a set of general-purpose control mechanisms, often linked to the prefrontal cortex of the brain, that regulate the dynamics of human cognition and action" (Miyake & Friedman, 2012, p. 8). Core EF skills include the ability to shift attention between tasks (cognitive flexibility), update and monitor working memory, and inhibit or control responses (Miyake et al., 2000). Theoretical frameworks suggest that EF begins developing early in life, reflects both genetic and environmental influences, and serves as the foundation for self-directed behavioral control (Blair 2016; Blair & Raver, 2012; Miyake & Friedman, 2012; Zelazo & Müller, 2002). EF is centrally involved in emotional and behavioral development, and one of the ways in which it may influence problematic outcomes in these domains is by affecting how children attend and respond to stressors (Williams et al., 2009). Youth with fewer EF skills are thought to be less well equipped to regulate emotions and adaptively cope with stress (Campbell et al., 2009; Reising et al., 2018), and deficits in EF have been conceptualized as a general risk factor for psychopathology (McTeague et al., 2017).

Importantly, EF can be nurtured through family- and school-based interventions, and there has recently been a call for work that examines EF in the context of unequally distributed forms of disadvantage (Raver & Blair, 2020). In this vein, there is evidence that EF moderates the impact of adverse childhood experiences on emotional and behavioral outcomes. Several studies have suggested that low levels of EF can exacerbate risk in the context of adversity and, conversely, that high levels of EF can buffer youth from problems and facilitate resilience. Burgers & Drabick (2016) found, for instance, that school-age children with lower levels of EF exhibited more anxiety in the context of direct exposure to community violence than youth with better developed EF. In a similar vein, Davidovich et al. (2016) found that adolescents aged 10–18 with better inhibitory control and mental flexibility exhibited fewer depressive symptoms in the context of parental major depressive disorder. These findings also extend to externalizing problems; Thompson et al. (2020) found, for example, that interparental conflict was associated with externalizing outcomes for preschool children who were low in regulation but not those who were high in regulation. Regarding adaptive outcomes and resilience, Obradović (2010) found that effortful control skills were the most significant predictor of resilience among young children experiencing homelessness and that those with better executive control skills exhibited more adaptive functioning across a range of outcomes. Taylor & Ruiz's (2019) investigation of children and adolescents of migrant farmworkers, an educationally marginalized group that often faces high levels of ecological risk, similarly indicated that higher levels of cognitive flexibility were associated with greater dispositional resilience. Thus, it appears that EF may offset risk for internalizing and externalizing problems and promote resilience in the context of family adversities.

Current Study

Using data from the baseline assessment of the Adolescent Brain Cognitive Development (ABCD) study, we examine whether EF moderates the impact of parental arrest on internalizing and externalizing behaviors among 9–10-year-olds who are on the precipice of adolescence. As Thompson et al. (2019) have noted, this developmental juncture precedes the onset of adolescent risk behaviors, making it a particularly important time to identify factors that heighten or mitigate risk for emotional and behavioral problems. Specifically, we address two research questions. First, are there differences in mean levels of EF and internalizing and externalizing problems between youth whose parents have been arrested and those who have not? Second, how do parental arrest and youth EF influence problem behaviors? Based on findings from previous research related to parental contact with the criminal legal system (e.g., Besemer et al., 2018; Haskins, 2016), we expect that youth whose parents

have been arrested will exhibit lower mean levels of EF and more internalizing and externalizing behaviors. We further hypothesize that EF will moderate the relationship between arrest and problem behaviors. Because EF can help youth regulate their emotions and behaviors when they encounter stressful events (Masten et al., 2021; Williams et al., 2009), we expect that higher levels of EF will be associated with fewer internalizing and externalizing behaviors.

Due to the racialized context in which contact with the U.S. criminal legal system occurs (Haskins & Lee, 2016; Williams & Perry, 2019) and the need for research that specifies how parental arrest and race intersect to influence child outcomes (Bruns & Lee, 2019), we will conduct these analyses separately for children who were identified by their responding parent as White and those who were identified by their responding parent as Black or African American. This decision is grounded in a recognition that race is a social construct that is used to stratify and inequitably distribute access to resources in the U.S. (Bonilla-Silva, 1997; Smedley & Smedley, 2005) and informed by related recommendations to examine sources of variability within racialized groups rather than emphasizing between-group differences in outcomes (Garcia et al., 2018; Sen & Wasow, 2016; Williams, 2019). Given previous evidence that boys' behavioral outcomes may be more sensitive to parental incarceration than girls' (Geller et al., 2012; Wildeman, 2010), we will also examine child and parent gender differences in how EF and parental arrest relate to problem behaviors.

