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RESEARCH

Racial Biases in Parent-Teacher Ratings of Childhood ADHD Symptoms: Roles of Implicit and Explicit Racial Attitudes and Stereotypes

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Abstract
Racial disparities in ADHD diagnoses may be attributable to parent-teacher discrepancies in symptom ratings, as teachers rate Black children as more symptomatic than non-Black children. Implicit racial biases may be a contributor to these parent-teacher differences. This study examined specific forms of racial biases among White teachers and Black parents, and their association with ratings of Black and White children's ADHD behaviors. Participants watched short videoclips and rated children's ADHD symptoms, and completed measures of implicit and explicit racial attitudes and ADHD stereotypes. Results showed that White teachers demonstrated more implicit biases than did Black parents. Implicit racial attitudes toward Black boys were associated with biased ratings of Black boys' ADHD symptoms, and explicit racial attitudes were associated with biased ratings of Black girls' ADHD symptoms. These findings demonstrate a potential role of teachers' implicit racial biases in ratings of Black children's externalizing behaviors, including ADHD.

Keywords ADHD assessment · Black youth · Racial bias · Racial disparities

Introduction

Attention deficit/hyperactivity disorder (ADHD) is one of the most common childhood psychopathology, affecting 11% of children and adolescents in the U.S. [13]. ADHD is characterized by pervasive and developmentally atypical inattention, hyperactivity, and/or impulsivity that are functionally impairing across multiple settings [57]. The diagnostic process for ADHD involves multimodal assessments using interviews and rating scales, which rely on parents' and teachers' subjective perceptions of child behavior and functional impairment (e.g., academic performance, [45]).

Despite the crucial role of parents' and teachers' perceptions of ADHD symptom severity and functional impairment in informing diagnosis, a large body of literature suggests systematic disagreements between parents and teachers [1], which are particularly pronounced between parents and teachers of different races [26, 31]. White teachers have consistently rated Black children as having more ADHD symptoms than non-Black children [17], whereas Black adults have rated Black children as having fewer behavior problems compared to other raters [26]. Because the majority (80%) of teachers in the U.S. are White [59], an ADHD assessment of Black children may rely heavily on discordant parent-teacher ratings, and this may contribute to racial disparities in rates of ADHD diagnosis and treatment for Black children [22] and place them at greater risk for diagnostic inaccuracy.

A better understanding of the mechanisms that underlie informant ratings of Black children's ADHD symptoms is imperative to inform culturally sensitive assessments and to reduce racial disparities in services. Implicit racial bias may be one contributor to discrepancies in ADHD behavior ratings [18]. Although one study found that White teachers' explicit negative racial attitudes were associated with higher ratings of Black boys' ADHD symptoms [29], no study has directly measured implicit racial biases toward Black children and their role in ADHD ratings. This study aimed to elucidate the specific form of racial bias that informs how White teachers perceive and rate Black children's ADHD symptoms.

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Informant Discrepancies in Ratings of Behavior Problems as a Function of Race

The limited agreement between different informants of children's social-emotional problems is well-documented and is thought to be due to both variation in child behavior across contexts (e.g., home and school) and differences in informants' perceptions [14]. Differences in informant race/ethnicity have emerged from this literature as a robust predictor of informant discrepancies, such that teachers have reported more externalizing behavior problems in Black children than do their parents [31, 32], a pattern observed across the age spectrum from preschool [26] to adolescence [56], and even when they observe and rate identical child behaviors [29]. These racial differences in parent-teacher ratings of Black children's externalizing behaviors call for further investigation of possible contributors to better inform the diagnostic and treatment processes of Black children's externalizing behaviors, including ADHD.

Racial Disparities in the Diagnosis of ADHD in the United States

Understanding contributors to how Black children's behavior problems are perceived and rated is important because of the racial disparities in the rates of ADHD diagnoses and treatment. Although some studies report similar rates of ADHD diagnosis across Black and White children [40, 54], the majority of extant research has found lower prevalence among Black children [11, 36]. This pattern was corroborated by a recent literature review that found that Black children are less likely to be diagnosed with ADHD and be treated with medication than White children [22], suggesting higher rates of unmet treatment needs among Black children with ADHD.

Parent-teacher differences in symptom ratings are a likely contributor to these disparities, given the heavy reliance on these ratings in diagnoses. Such discordant ratings may place Black children at risk for inaccurate diagnoses, leading to either under- or over-diagnosis of ADHD, which can result in unfair outcomes for Black children (e.g., over-punishment at school; [5]). Thus, better understanding potential mechanisms to these discordant ratings will not only promote more sensitive identification of ADHD, but also mitigate the unequal rates of ADHD treatment and subsequent educational outcomes for Black children.

Behavior Ratings within the Context of Systemic Racism: Potential Mechanisms

Parent-teacher discrepancies in ratings of Black children's behaviors are likely due to the ways that cultural differences affect individual perceptions. For example, research has found that White teachers who endorse more anti-Black beliefs rate Black boys' ADHD symptoms higher than teachers with less racist beliefs [29]. Thus, two theories that provide a useful framework to understand the role of racism in these parent-teacher discrepancies are critical race theory [15] and social categorization theory [49].

Critical race theory (CRT) posits that structural racism has a foundational role in the construction of modern society, and this deeply rooted racism plays a pervasive role in daily lives of Black Americans [15], including Black children [53]. Within this framework, racism is embedded in every institutional and structural components of daily life, and interpersonal manifestation of racism partially constitutes the formation and maintenance of structural racism [3]. Two important psychological manifestation of such racism that might influence intergroup interactions include negative attitudes (prejudice) and overgeneralized beliefs (stereotypes [7],).