Method

Data and Sample

Data were derived from the Adolescent Brain Cognitive Development (ABCD) study, an ongoing longitudinal study of U.S. children designed to investigate brain development and health that will follow a cohort of 9–10-year-olds throughout adolescence (https://abcdstudy.org) and gather information from youth, a participating parent/guardian, and teachers. Youth ($n = 11,\ 875$) were recruited across the United States and are in the process of undergoing structural and functional neuroimaging, biospecimen collection, and assessment of physical and mental health, substance use, neurocognition, and physical and psychosocial environments at regular intervals. 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 followed by recruitment of age-eligible children in each school. 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 (Garavan et al., 2018; Heeringa & Berglund, 2020).

Our analyses were based on the Annual Curated Release 2.0, which includes baseline data for the full sample and was made available through an agreement with the NIMH National Data Archive (NDA). Descriptive statistics for all study variables are presented in Table 1. Participants ranged in age from 9 to 10 years of age ($M = 9.91$) and nearly half (47.9%) were girls. In terms of race and ethnicity, 52.2% of the participants were identified by their responding parent as White, 15.1% as Black or African American, 20.4% as Hispanic, 2.3% as Asian, and 10% as multiracial or other race. 12.5% of the sample had a mother or father who had been arrested for reasons related to drugs or alcohol. Of these youth, 75.2% experienced paternal arrest, 16.2% experienced maternal arrest, and 11.4% experienced both paternal and maternal arrest. 46.9% of the youth who experienced parental arrest were White, 23.8% were Hispanic, 14.2% were multiracial, 14.1% were Back or African American, and 1.0% were Asian.

Measures

Parental arrest

Data on parental arrests were derived from items pertaining to biological parents' problems with alcohol or drug use. Specifically, the participating parent was asked to indicate whether either the child's biological mother or father ever experienced arrests or DUIs related to alcohol or drug use. Given the unequal cell sizes noted above in terms of paternal vs. maternal arrest, responses were combined into a single dichotomous variable that indicated whether either the child's biological mother or father had a history of arrests related to alcohol or drug use.

Sociodemographic risk

Family sociodemographic characteristics were derived from the parent demographic survey and operationalized in terms of parent education, income, family structure, and economic hardship. Parent education 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 and roughly corresponds to number of years in school. Household income is an ordinal variable based on total gross family income for the past 12 months, and participants were instructed to include income from all sources and to average across households if they were

Table 1 Descriptive statistics for full sample and disaggregated by parental arrest group

	Full sample *M* (SD) or %	No parental arrest *M* (SD) or %	Parental arrest *M* (SD) or %	Arrest group comparison test statistic
Experienced parental arrest	12.5%	0%	100%	n/a
Youth demographic characteristics				
Age (in months)	118.94 (7.46)	118.95 (7.47)	118.91 (7.43)	$t(11873) = 0.19$
Gender—Female	47.9%	47.7%	49.0%	$\chi^2(1) = 0.89$
Family sociodemographic characteristics				
Parent highest grade completed	16.60 (2.77)	16.71 (2.76)	15.78 (2.67)	$t(1959) = 12.58$*
Number of economic hardships	0.47 (1.10)	0.41 (1.03)	0.92 (1.45)	$t(1692) = -12.93$*
Parent married or living with partner	73.7%	76.7%	52.5%	$\chi^2(1) = 388.74$*
Median household income	$75,000–$99,999 (14.5%)	$75,000–$99,999 (14.7%)	$50,000–$74,999 (17.3%)	$\chi^2(9) = 313.43$*
Executive function				
Inhibitory control and attention	95.43 (13.67)	95.44 (13.64)	95.32 (13.90)	$t(11710) = 0.30$
Working memory	100.55 (14.79)	100.79 (14.84)	98.83 (14.26)	$t(11667) = 4.86$*
Cognitive flexibility	96.71 (15.16)	96.95 (15.19)	95.07 (14.90)	$t(11711) = 4.48$*
Child outcomes				
Internalizing problems	48.45 (10.64)	48.05 (10.47)	51.24 (11.38)	$t(1850) = -10.21$*
Externalizing problems	45.73 (10.34)	45.18 (10.04)	49.43 (11.49)	$t(1812) = -13.80$*

Independent samples *t*-tests conducted on all participants with data on a particular variable and do not assume equal variances across groups (with the exception of age and the three executive function variables); degrees of freedom therefore vary across variables and are not integers for all but age and inhibitory control/attention