Social categorization theory contends that individuals are inclined to categorize themselves and others to be similar (ingroup) or dissimilar (outgroup) based on perceived group differences, including race (see [27] for review). According to this theory, individuals tend to perceive members of their ingroup more favorably than members of an outgroup [49], and racial prejudice (i.e., negative attitudes toward a group that informs interpersonal interactions [2],) is derived from this ingroup favoritism. Similarly, stereotypes are defined as the overgeneralized attribution of a set of traits and behaviors (negative or positive) from one individual to all members of that group [47]. When individuals assume that all members of an outgroup possess a set of negative attributes and behaviors, such stereotypical inferences may lead to negative judgments and actions that have deleterious effects on outgroup members, especially if the outgroup is historically and systemically marginalized (e.g., Black Americans [46],). Further, both forms of racial biases are thought to manifest and influence intergroup interactions explicitly (*with* awareness and intention) and implicitly (*without* awareness and intention) and are thus measured directly using self-report questionnaires and indirectly using reaction times on computerized tasks, respectively [38].

Using these frameworks in the context of this study, Black children's ADHD symptom ratings by White teachers (outgroups) might be influenced by negative racial attitudes and stereotypes and contribute to racial disparities in ADHD diagnoses. Although no studies have directly measured teachers' implicit racial biases and how they are related to ratings of Black children's externalizing behaviors, studies about teachers' disproportionate identification of behavior problems in Black children (e.g., [16, 43]) offer indirect evidence. It remains critical to clarify the magnitude and

impact of teachers' implicit racial biases on their perceptions and ratings of Black children's ADHD behaviors.

Present Study

The purpose of this study is to delineate the specific forms of racial bias that impact ratings of Black children's behaviors in ADHD assessments. Because the majority of public school teachers in the U.S. are White [59], we focused on the two participant demographics most likely to provide symptom ratings for Black children in ADHD assessments: White elementary school teachers and Black parents of elementary school-aged children. We examined participants' implicit and explicit racial attitudes and racial ADHD stereotypes, and how these biases mediated their relative ratings of Black children's ADHD symptoms. Given past findings suggesting gender differences in how racial attitudes are associated with ratings of Black boys' and girls' ADHD symptoms (e.g., [29]), we measured and examined racial biases and ADHD ratings toward boys and girls separately. We hypothesized that compared to Black parents, White teachers would demonstrate stronger racial biases, both in racial attitudes and ADHD stereotypes, and that these racial biases would mediate differences in their ADHD symptom ratings for Black children relative to White children.

Method

Participants

Participants were recruited on Amazon's Mechanical Turk (MTurk) and included 136 White teachers (M_{age}=37.84, SD=9.63; 75% female, 25% male) and 124 Black parents (M_{age}=36.37, SD=6.81; 75% female, 23% male). To examine the effects of race vs. role, recruitment efforts also included Black teachers but their low representation posed a challenge; thus, data from a small group of Black teachers is included for exploratory purposes (n=15; M_{age}=33.87, SD=6.53, 8 female, 7 male). Only those participants who completed all behavior ratings and at least one predictor variable were included in analyses. Teachers' years of experience ranged from 6 months to 35 years (Median=8 years), and an average of 51% of their students qualified for free or reduced price lunch. Overall, a majority of White teachers rated the frequency of their interactions with White students as "a lot" (n=36) or "a great deal" (n=83), and their interactions with Black students varied from "none at all" (n=2), "a little" (n=33), "a moderate amount" (n=41), "a lot" (n=28), to "a great deal" (n=32). A majority of teachers (66%) reported being a parent, and 32 (24%) reported having a child with ADHD. Seventeen teachers disclosed having been diagnosed with ADHD themselves. Seventeen parents reported having at least one child with ADHD and eight disclosed having been diagnosed with ADHD themselves. Teachers reported a significantly higher median annual income ($60,000 to $99,999) than did parents ($40,000 to $59,999), p<.001. Participants resided in 42 different states across the U.S.

Materials

The dependent variables were calculated from participants' behavior ratings of Black and White children from eight identical 1-min videoclips. The videos used to create these clips were obtained from YouTube and consisted of three preschool, two kindergarten, and two first grade classrooms containing a racially diverse group of children. These grade levels were chosen because younger children tended to exhibit more observable ADHD behaviors compared to older children. The first author identified YouTube videos of these grade level classrooms with racially diverse students and created 20 one-minute videoclips capturing moments of active instructional engagement (e.g., phonics lessons; story readings) and not unstructured play time or recess, during which the target child was visibly distracted. These 20 videoclips were rated by three undergraduate research assistants, two clinical psychology graduate students, and one licensed clinical psychologist and professor in clinical psychology. Then, the first author reviewed means and standard deviations of the research team's ratings for each clip, and chose eight clips with high mean ratings (indicating presence of observable ADHD behaviors) and comparable standard deviations (indicating similar variability) to be used for the full study. The eight 1-min segments were selected to display a child (two Black boys, two Black girls, two White boys, and two White girls) showing at least some behaviors reflecting ADHD symptoms. In these video clips, the two Black boys were in preschool and kindergarten, the two Black girls were in preschool and kindergarten, both White boys were in first grade, and both White girls were in preschool. In cases where more than one clip was created from the same classroom, none were identical segments. Videoclips were counterbalanced for race and gender of each child, so that no same-race and same-gender children were shown consecutively. These methods have been previously utilized in similar studies that examined racial differences in parent-teacher ratings [29].

Measures

Child Behavior Ratings

Participants were asked to rate the behaviors of the target child using selected items from the Vanderbilt Assessment Scale, a commonly utilized rating scale among clinicians, school psychologists, and pediatricians to assess youth psychopathology with good to excellent internal consistency (α = .90 to .95; [55]). It includes 43 items, 18 of which apply to the diagnostic criteria of ADHD. Participants rated children in the videoclips using 11 items from the ADHD scale (4 inattention, 7 hyperactivity/impulsivity) from the Vanderbilt Teacher Report Scale. These items were selected by the research team based on what could be readily observed from the videoclips. Each item on the Vanderbilt Scale is typically rated on a 4-point Likert scale (*Never—Very Often*), but participants in this study were asked to use a slider scale that ranges from 0 to 100 instead to allow for more precise comparison of symptom endorsement for each child. The obtained value from this scale provided a mean score for each participant's ratings of each child, where a higher score represents greater ADHD symptom endorsement. Across all videoclips, internal consistency of ADHD symptom ratings were excellent (α = .91 to .95).

From these video ratings, four composite ADHD variables were constructed by averaging ratings for the two Black boys, two White boys, two Black girls, and two White girls. From these composite ADHD variables, two difference scores were calculated by subtracting ratings of White children from ratings of Black children's for each child gender. Given that it was not possible to standardize the actual degree of ADHD behaviors from naturalistic videos, these ADHD rating difference scores accounted for individual differences within each participant's response patterns and allowed for between-participant analyses of biased ratings. As dependent variables, these ADHD rating difference scores represented the difference in each participant's behavior ratings between Black and White children where a higher (more positive) score reflected the magnitude with which *each* participant rated Black children as exhibiting more ADHD symptoms than White children, indicating a *relative* bias in behavior ratings.

Implicit Racial Attitudes and ADHD Stereotypes

The Implicit Association Test (IAT; [24]) was used to measure all participants' implicit racial attitudes and implicit racial ADHD stereotypes. The IAT is a dual-categorization task that measures response times to assess the strength of automatic associations between distinct concepts. The basic assumption of the IAT is that people are faster to categorize groups of stimuli that share a response key when those stimuli are mentally linked [23]. For example, the IAT assumes that participants who more strongly associate White children with positive concepts compared to negative concepts will be faster to categorize stimuli when the categories "White" and "good" are paired on the same response key and "Black" and "bad" are paired on a different response key compared to when categorization is switched: "Black" and "good" are paired on the same key and "White" and "bad" on the other.

The IATs used in this study were designed to examine the strength of association between child race (Black vs. White) with positive vs. negative concepts (e.g., miracle vs. evil), and child race and words descriptive of ADHD symptoms vs. non-ADHD words (e.g., hyperactive vs. composed) for each child gender. Four IATs were used in this study: 1) racial attitude IAT for boys; 2) racial attitude IAT for girls; 3) ADHD stereotypes IAT for boys; and 4) ADHD stereotypes IAT for girls (Supplemental Table A). Using software provided by Carpenter et al. [9] and standard procedures [24], standardized bias scores were calculated for each participant (*D* score). For racial attitude IATs, positive *D* scores indicate more negative racial attitudes, or stronger association of unpleasant compared to pleasant concepts with Black relative to White children. For ADHD stereotype IATs, positive *D* scores indicate greater racial stereotypes, or stronger association of ADHD symptoms with Black relative to White children. Images of Black and White children's faces were obtained from the Child Affective Facial Expression set [34], which have been used in previous studies to examine implicit racial and gender stereotypes [50, 52] and implicit stereotypes about childhood psychopathology [30]. Using IATs on online survey platforms has demonstrated viable psychometric utility [9].

Explicit Racial Attitudes and Stereotypes

The Racial Attitudes Scale [8] was administered to measure explicit racial attitudes. It consists of two scales, one for Black and one for White respondents, and is designed to assess racial attitudes toward the other race. Each scale contains 20 items rated on a 7-point Likert scale (*Strongly disagree – Strongly agree*). The scale that measures Whites' Attitudes Toward Blacks (ATB) includes 10 positively and 10 negatively worded items with good reliability (e.g., "Black people are demanding too much too fast in their push for equal rights"; α = .88). Only the ATB completed by White teachers was analyzed in this study given that functionally, Black parents' racial attitudes toward White Americans are clinically irrelevant (i.e., Black parents would not be asked to rate White children's behaviors in ADHD assessments). In the current sample, the ATB demonstrated

good reliability (α = .88) and the average ATB scores were reversed so that higher scores indicate more negative racial attitudes.

Two Semantic Differential Scales [41] for each child gender measured explicit racial ADHD stereotypes about Black and White children, using the same stimuli words as the IAT. Participants indicated the extent to which they associate each stimulus word with Black or White boys or girls on a 7-point bipolar scale (e.g., "In your opinion, Black/African American boys are often 1: *Inattentive* – 7: *Attentive*). Results on the semantic differential scale reflected the extent to which participants deliberately associated each ADHD symptom to Black or White boys and girls. To capture each participant's explicit ADHD stereotypes about Black children relative to their own explicit ADHD stereotypes about White children, difference scores were calculated by subtracting White children's ratings from Black children's ratings separately for each child gender. Higher (more positive) difference scores indicated each participant's greater association of ADHD symptoms with Black relative to White children.

Procedure

On MTurk, all participants were screened twice using identical surveys 3 weeks apart. This two-part screening procedure has been used in similar studies (e.g., [29]) and was designed to limit the number of online participants who falsely claim to meet eligibility criteria. Parents were asked the ages, birth months/years, and race/ethnicity for each of their children, and their own race/ethnicity. Teachers were asked about their race/ethnicity, the grade level, type of school, subject they teach, and the year and state from which they received their teaching licensure. Parents who indicated their race as Black/African American (including biracial and multiracial), and teachers who indicated their race as White/European American were invited to the second screening. All participants rated their familiarity with ADHD, and those who had never heard of ADHD were excluded. Parents and teachers who provided consistent responses over the two screening surveys were invited to participate in the full survey on Qualtrics. The full study was split into two sessions to minimize fatigue from long study participation and repeated tasks.

During session 1, participants watched eight 1-min videoclips from classrooms ranging from preschool to first grade in counterbalanced order for child race and gender (i.e., four different orders for video clips).[1] Before each clip, a screenshot of the classroom with a large red circle around the target child instructed participants to watch and rate that particular child's behaviors ("Please watch the indicated child in the following video carefully…"). After each videoclip, participants rated the target child (two Black boys, two White boys, two Black girls, two White girls) on the degree to which they displayed behaviors associated with ADHD. After watching and rating all videoclips, participants were administered either the racial attitude IAT or the racial ADHD stereotypes IAT in a counterbalanced order[2] for one child gender. After the first IAT, participants were administered the first half of a demographic questionnaire, then they completed the second IAT (either the racial attitude IAT or the ADHD stereotypes IAT for the same child gender as the first IAT). Next, participants completed a semantic differential scale to determine the extent to which they explicitly associate (or stereotype) each ADHD symptom with Black and White boys or girls. Then, White teachers completed the racial attitudes scale [8] to assess explicit racial prejudice toward Black Americans. Lastly, all participants completed the second half of the demographic information and family history questionnaire. Upon full completion of session 1, participants were invited to complete session 2 within one week. During session 2, participants completed the racial attitude IAT, the racial ADHD stereotypes IAT (again in counterbalanced order), and semantic differential scales all for the child of the other gender than the first session. The first screening compensated $0.02 to each participant, and the second screening compensated $0.05. For the full study, the first session lasted 1 h and compensated $4 per participant, and the second session lasted 20 min and compensated $6 per participant. Each participant who fully completed the study was paid $10.