*$p < 0.001$

separated or divorced from the child's other parent. Participants were asked to select from ten options that ranged from "less than $5000" to "$200,000 or greater". Family structure was measured via an item that inquired as to whether the responding parent was married, widowed, divorced, separated, never married, or living with a partner at the time of the interview. Responses were combined into a dichotomous variable that reflects whether the parent is married/cohabiting or not. Economic hardship was measured using seven items that assess unmet basic needs during the past year (Barch et al., 2018; Diemer et al., 2013). The participating parent was asked to indicate whether they or anyone in their immediate family had difficulty meeting basic needs pertaining to food, utilities, housing, medical care, and dental care. Sample items include "I needed food, but couldn't afford to buy it or couldn't afford to go out to get it," "had services turned off by the gas or electric company," and "had someone who needed to see a doctor or go to the hospital but didn't go because you could not afford it." Responses to these items were summed to arrive at a total hardship score that ranged from 0 to 7 ($\alpha = 0.75$). Higher scores reflect a higher level of economic hardship.

Each of the four sociodemographic characteristics items (income, parent education, family structure, and economic hardship) were significantly correlated, with *r* ranging from 0.24 to 0.62 (all $ps < 0.001$). We therefore created a composite score by first standardizing each item, then averaging across the four items. Reliability of the resulting "sociodemographic risk" index was $\alpha = 0.72$.

Executive function

Executive function was operationalized in terms of: (a) inhibitory control and attention; (b) cognitive flexibility; and (c) working memory. These constructs were assessed via the NIH Toolbox® cognition battery (www.nihtoolbox.org) and administered to participants via an iPad.

Inhibitory control and attention Inhibitory control and executive attention were assessed via a version of the Eriksen flanker task that was adapted from the Attention Network Test (ANT) for computer administration (Zelazo et al., 2013). The task assesses ability to focus attention on a particular stimulus while inhibiting attention to congruent and incongruent flanking stimuli. The modified version of the flanker test used in the NIH Toolbox® has shown excellent test-retest reliability (ICC = 0.92; 95% CI = 0.86, 0.95), and adequate convergent validity ($r = 0.34$; $p = 0.002$) among 8–15-year-olds (Zelazo et al., 2013). Scoring

is based on accuracy and reaction time, and age corrected scores were used in the current study. Higher scores reflect higher levels of inhibitory control and attention.

Cognitive flexibility Cognitive flexibility was assessed via a computerized version of the Dimensional Change Card Sort (Zelazo, 2006). In this task, participants are presented with two target pictures that vary along two dimensions (shape and color) and are then asked to match bivalent test pictures to the target pictures, first according to one dimension and then to the other dimension. Over the course of the task, which takes approximately four minutes to complete, participants are asked to change the dimension being matched (e.g., after matching on shape, they switch to trials matching on color and then back to shape). The task has shown excellent test-retest reliability (ICC = 0.92; 95% CI = 0.86, 0.95) and very good convergent validity (r = 0.64; $p < 0.001$) among children and adolescents (Zelazo et al., 2013). Scoring is based on accuracy and reaction time, and age corrected scores were used in the current study. Higher scores reflect higher levels of cognitive flexibility.

Working memory A list sorting and sequencing technique was used to assess working memory (Tulsky et al., 2013). The task, adapted from the Spanish and English Neuropsychological Assessment Scales (SENAS) List Sorting test (Mungas et al., 2005), involves being presented with visual and auditory stimuli and then being asked to immediately recall and sequence the stimuli. Scoring is based on number of correctly recalled and sequenced items, with higher scores indicating higher levels of working memory. The measure has shown high test-retest reliability (ICC = 0.86; 95% CI = 0.78, 0.91), and scores are moderately correlated ($r = 0.57$; $p < 0.001$) with "gold standard" measures of similar constructs (Tulsky et al., 2013). Age corrected scores were used in the current study.

Based on recent work recommending composite scores rather than factor scores for EF (Camerota et al., 2020), we created a composite EF score by averaging across the three items. Correlations between inhibitory control, cognitive flexibility, and working memory are presented in Table 2. Reliability for the overall scale was $\alpha = 0.58$; though relatively low (above 0.70 is preferable, Nunnally, 1978), these constructs are theoretically related and reflect child executive functioning. We therefore chose to use this composite score for further analyses (Miyake et al., 2000; Miyake & Friedman, 2012).

Internalizing and externalizing behaviors

The parent report form of the Child Behavior Checklist (CBCL; Achenbach, 2009) was used to assess internalizing and externalizing behaviors. The CBCL is one of the most widely used measures of children's emotional and behavioral problems and the parent report form has well established psychometric properties, including excellent test-retest reliability ($r_{internalizing} = 0.91$; $r_{externalizing} = 0.92$) and internal consistency ($\alpha_{internalizing} = 0.90$; $\alpha_{externalizing} = 0.94$ (Achenbach & Rescorla, 2001). Scores are based on the participating parent's responses to 112 items that pertain to children's behavior over the past six months. Items assess a variety of internalizing and externalizing behaviors, including anxiety, depression, somatic complaints, rule breaking, and aggressive behavior. For each item, parents are asked to indicate whether the behavior was "not true", "somewhat or sometimes true" or "very often or always" true. The internalizing syndrome scale is composed of the anxious/depressed, withdrawn/depressed, and somatic complaints syndrome scores ($\alpha = 0.71$), and the externalizing syndrome scale reflects aggressive behavior and rule breaking ($\alpha = 0.70$). Norm-referenced t-scores for the internalizing and externalizing syndrome scales, adjusting for child age and gender, were used in the current study.

Analysis Plan

Data analysis occurred in two phases to address our two research questions. The initial, descriptive phase involved examining mean-level differences in executive function, internalizing behaviors, and externalizing behaviors by parental arrest group (arrest vs. no arrest). We then estimated a series of regression analyses to specify relations among youth outcome variables by parental arrest, youth executive

Table 2 Zero-order correlations among main study variables

	1.	2.	3.	4.	5.	6.	7.
1. Inhibitory control and attention	0.74**	1					
2. Working memory	0.69**	0.25**	1				
3. Cognitive flexibility	0.78**	0.43**	0.26**	1			
4. Internalizing problems	−0.03**	−0.02*	−0.02	−0.03**	1		
5. Externalizing problems	−0.11**	−0.06**	−0.10**	−0.08**	0.59**	1	
6. Sociodemographic risk	−0.29**	−0.15**	−0.29**	−0.20**	0.12**	0.20**	1

*$p < 0.05$, **$p < 0.001$

functioning, and child gender. These analyses were conducted in SAS version 9.4 and proceeded in two steps: (1) we conducted two regressions predicting child internalizing and externalizing behaviors using the entire sample of children; (2) we disaggregated our sample by child race and conducted separate regressions for White children and Black children. All models included interactions between children's experience of parental arrest, child gender, and executive functioning. To facilitate the interpretation of significant interactions, we then calculated and plotted simple slopes (Aiken & West, 1991; Dawson, 2014). The family sociodemographic risk index was included as a control in all models. In addition, to examine whether there were differences between whether the child experienced mother or father arrest, we used the PROC MIXED procedure and imposed a repeated structure for mother vs. father arrest within a family. This allowed us to statistically compare mother vs. father arrest as a predictor of child outcomes.

Analysis of missing data revealed that there was very little missing data (<0.1%) on internalizing and externalizing behaviors, parental arrest, and child gender, and 1.3% missing data on the EF composite variable. However, 9.2% of the sample was missing data necessary to calculate the sociodemographic risk index (4.8% of White children and 16.8% of Black children; 7.7% of the "arrest" group and 9.4% of the "no arrest" group). We therefore used the restricted maximum likelihood (REML) specification in PROC MIXED to account for missing data (Allison, 2012). REML is often the preferred method to handle missing data when missingness exceeds 10%, rather than multiple imputation or deletion methods (Little et al., 2014).

Results

Demographic Characteristics and Mean-level Differences

Descriptive statistics for the full sample and disaggregated by parental arrest are presented in Table 1. Comparisons between children with and without parental arrest indicate significant differences in several demographic characteristics. Children with parents who had been arrested came from families that had lower levels of parental education, lower rates of marriage/cohabitation, lower income, and higher levels of economic hardship. Children with a history of parental arrest had lower levels of cognitive flexibility and working memory than those without, but the groups did not significantly differ in terms of inhibitory control/attention. Children with a history of parental arrest also had higher levels of internalizing symptoms and externalizing behaviors than youth who did not experience parental arrest. Comparisons between boys and girls on outcome variables indicated that, although CBCL scoring is normed based on age and gender, boys scored higher on both internalizing and externalizing behaviors than did girls ($t_{(11803)} = 9.83$, $p < 0.001$ for internalizing and $t_{(11858)} = 8.70$, $p < 0.001$ for externalizing).