Analytic Plan

Using SPSS v29 [12], one-sample t-tests examined the presence of implicit racial biases among White teachers and Black parents separately. One-way analyses of variance (ANOVAs) compared the magnitude of implicit and explicit racial biases between White teachers and Black parents. Then, Mplus v8 [37] was used to estimate the mediation models. Full information maximum likelihood was used to address missing data. All models were just identified; thus, model fit indices are not reported. Power analyses for linear

[1] For example, 25% of participants were assigned to a condition where they watched videos in this order: Black boy 1 → White boy 1 → Black girl 1 → White girl 1 → Black boy 2 → White boy 2 → Black girl 2 → White girl 2. Another 25% of participants watched videos in this order: White boy 1 → Black boy 1 → White girl 1 → Black girl 1 → White boy 2 → Black boy 2 → White girl 2 → Black girl 2.

[2] The gender of Black and White children was counterbalanced across the two sessions, such that half of the participants completed racial attitude IAT and ADHD racial stereotypes IAT in a counterbalanced order for boys or girls during the first session, then the racial attitude IAT and ADHD racial stereotypes IAT for the other child gender during the second session.

multiple regressions conducted using G*Power [19] showed that a sample of 103 White teachers was sufficient to detect a small-medium effect size ($f^2 = .08$), and a sample of 48 Black parents was sufficient to detect a medium-large effect size ($f^2 = .17$) with a power of .80. The mediation models were estimated with informant (Parent vs. Teacher) as the predictor and both racial attitudes and ADHD stereotype variables (separately for implicit and explicit) for boys and girls as mediators. The outcome variables were ADHD rating difference scores calculated by subtracting White children's ratings from Black children's ratings for each participant, which represented the degree to which each participant rated Black children's behaviors compared to their own ratings of White children's behaviors. All mediation models were estimated using bias corrected bootstrapping confidence intervals.

Results

Descriptive Statistics

See Table 1 for descriptive statistics for study variables completed by both White teachers and Black parents. For outcome variables, there were no parent-teacher differences in individual ratings for Black or White boys or girls ($ps > .22$). Table 2 displays correlation coefficients of all study variables separately for parents and teachers. Across all participants, measures of racial bias with shared method were correlated with each other (e.g., implicit racial attitudes and implicit ADHD stereotypes; explicit ADHD stereotypes for boys and girls; $ps < .04$). Teachers' explicit racial attitudes were positively correlated with implicit racial attitudes toward boys ($p = .03$), explicit ADHD stereotypes toward boys ($p = .002$), and negatively correlated with their level of experience teaching Black students ($p = .004$). For parents,

Table 1 Descriptive Statistics for Study Variables

	Black Parents ($n = 124$)		White Teachers ($n = 136$)				
	M	*SD*	*M*	*SD*	df	*F*	*p*
Mediators							
Implicit racial attitudes toward Black vs. White boys[1]	0.01	0.38	0.37	0.39	1, 241	51.36	<.001
Implicit racial attitudes toward Black vs. White girls[1]	0.01	0.37	0.44	0.34	1, 243	90.70	<.001
Implicit racial ADHD stereotypes toward Black vs. White boys[1]	0.04	0.33	0.16	0.34	1, 244	28.96	<.001
Implicit racial ADHD stereotypes toward Black vs. White girls[1]	−0.04	0.33	0.27	0.32	1, 239	55.38	<.001
Explicit racial ADHD stereotypes toward Black vs. White boys[2]	−0.27	1.14	−0.05	0.80	1, 251	3.01	.08
Explicit racial ADHD stereotypes toward Black vs. White girls[2]	−0.31	0.97	0.20	0.96	1, 252	17.73	<.001
Outcome Variables							
Difference in ADHD behavior ratings for boys[3]	3.65	12.75	6.48	13.76	1, 258	2.93	.09
Black boys' ADHD composite	28.75	20.55	28.94	17.90	1, 258	0.01	.94
White boys' ADHD composite	25.10	18.44	22.46	16.10	1, 258	1.51	.22
Difference in Inattention behavior ratings for boys[3]	−5.02	15.69	0.82	16.42	1, 258	8.56	.004
Black boys' inattention composite	27.15	22.20	30.15	18.88	1, 258	1.38	.24
White boys' inattention composite	32.17	21.99	29.32	19.09	1, 258	1.25	.27
Difference in Hyperactivity behavior ratings for boys[3]	8.62	14.14	9.71	14.55	1, 258	0.37	.54
Black boys' hyperactivity composite	29.66	20.83	28.22	18.48	1, 258	0.35	.56
White boys' hyperactivity composite	21.04	17.57	18.51	15.70	1, 258	1.50	.22
Difference in ADHD behavior ratings for girls[3]	−11.31	14.96	−10.75	12.71	1, 258	0.10	.75
Black girls' ADHD composite	21.40	17.24	20.48	14.74	1, 258	0.22	.64
White girls' ADHD composite	32.71	20.12	31.23	16.69	1, 258	0.42	.52
Difference in Inattention behavior ratings for girls[3]	−11.20	16.71	−11.13	15.61	1, 258	0.001	.97
Black girls' inattention composite	19.79	18.22	19.06	15.21	1, 258	0.11	.74
White girls' inattention composite	30.99	21.03	30.19	18.45	1, 258	0.12	.73
Difference in Hyperactivity behavior ratings for girls[3]	−11.29	16.12	−10.90	14.55	1, 258	0.16	.69
Black girls' hyperactivity composite	22.38	18.03	21.24	15.37	1, 258	0.30	.58
White girls' hyperactivity composite	33.68	21.42	31.85	17.25	1, 258	0.58	.45

Note.[1]: *D* scores from respective implicit association tests that examined relative racial biases toward Black vs. White boys/girls, in which higher scores represent greater implicit racial bias toward Black relative to White boys/girls. [2]: relative explicit ADHD stereotypes scores obtained by subtracting semantic differential scale ratings of White boys/girls from Black boys/girls, in which higher scores represent greater explicit racial ADHD stereotypes toward Black relative to White boys/girls. [3]: ADHD rating difference scores obtained by subtracting average inattention, hyperactivity, and ADHD composite symptom ratings of White boys/girls from Black boys/girls, in which higher scores represent the degree to which each participant rated Black children's behaviors compared to their own ratings of White children's behaviors.

Table 2 Intercorrelations Between Demographic and Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Biased ADHD ratings (boys)†	–	.06	.20*	.05	.03	-.05	–	.02	.11	.08	–	–	.01	.08
2. Biased ADHD ratings (girls)†	-.03	–	.18	.09	.03	.08	–	.06	.19*	.08	–	–	-.15	.06
3. Implicit racial attitudes (boys)†	.09	.09	–	.29**	.19*	.33***	–	.18	.21*	.23*	–	–	-.02	.01
4. Implicit ADHD stereotypes (boys)†	.05	.10	.32***	–	.08	.22*	–	-.03	.08	.03	–	–	.17	.18
5. Implicit racial attitudes (girls)†	.16	.03	.41***	.37***	–	.28*	–	.16	.08	.11	–	–	-.04	-.07
6. Implicit ADHD stereotypes (girls)†	-.12	.14	.29**	.31***	.30***	–	–	-.05	-.05	.04	–	–	.00	.18
7. Explicit racial attitudes	-.07	.19*	.15	.16	.02	-.09	–	–	–	–	–	–	–	–
8. Explicit ADHD stereotypes (boys)†	.19*	.05	.16	.10	.11	-.02	.27**	–	.44***	.09	–	–	-.07	-.26**
9. Explicit ADHD stereotypes (girls)†	.03	.04	.21*	.004	.05	-.03	.16	.45***	–	.001	–	–	.08	-.05
10. Age	.11	-.12	-.04	-.01	.03	-.11	-.09	.10	.07	–	–	–	.07	-.15
11. Teaching experience (years)	.07	-.04	-.11	.01	-.01	-.12	-.09	.09	.03	.74***	–	–	–	–
12. Experience with Black students	.02	-.05	-.08	-.01	.03	.04	-.25**	.01	-.06	-.09	-.06	–	–	–
13. Child with ADHD	-.01	.01	-.05	-.10	-.01	-.05	-.04	-.13	-.09	-.02	-.07	-.08	–	–
14. Self with ADHD	.05	-.05	-.13	-.21*	-.13	-.15	.01	-.13	-.15	-.04	-.08	.08	.09	–

Note. Bottom half of the diagonal represents Pearson coefficients for White teachers (n = 136) and top half represents Black parents (n = 124); * p < .05; ** p < .01; *** p < .001; †: denotes variables that represent relative difference scores between Black and White child ratings

explicit ADHD stereotypes toward girls was correlated with implicit racial attitudes toward boys (p = .02).

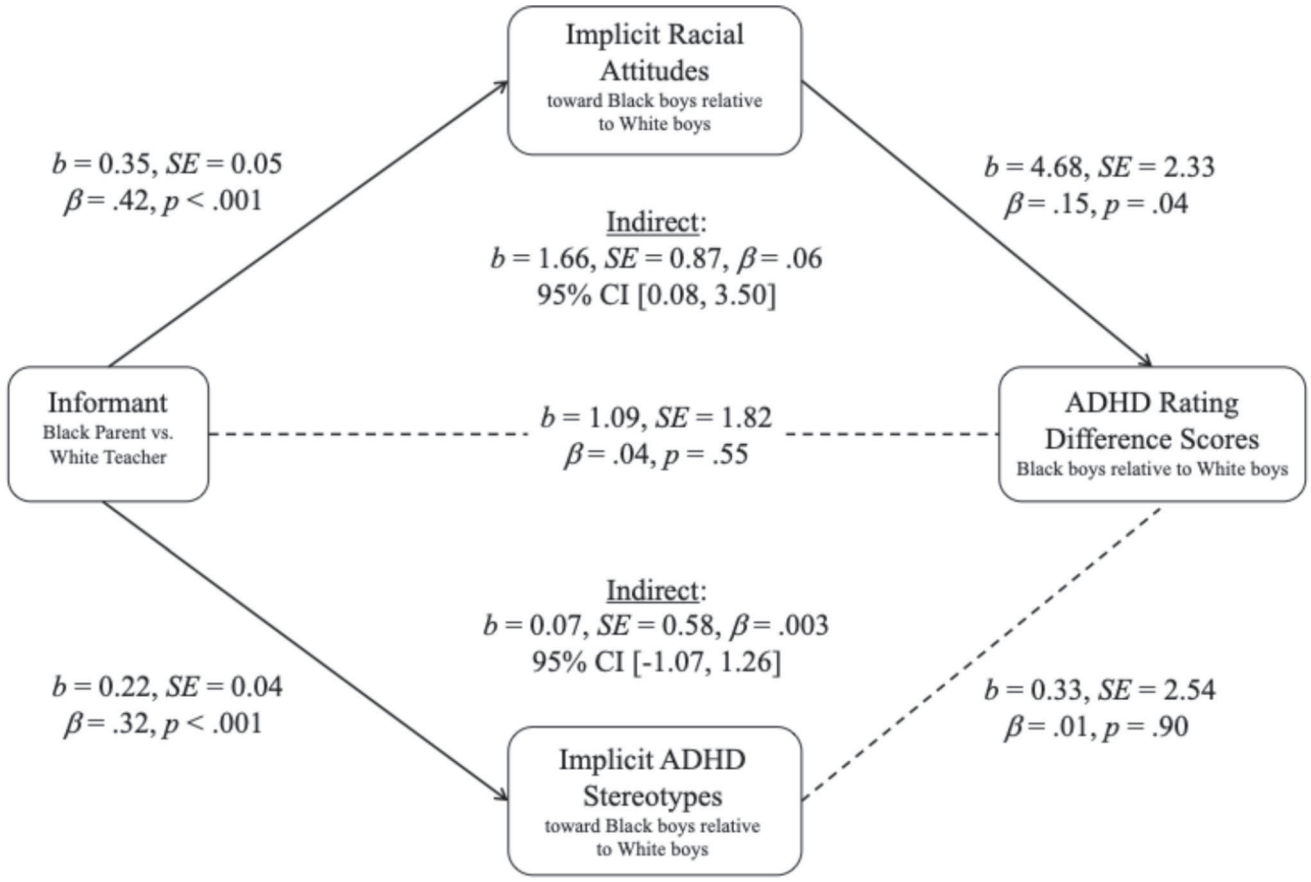
Differences in Implicit and Explicit Biases Between White Teachers and Black Parents