Effects of Parental Arrest, Executive Function, and Child Gender on Child Behavioral Outcomes

Zero-order correlations among variables of interest are displayed in Table 2. In general, items within the same construct (executive function and problem behaviors) were significantly and strongly related. Children who exhibited higher levels of executive functioning had lower parent-reported problem behaviors. Sociodemographic risk was significantly and moderately related to executive function and problem behaviors, such that children from families with higher reported risk had lower executive functioning and higher internalizing and externalizing problem behaviors. Results of regression analyses that modeled the relationships among child executive functioning, parental arrest, and behavioral outcomes while controlling for socioeconomic risk are presented in Table 3 for the full sample and Table 4 for White and Black children. Patterns of relations between executive function and behavioral outcomes were partially consistent with hypotheses. In the full sample, children who experienced parental arrest exhibited higher levels of both internalizing and externalizing behaviors. Child externalizing behaviors were also higher when executive functioning was lower (Table 3). There were also significant interactions between parental arrest × parent gender, such that internalizing and externalizing behaviors were significantly higher, within the group of children who had experienced parental arrest, when mothers were arrested (Figs. 1 and 2).

In regression models that examined variability among White children, the overall pattern of results was similar to the full sample, with child internalizing and externalizing behaviors being higher in male children, among those with lower levels of EF, and among children who experienced parental arrest. Results further suggested that problem behaviors were higher when mothers vs. fathers had been arrested. In terms of variability among Black children, there was a significant interaction between parental arrest and executive functioning for internalizing behaviors (Fig. 3). Specifically, at low levels of executive functioning, youth who experienced parental arrest exhibited higher levels of internalizing behaviors than youth who had not experienced parental arrest. Parental arrests, but not executive functioning, were associated with greater externalizing behaviors for Black youth.

Discussion

As scholarship on the consequences of parental contact with the U.S. criminal legal system has evolved, researchers have

Table 3 Results of multilevel regressions: full sample

Full sample					
Effect	Est.	SE	*p* value	95% CI	95% CI
Internalizing					
Intercept	47.95	0.08	**<0.001**	47.79	48.11
Sociodemographic risk	1.58	0.11	**<0.001**	1.37	1.79
EF	0.00	0.01	0.769	−0.01	0.02
Child gender	−1.44	0.13	**<0.001**	−1.70	−1.18
EF × child gender	0.01	0.01	0.249	−0.01	0.04
Arrest	2.56	0.36	**<0.001**	1.85	3.27
EF × arrest	−0.04	0.03	0.232	−0.10	0.03
Child gender × arrest	−0.65	0.64	0.305	−1.91	0.60
EF × child gender × parental arrest	0.06	0.06	0.312	−0.05	0.17
Mother vs. father differences					
Arrest × parent	1.08	0.35	**0.002**	0.40	1.77
EF × arrest × parent	0.00	0.03	0.960	−0.06	0.06
Child gender × arrest × parent	0.00	0.62	0.998	−1.22	1.23
EF × child gender × arrest × parent	0.05	0.06	0.413	−0.06	0.16
Externalizing					
Intercept	45.17	0.08	**<0.001**	45.02	45.33
Sociodemographic risk	2.47	0.10	**<0.001**	2.27	2.67
EF	−0.05	0.01	**<0.001**	−0.06	−0.03
Child gender	−1.16	0.13	**<0.001**	−1.41	−0.91
EF × child gender	0.00	0.01	0.897	−0.02	0.02
Arrest	3.51	0.35	**<0.001**	2.84	4.19
EF × arrest	−0.04	0.03	0.242	−0.10	0.02
Child gender × arrest	−1.09	0.61	0.073	−2.29	0.10
EF × child gender × parental arrest	0.07	0.06	0.177	−0.03	0.18
Mother vs. father differences					
Arrest × parent	1.69	0.33	**<0.001**	1.04	2.35
EF × arrest × parent	−0.05	0.03	0.116	−0.11	0.01
Child gender × arrest × parent	0.18	0.60	0.767	−0.99	1.35
EF × child gender × arrest × parent	0.01	0.05	0.893	−0.10	0.11

Female is coded 0 = male child, 1 = female child; arrest is an indicator of whether either parent was arrested (0/1), with "parent" as a dummy code for whether 1 = mother was arrested or −1 = father was arrested. Significant *p* values are bolded

EF child executive function

increasingly articulated the importance of widening our scope beyond incarceration to include other forms of contact such as arrests and documenting sources of heterogeneity among children. Identifying modifiable factors that offset risk and promote resilience is an important complement to policy-level interventions designed to reduce children's exposure to parental arrests and incarceration (Arditti & Johnson, 2020), and executive functioning has been identified as a key child-level protective factor that is responsive to intervention (Diamond & Lee, 2011; Masten & Barnes, 2018). The goal of the current study was twofold. First, we sought to explore whether parental arrests were associated with internalizing and externalizing behaviors among 9–10-year-olds who participated in the ABCD study. Second, we were interested in ascertaining whether child executive functioning moderates these associations. In addressing these goals, our study advances work on parental contact with the criminal legal system, and responds to a recent call for research that examines EF in the context of overlapping racial, social, and economic inequalities (Raver & Blair, 2020).