On average, White teachers' implicit racial attitudes and implicit racial ADHD stereotypes for both boys and girls were significantly higher than that of Black parents (ps < .001). One-sample t-tests on D scores separately for teachers and parents demonstrated that White teachers' average D scores were significantly above zero for implicit bias toward Black compared to White boys, $t(128) = 10.72$, $p < .001$, and girls, $t(129) = 14.79$, $p < .001$, and for implicit ADHD stereotypes toward Black compared to White boys, $t(130) = 9.30$, $p < .001$, and girls, $t(125) = 9.67$, $p < .001$. On the other hand, none of Black parents' average D scores were significantly above zero, not for implicit racial attitudes toward Black compared to White boys, $t(113) = 0.35$, $p = .72$, or girls, $t(114) = 0.15$, $p = .88$, or implicit ADHD stereotypes toward Black compared to White boys, $t(114) = 1.21$, $p = .23$, or girls, $t(114) = -1.15$, $p = .25$. Together, these results point to the presence of implicit negative racial attitudes and ADHD stereotypes toward Black (relative to White) children among White teachers but not among Black parents.

For explicit stereotypes, White teachers associated ADHD symptoms more with Black girls than White girls, more than did Black parents, $F(1, 252) = 17.73$, $p < .001$. Explicit ADHD stereotypes toward boys were not different between parents and teachers (p = .08).

Exploratory Analyses with Black Teachers

Although the sample was small, exploratory analyses with 15 Black elementary school teachers provided some insight into whether observed differences in implicit and explicit racial biases between White teachers and Black parents are due to informant role (teacher vs. parent) or race (White vs. Black). One-sample t-tests on implicit racial attitudes and ADHD stereotypes showed that none of Black teachers' average D scores were significantly above zero: racial attitudes ps < .75, ADHD stereotypes ps < .37. One-way ANOVAs comparing the magnitude of racial biases showed that compared to White teachers, Black teachers demonstrated significantly lower implicit racial attitudes (boys: $F(1, 140) = 11.59$, $p < .001$; girls: $F(1, 139) = 14.07$, $p < .001$) and significantly lower implicit ADHD stereotypes (boys: $F(1, 142) = 4.22$, $p = .04$; girls: $F(1, 135) = 4.16$, $p = .04$). However, there were no mean differences in racial biases between Black parents and Black teachers, ps < .29, indicating that Black teachers may resemble Black parents more than White teachers in key study variables.



Mediating Effects of Implicit Racial Biases. Note. Predictor is a dummy coded variable for informant role (0 = Black parent; 1 = White teacher). Outcome variables were calculated by subtracting ratings of White children from ratings of Black children such that higher scores indicate the degree to which each participant rated Black children's behaviors compared to their own ratings of White children's behaviors. Non-significant paths are depicted using dotted lines

Fig. 1 Mediating effects of implicit racial biases

Roles of Implicit Racial Attitudes and ADHD Stereotypes

To test the mediating effects of implicit racial biases, ADHD rating difference scores for boys and girls were each regressed on a dummy coded Black parent vs. White teacher variable (i.e., informant). Implicit racial attitudes and implicit ADHD stereotypes (IAT *D* scores) for each child gender were also regressed on informant and these two mediators were allowed to covary.

For boys, the indirect path from informant to difference in ADHD ratings via implicit racial attitudes toward Black (relative to White) boys was significant, $b = 1.66$, $SE = 0.87$, $\beta = .06$, 95% CI [0.08, 3.50]. White teachers demonstrated more negative implicit racial attitudes than did Black parents, $b = 0.35$, $SE = 0.05$, $\beta = .42$, $p < .001$, which in turn was related to greater differences in how they rated Black boys' ADHD symptoms relative to how they rated White boys' ADHD symptoms, $b = 4.68$, $SE = 2.33$, $\beta = .15$, $p = .04$, controlling for implicit ADHD stereotypes (Fig. 1). The indirect path from informant to ADHD ratings via implicit ADHD stereotypes controlling for implicit racial attitudes was not significant, $b = 0.07$, $SE = 0.58$, $\beta = .003$, 95% CI [−1.07, 1.26]. For girls, neither indirect path via implicit racial attitudes ($b = 0.01$, $SE = 1.04$, $\beta = .00$, 95% CI [−2.10, 2.00]) nor implicit racial stereotypes ($b = 1.43$, $SE = 0.92$, $\beta = .05$, 95% CI [−0.30, 3.33]) were significant.[3]

[3] For exploratory purposes, mediating effects of implicit biases on separate ratings of inattention and hyperactivity were also tested. For girls, the indirect path from informant to inattention rating difference scores via implicit ADHD stereotypes was significant, $\beta = .06$, 95% CI [0.10, 4.07] controlling for implicit racial attitudes toward Black girls. That is, White teachers demonstrated more implicit ADHD stereotypes toward Black girls than did Black parents, $\beta = .43$, $p < .001$, which in turn was associated with their ratings of Black girls' inattention symptoms relative to White girls' inattention symptoms, $\beta = .14$, $p = .04$, controlling for implicit racial attitudes toward girls.

Roles of Explicit Racial Attitudes and ADHD Stereotypes

Because explicit racial attitudes toward Black Americans were only measured for White teachers, direct effects were estimated rather than mediation effects. Teachers' Black-White difference score in ADHD ratings for boys and girls were each regressed on the mean ATB score [8] and self-reported experience teaching Black students, and these two predictors were allowed to covary ($\beta = -.25$, $p = .005$). Explicit racial attitudes were associated with biased ADHD ratings for girls such that teachers with more explicit racial biases rated Black girls' ADHD behaviors higher than they rated White girls' ADHD behaviors, $b = 2.64$, $SE = 1.24$, $\beta = .19$, $p = .03$, controlling for their experience teaching Black students. Teachers' explicit racial attitudes were not associated with their biased ADHD ratings for boys ($p = .46$).

Explicit ADHD stereotypes were measured across parents and teachers, so these mediating effects were estimated by regressing ADHD rating difference scores for boys and girls on the dummy-coded informant variable (Parent vs. Teacher). Difference scores in explicit ADHD stereotypes, obtained by subtracting White children's semantic differential scale ratings from Black children's, were also regressed on informant. No indirect paths were significant for explicit ADHD stereotypes for boys or girls (see Supplemental Table B for all indirect effects).

Discussion

This study aimed to delineate the roles of implicit and explicit racial biases that potentially contribute to how White teachers perceive and rate Black children's ADHD symptoms. Results showed that White teachers, on average, demonstrated implicit negative racial attitudes toward Black children more than did Black parents, and those racial attitudes specifically toward Black boys were associated with how they rated Black boys' ADHD symptoms relative to White boys' ADHD symptoms. Although neither measure of implicit biases were associated with Black girls' ADHD ratings, exploratory analyses showed that implicit ADHD stereotypes may play a role in how their inattention symptoms are rated. Finally, White teachers' explicit racial attitudes were associated with how they rated Black girls' ADHD symptoms relative to White girls' ADHD symptoms.

Roles of Implicit Racial Attitudes and ADHD Stereotypes

Consistent with social categorization theory [49], White teachers demonstrated more implicit racial biases toward Black children than did Black parents, and these biases were associated with how they rated Black boys' externalizing behaviors. That is, more negative racial attitudes toward Black boys emerged for White teachers compared to Black parents, which was associated with higher ratings of Black boys' ADHD symptoms. Although previous research [16] and education policy guidelines [58] have speculated the potential role of teachers' implicit racial biases in education and behavioral health disparities for Black children, most studies have found implicit racial attitudes from measures using images of Black adults as IAT stimuli [48]. This study adds to the small yet growing body of research that has found implicit biases toward Black children using images of Black and White children [33], lending critical empirical support to the long-hypothesized notion that teachers' implicit racial biases extend to children and may account for their overidentification of behavioral problems in Black children.

These findings may also have implications for clinical psychologists and other mental health providers who are making diagnostic decisions based on parent-teacher ratings of Black children's behavior ratings. Studies have found implicit racial attitudes among child psychiatrists [35] and school mental health professionals [33] using images of Black children as IAT stimuli. Similar to the teachers in the current study, child psychiatrists and school mental health professionals demonstrated negative racial attitudes and associated externalizing behaviors more with Black children than with White children. Altogether, these findings on implicit racial biases among child-serving adults underscore the importance of further examining their impacts on Black children's educational and behavioral health outcomes.

Roles of Explicit Racial Attitudes and ADHD Stereotypes

White teachers' explicitly endorsed negative racial attitudes toward Black Americans were associated with higher ratings of Black girls' ADHD symptoms relative to White girls' ADHD symptoms. These results contrast with previous findings where White teachers' explicit racial attitudes were associated with higher ratings of Black boys' ADHD symptoms [29]. Although the precise reason for this is unclear, there are some factors that might be at play. For example, the outcome in this study was teachers' *relative* ratings of Black children's ADHD symptoms compared to their own ratings of White children's ADHD symptoms. Because it was not possible to objectively measure and standardize child behaviors found in online videos, this study relied on these difference scores as a measure of individual participant's "biased" ratings. On the other hand, Kang and Harvey [29] reported significant relations between

racial attitudes and average ratings of Black boys' ADHD symptoms in absolute, not relative, measures, which could explain the difference in the pattern of findings.

Intersectionality of Race and Gender

These results highlight the need for more intersectional approaches to understand specific racial and gender biases in ratings of childhood ADHD symptoms. Although implicit racial attitudes and ADHD stereotypes were present among White teachers and not among Black parents across child gender, the association between implicit racial attitudes and ADHD ratings was only observed for boys, and teachers' explicit racial attitudes were only associated with difference in ADHD ratings for girls. Discrepancies in implicit and explicit measures of racial biases are common [21] and the specific reasons for these are not clear. However, given the historical pattern of underdiagnosis and undertreatment of ADHD in girls [10], and the especially low rates among Black girls [25], more research is needed to better understand potential contextual factors for Black girls, and racial and gender biases that may be uniquely affecting Black girls with ADHD symptoms.

Are Observed Patterns Due to Role vs. Race?

These findings point to an important unanswered question about whether the observed difference in White teachers' and Black parents' racial biases are due to their role vs. race. Exploratory analyses with Black teachers pointed to the direction of race, as their scores on implicit racial bias measures resembled that of Black parents' more than White teachers'. These patterns may underlie the robust evidence that Black students are less likely to be described as having disruptive or externalizing behavior problems when rated by Black teachers than when rated by teachers of another race [42]. Unfortunately, Black teachers comprise less than 7% of public school teachers, compared to 80% of White teachers [59]. This low representation of Black teachers not only contributed to recruitment challenges for this study, but also indicates that most behavior rating scales for Black students are likely being completed by White teachers with similar patterns of racial biases as teachers in this study. Future research should examine the specific protective factors of Black teachers to Black children's social-emotional, educational, and behavioral health outcomes.