Regarding our first goal, results of analyses that controlled for sociodemographic risk suggested that parental arrests were associated with greater internalizing and externalizing behaviors in the full sample of children. These findings are consistent with research documenting the adverse impact of parental incarceration on child outcomes (e.g., Foster & Hagan, 2015; Turney & Haskins, 2019), and extends work on the intergenerational consequences of contact with the U.S. criminal legal system by suggesting that parental arrests also appear to be consequential for children's emotional and behavioral well-being. There was no evidence that the effects of parental arrests were conditioned upon child gender in the overall sample or in analyses that were disaggregated by child race. However, similar to what has been observed for parent gender in the incarceration literature (e.g., Dallaire, 2007; Kjellstrand et al., 2012), our findings indicated that children's internalizing and externalizing behaviors were more sensitive to mothers' vs. fathers' arrests. Children's heightened sensitivity to mothers' arrests is also consistent with Turney & Sugie's (2021) finding that mothers' arrests are more consequential for parents' relationships and co-parenting than fathers' arrests. That our models established a link with child outcomes and controlled for material hardship, one of the main mechanisms by which maternal arrests affected family life in Turney & Sugie's (2021) investigation, highlights the robustness of this finding and underscores the importance of identifying other ways in which maternal arrests may destabilize families and challenge child well-being. Links between maternal arrest and youth behavior need further exploration, including identifying mechanisms of risk and factors that promote resilience (Poehlmann-Tynan & Turney, 2021).

In terms of our second goal, findings revealed that patterns relating parental arrest and executive functioning to child behavior were conditioned upon child race. Specifically, EF moderated the relation between parental arrest and internalizing behaviors for Black children, but not White children. Among White children, parental arrests and child EF had independent effects on internalizing and

Table 4 Results of multilevel regressions: disaggregated by race (White and Black children)

White children						Black children					
Effect	Est.	SE	*p* value	95% CI	95% CI	Effect	Est.	SE	*p* value	95% CI	95% CI
Internalizing						*Internalizing*					
Intercept	49.15	0.13	**<0.001**	48.90	49.39	Intercept	45.42	0.29	**<0.001**	44.85	46.00
Sociodemographic risk	3.05	0.19	**<0.001**	2.68	3.42	Sociodemographic risk	1.71	0.27	**<0.001**	1.19	2.23
EF	−0.03	0.01	**0.004**	−0.05	−0.01	EF	0.06	0.02	**0.014**	0.01	0.10
Child gender	−1.26	0.18	**<0.001**	−1.61	−0.91	Child gender	−1.52	0.41	**0.000**	−2.34	−0.71
EF × child gender	0.01	0.02	0.761	−0.03	0.04	EF × child gender	0.01	0.04	0.769	−0.06	0.08
Arrest	2.29	0.51	**<0.001**	1.29	3.29	Arrest	1.03	1.25	0.409	−1.42	3.49
EF × arrest	0.01	0.05	0.894	−0.09	0.10	EF × arrest	−0.20	0.10	**0.048**	−0.40	0.00
Child gender × arrest	−0.36	0.89	0.685	−2.11	1.39	Child gender × arrest	−0.76	2.25	0.736	−5.16	3.65
EF × child gender × parental arrest	−0.08	0.08	0.336	−0.24	0.08	EF × child gender × parental arrest	0.11	0.18	0.539	−0.24	0.46
Mother vs. father differences						*Mother vs. father differences*					
Arrest × parent	1.10	0.49	0.025	0.14	2.06	Arrest × parent	−0.15	1.23	0.905	−2.55	2.26
EF × arrest × parent	0.03	0.05	0.499	−0.06	0.12	EF × arrest × parent	−0.08	0.10	0.440	−0.27	0.12
Child gender × arrest × parent	−0.03	0.87	0.968	−1.75	1.68	Child gender × arrest × parent	−0.19	2.21	0.930	−4.52	4.14
EF × child gender × arrest × parent	−0.08	0.08	0.291	−0.24	0.07	EF × child gender × arrest × parent	0.11	0.17	0.514	−0.23	0.45
Externalizing						*Externalizing*					
Intercept	46.09	0.12	**<0.001**	45.86	46.32	Intercept	44.22	0.31	**<0.001**	43.61	44.82
Sociodemographic risk	3.77	0.18	**<0.001**	3.42	4.12	Sociodemographic risk	2.75	0.28	**<0.001**	2.20	3.29
EF	−0.07	0.01	**<0.001**	−0.09	−0.05	EF	−0.01	0.02	0.727	−0.05	0.04
Child gender	−0.89	0.17	**<0.001**	−1.23	−0.56	Child gender	−1.49	0.43	**0.001**	−2.34	−0.64
EF × child gender	−0.03	0.02	0.075	−0.06	0.00	EF × child gender	−0.01	0.04	0.884	−0.08	0.07
Arrest	3.41	0.48	**<0.001**	2.46	4.36	Arrest	3.29	1.31	**0.012**	0.72	5.86
EF × arrest	−0.02	0.04	0.692	−0.10	0.07	EF × arrest	−0.04	0.11	0.684	−0.25	0.16
Child gender × arrest	−0.89	0.85	0.292	−2.55	0.77	Child gender × arrest	1.29	2.35	0.583	−3.32	5.90
EF × child gender × parental arrest	0.04	0.08	0.590	−0.11	0.19	EF × child gender × parental arrest	0.28	0.19	0.128	−0.08	0.65
Mother vs. father differences						*Mother vs. father differences*					
Arrest × parent	1.66	0.47	**0.000**	0.75	2.57	Arrest × parent	1.19	1.28	0.354	−1.33	3.71
EF × arrest × parent	−0.07	0.04	0.093	−0.16	0.01	EF × arrest × parent	0.02	0.10	0.823	−0.18	0.22
Child gender × arrest × parent	0.53	0.83	0.526	−1.10	2.15	Child gender × arrest × parent	−0.12	2.31	0.958	−4.66	4.41
EF × child gender × arrest × parent	−0.03	0.08	0.738	−0.17	0.12	EF × child gender × arrest × parent	0.18	0.18	0.324	−0.18	0.54

Child gender is coded −0.5 = male child, 0.5 = female child; arrest is an indicator of whether either parent was arrested (0/1), with "parent" as a dummy code for whether 1 = mother was arrested or −1 = father was arrested. Significant *p* values are bolded

EF child executive function

externalizing behaviors. Given that EF was broadly beneficial and did not assume additional importance in the context of parental arrests, our results are suggestive of a promotive rather than protective effect of EF among White children (see Masten et al., 2021). A more nuanced pattern emerged among Black children. At low levels of EF, Black children who experienced parental arrest exhibited higher levels of internalizing behaviors than youth who had not experienced parental arrest, but high levels of EF did not appear to offset risk or protect youth from the effects of parental arrest. In other words, results seem to suggest that low EF may magnify risk among Black children, but that high EF does not appear to confer behavioral benefits. This pattern of findings is consistent with the Minorities' Diminished Returns framework, which notes that returns to economic and non-economic resources for Black children in

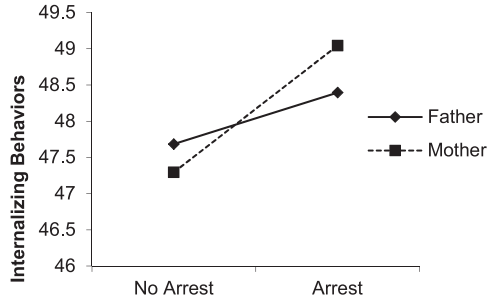

Fig. 1 Significant parental arrest × parent gender interaction for internalizing behaviors in the full sample

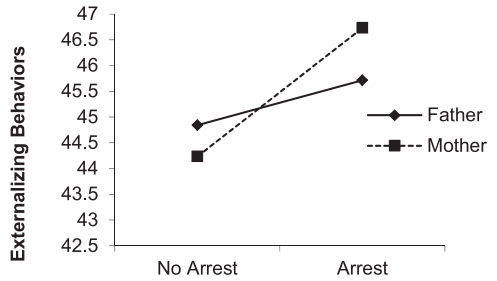

Fig. 2 Significant parental arrest × parent gender interaction for externalizing behaviors in the full sample

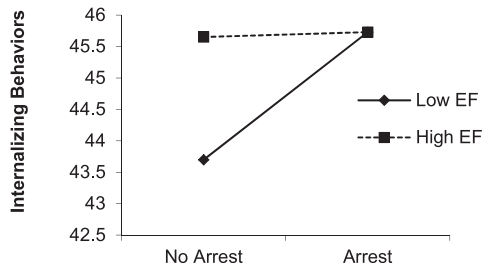

Fig. 3 Significant parental arrest × executive function interaction among Black children

the U.S. are often undermined by social stratification, racism, and discrimination (Assari et al., 2019; Assari, 2020). Our findings therefore suggest that racial stratification may not only potentially affect *access* to protective resources in the context of parental contact with the criminal legal system (Bruns & Lee, 2019), but also the benefits of them. Continued theoretical and empirical attention to when, how, and why race and parental contact with the U.S. criminal legal system intersect to affect child outcomes is imperative. As Haskins & Lee (2016) have noted, "we simply cannot get the story about mass incarceration right if we do not talk about race and racism" (p. 229).