Limitations

There were several limitations to this study. First, although this study aimed to examine individual differences of bias in ratings of children's ADHD behaviors, as with prior research, there was no way of establishing whether average parent-teacher differences in ADHD ratings were driven by parent bias, teacher bias, or a combination of both. Similarly, it could not be concluded whether the observed effects were due to teachers' race or their role, though the exploratory analyses with a small sample of Black teachers point to the important role of race. Second, using behavior ratings from short videoclips as outcome variables posed some limitations. The videoclips of children of different races and genders allowed for comparisons in how Black and White participants perceive and rate the same child behavior differently, as it was not possible to objectively standardize behaviors across naturalistic videos. A diverse research team reviewed and selected clips with similar levels of ADHD symptoms, but their own subjectivity and bias could have played a role in their selection. Additionally, the children in the clips generally did not show very high levels of ADHD symptoms. When the Vanderbilt Assessment Scales are used in ADHD assessments, Likert ratings of "Often" and "Very Often" are considered clinically significant presence of symptoms. In this study, the mean behavior ratings ranged between 30 to 40 on a 100-point scale, reflecting the "Rarely" range on the Vanderbilt. Therefore, these effects might be different if adults were observing behaviors with more severe symptoms. Similarly, the 1-min videoclips were likely too short to assess the full range of biased ratings in actual ADHD assessments. When parents and teachers are asked to rate ADHD symptoms for a child in clinical settings, they have a greater scope of familiarity with the child's everyday behaviors at home and in the classroom. Thus, the short clips may have been insufficient to capture the extensive basis upon which parents and teachers typically make their behavior ratings during ADHD assessments. Finally, the age groups of children in the videos were generally younger than the median age of children who receive an ADHD diagnosis in the U.S. (age 6; [54]). Although videos of younger classrooms were chosen because they demonstrated more observable ADHD behaviors, it is unclear whether these findings would extend to ratings of elementary school aged children's ADHD behaviors. Next, the validity and generalizability of biases measured by implicit association tests are controversial. Specifically, the construct validity (i.e., does it actually measure implicit bias? [44]) and ecological validity (i.e., does it translate to discriminatory behavior? [39]) of the IATs have been hotly debated since the 1990s. However, the consistent differences between Black parents and White teachers across these

measures suggest that the IATs used in this study were tapping into an important racial difference in associations, even if the precise construct of bias that was measured is less clear. Lastly, the scope of this study only aimed to examine racial attitudes and stereotypical beliefs towards Black children and how their ADHD behaviors are perceived. However, Black children are disproportionately diagnosed with disruptive behavior disorders including oppositional defiant disorder and conduct disorder [6]. It is important for future studies to investigate how racial biases affect assessment of other childhood psychopathology and how biases impact children of other marginalized racial backgrounds.

Implications and Future Directions

This study is the first to measure and examine the roles of both implicit and explicit racial attitudes and racial ADHD stereotypes in how Black children's ADHD behaviors are perceived and rated by White teachers. The finding that implicit and explicit racial attitudes may both be associated with teachers ratings of Black children's behavior ratings has potential implications for interventions to reduce the impact of racial biases on ADHD assessments. Although the social psychology literature on effective interventions to reduce the impacts of implicit biases is small and decidedly mixed [20], a recent study from education psychology examined teachers' motivation to promote racial equity in school discipline and identified pivotal moments that reinforced their motivation to reduce their racial biases [4]. For example, continuous education for teachers to engage in learning about racial bias and systemic effects of racism on school outcomes may be an important component to promote racial equity [4], which may encompass monitoring the influence of racial bias in student–teacher interactions and ultimately ADHD assessments. Additionally, some child clinical psychology research has demonstrated that providing parents with explicit guidelines before they complete symptom questionnaires reduced the magnitude of parent-teacher disagreements in ADHD assessments [28]. As such, intervention efforts to reduce the impact of racial biases in psychological assessments for children should consider these interdisciplinary findings from social, educational, and clinical psychology to determine the most efficient and effective way to achieve racial equity in mental health care.

An important future direction for this line of research is to connect the impact of interpersonal racism to the broader context of structural racism in the education and mental healthcare systems that consistently underserve children and families of color in the U.S. This future work should involve more closely examining how Black children's behaviors are perceived and how their needs for emotional and behavioral services are assessed at various levels of care (e.g., classrooms, school districts, and behavioral health providers). For example, it is critical to comprehensively understand the interplay of individual-level biases and structural racism for Black children from initial identification of ADHD behaviors in the classroom, referring for an assessment, and the subsequent impacts on student–teacher relationships as well as social-emotional and academic outcomes. Notably, despite consistent evidence that Black students are less likely to be identified with behavioral problems when working with Black teachers [42], Black teachers are disproportionately underrepresented in the U.S. public school workforce as a result of racist practices that systematically eliminated Black educators post *Brown* [51]. As such, these persistent racial disparities are a product of highly nuanced historical, sociopolitical, and cultural forces that maintain structural racism, as outlined by critical race theory [15]. Therefore, although targeted interventions to reduce the impacts of individual implicit biases will be important in promoting racial equity in ADHD assessments and treatment, concerted effort to diversify the education workforce to reflect the increasingly diverse student body is also urgent and critical to closing the gaps in academic, social, and emotional outcomes for historically marginalized and underserved children of color in the United States.

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Author Contribution SK, ND, EH conceived and designed research protocol. SK recruited study participants and managed data collection. SK and EH analyzed data. SK wrote the manuscript and ND, SF, and EH provided feedback and revisions to the manuscript. All authors read and approved the manuscript.

Data Availability No datasets were generated or analysed during the current study.

Declarations

Competing Interests The authors declare no competing interests.

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