Centering adaptive coping processes and other individual, family, and community assets that promote positive youth development while also being sensitive to interlocking systems of oppression is an essential direction for future research (Arditti & Johnson, 2020). The need for strengths-based research is particularly acute in research on youth of color, who are often viewed through multiple deficit-based lenses (e.g., Clonan-Roy et al., 2016; Gaylord-Harden et al., 2018). Miller (2007) has noted, for instance, that researchers who study the intergenerational consequences of parental contact with the criminal legal system often fail to recognize the strengths of African American children and families. Her work suggests that African American youth have access to social supports and coping strategies that protect them from problematic outcomes in the face of adversity (Miller & Bank, 2013) and that warrant investigation in future research. Though we were not able to do so here due to the nature of the data we leveraged, future work should also consider positive child outcomes as opposed to narrowly focusing on the presence or absence of problem behaviors.

Limitations and Conclusions

Although the ABCD data provide exciting opportunities for examining child development in the context of parental contact with the criminal legal system, there are tradeoffs involved with secondary analyses. In our case, the limitations pertain primarily to the baseline measures of parental contact with the criminal legal system. Our arrest variable captures only arrests related to parental alcohol or drug use, meaning that we have likely underestimated children's arrest-related experiences. We were also unable to consider whether children witnessed their parent's arrest or experienced other arrest-related traumas that may significantly impact their well-being. The causal pathways linking trauma, executive functioning, and internalizing symptoms have yet to be specified (see Aupperle et al., 2012; Op den Kelder et al., 2017), but it is clear that trauma is an important variable to consider in future research. There is also likely considerable variability in the sample in terms of developmental timing and outcome of parental arrests that we were unable to model given the way that data were collected. Data on parental incarceration will be included in future waves and will provide important opportunities to document the effects of arrests and incarceration on developmental processes. An additional set of limitations pertains to the non-experimental and cross-sectional nature of the data, which preclude us from making causal inferences and exploring temporal patterning. Although our models accounted for family sociodemographic characteristics and economic hardship, which often map on to stress and parenting processes (Masarik & Conger, 2017), a complete accounting of all of the risk and protective factors in children's lives was beyond the purpose and scope of the current study. The result is that we may have overestimated the impact of parental arrest on EF and child outcomes. In this vein, it is also possible that parental contact with the criminal legal system is a marker of exposure to parental substance use rather than the cause of the problem

behaviors observed, or that associations may be the result of passive gene-environment correlations rather than a unique impact of arrests (Price & Jaffee, 2008).

Nonetheless, the ABCD study provides unprecedented opportunities to examine multiple indicators of development—both positive and negative—and to conduct developmentally informed analyses of risk and protective factors. As Provencher & Conway (2019) have observed, much of what we know about family member contact with the criminal legal system has been based on a very limited number of datasets. The aforementioned limitations notwithstanding, findings reveal heterogeneity among youth who have experienced parental arrests and underscore the importance of including neurocognitive variables in conceptual and statistical models of development among children who experience parental contact with the criminal legal system—while being exceptionally mindful of how these processes intersect with racialized disparities in the penalties associated with risks (see Williams & Baker, 2021) and the benefits conferred by resources (Assari, 2020; Assari et al., 2020).

Practical Implications

Micro- and macro-level interventions that support the development of child EF, reduce children's exposure to parental arrests and arrest-related trauma, and minimize children's ongoing exposure to parental substance use may stem the emergence of behavioral problems in children and adolescents. EF-based interventions may take the form of school-based programs, initiatives that support parents in helping to facilitate their children's EF, and/or community-based approaches designed to reduce stress and build social supports—especially in ways that capitalize on families' and communities' success in activating resilience in the face of adversity and oppression (Blair & Raver, 2012; Raver & Blair, 2020). Macro-level interventions that reduce the size, scope, and inequitable distribution of parental contact with the criminal legal system are essential for minimizing harm, as are social policies that ensure families are able to meet their basic needs and that increase the availability and accessibility of substance use treatment. It is also critically important to enact policies and practices that reduce racialized inequities in the extent to which children and their families benefit from economic and non-economic resources. As Assari et al. (2020) have noted, this requires not only equalizing access to resources, but also increasing the returns to resources for Black children and families by eliminating systemic racism and discrimination.

Materials availability

Upon publication, the NDA study associated with this manuscript will be available at https://doi.org/10.15154/1520776.

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Compliance with Ethical Standards

Conflict of Interest The authors declare no competing interests.

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." All procedures were performed in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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