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Do Racial Stereotypes Contribute to Medical Misdiagnosis of Child Abuse?
Investigating Tunnel Vision in the Emergency Room

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Table of Contents

Why We Need to Investigate Racial Stereotyping and Tunnel Vision in the Emergency Room	3
Race and Medical Misdiagnosis of Abuse	4
Racial Stereotyping as an Explanatory Mechanism	5
Racial Stereotyping in the Context of CPS Involvement	7
Overview and Hypotheses	8
Method	8
Results	12
Discussion	17

Why We Need to Investigate Racial Stereotyping and Tunnel Vision in the Emergency Room

Recent cases involving legal appeals, acquittals, and exonerations have shined a light on medical misdiagnosis of child abuse as a source of wrongful convictions. Consider, for example, the 2008 case involving Adrian Thomas, a 26-year-old African American man who was charged with the murder of his four-month-old son Matthew (see *People v. Thomas*, 2014). Thomas's wife called 911 after finding Matthew unresponsive in their home. Upon arrival at a local hospital, Matthew was determined to be in critical condition and then transferred to the pediatric intensive care unit of a major hospital, where his health continued to decline and he eventually died. Following two days of lengthy and intensive police interrogation during which detectives repeatedly lied to Thomas, Thomas confessed to forcefully slamming Matthew down on a bed several times. Despite almost immediately recanting the coerced confession after being arrested, Thomas was convicted by a jury for murdering his son. Nearly five years later, however, the New York Court of Appeals determined Thomas's coerced confession should not have been allowed as evidence. In the subsequent retrial, absent the incriminating coerced confession, the jury was persuaded by defense evidence contradicting the pediatric critical care doctor's diagnosis of shaken baby syndrome, including the absence of a skull fracture that the doctor had documented and expert testimony opining that Matthew's death was a result of an overwhelming pneumococcal infection and sepsis. Thomas was acquitted in 2014 (National Registry of Exonerations, 2020).

Thomas's case became a cause célèbre because the contrast in outcomes from his original trial and retrial so clearly demonstrates how coerced confessions can shape juror decision-making and lead to wrongful convictions. However, his case also raises important questions about the role of medical professionals in generating wrongful allegations of child abuse in the first place. Before Matthew died, the pediatric critical care doctor who was tending to him told the detectives investigating the incident that "somebody murdered this child" (Babcock & Hadaegh, 2011). This undoubtedly informed the detectives' strong presumption of Thomas's guilt, their decision to interrogate him, and their use of coercion to elicit his confession. But what led the doctor to ignore the evidence that Matthew was suffering from an acute infection, such as his low white blood cell count, and instead determine that his injuries were caused by abuse? In particular, would the doctor have come to the same conclusion if Matthew had been White rather than Black?

The question of whether race contributed to the medical misdiagnosis in Adrian Thomas's case is founded on research indicating that Black individuals are both disproportionately more likely to be implicated in child abuse (e.g., Flaherty et al., 2008) and wrongfully convicted (see Gross et al., 2017; Najdowski, 2011; Olney & Bonn, 2015). To investigate the influence of race on the probability of an abuse-related diagnosis, we had emergency medical professionals review a fictional case involving an infant patient who was depicted as either Black or White, but who otherwise experienced an identical pattern of symptoms prior to being taken in at an emergency room. We predicted that stereotypes that link child abuse to Black individuals (see, e.g., Krowchuk, 1989; Najdowski & Bernstein, 2018) would produce confirmation bias and tunnel vision in medical professionals' information-processing and decision-making, thereby increasing the likelihood of an abuse-related diagnosis for a Black versus White infant. We also explored how stereotyping would be affected by a

contextual cue that would suggest an infant's symptoms were the product of abuse: prior involvement of the family with child protective services ("CPS"; Nouman & Alfandari, 2020).

Next, we review the extant literature suggesting that medical misdiagnosis of abuse is more likely to affect Black than White children and families. We then discuss evidence suggesting that a stereotype linking race and child abuse may underlie such racial disparities and describe the psychological process by which the race-abuse stereotype may affect medical decision making. We further discuss how effects of the race-abuse stereotype may be exacerbated or mitigated by contextual case information. We present the study we designed to test those hypothesized effects, and then conclude with a discussion of our findings, directions for future research, and implications for reducing racial disparities in medical misdiagnosis of abuse, unwarranted social welfare and legal intervention, and, ultimately, wrongful convictions.

Race and Medical Misdiagnosis of Abuse

Of the nearly eight million children investigated for suspected maltreatment in 2018, 11% were referred to CPS by medical professionals (Children's Bureau, 2020). Of importance, although hospitals are the third most common source to identify child maltreatment (Sedlak et al., 2010), only 25% of the cases that hospitals report to CPS are deemed worthy of investigation (Sedlak & Ellis, 2014). This investigation rate is low compared to other sentinel groups (e.g., 94% of cases reported by social services and 64% of cases reported by law enforcement result in investigation), suggesting that the medical community may be more likely than others to suspect child abuse when it has not actually occurred. Not surprisingly then, Adrian Thomas's case is but one of many that have raised controversy regarding medical misdiagnosis of abuse in both legal and medical circles (see, e.g., *The People of the State of New York v. Renee Susan Bailey*, 2014; Possley, 2018; Wester, 2019). Kirschner and Stein (1985) first drew attention to this issue 35 years ago by reporting on 10 cases in which false accusations were lodged against families after emergency room physicians mistook life-threatening illnesses or postmortem artifacts as child abuse. More recently, shaken baby syndrome (also known as abusive head trauma) has been identified as a problematic diagnosis that contributes to wrongful convictions (National Registry of Exonerations, 2020). The supposedly tell-tale symptoms of shaken baby syndrome—subdural hematoma, retinal bleeding, and brain swelling—can stem from a variety of other causes, including, for instance, sudden infant death syndrome, venous sinus thrombosis (see Zakirova, 2017), and external hydrocephalus (Wester, 2019). As a result, medical and legal experts are increasingly likely to dispute the appropriateness of a shaken baby syndrome diagnosis (see, e.g., Findley et al., 2012; Jenny, 2014; Lynøe et al., 2017). Indeed, 11% of the 2,000 shaken baby syndrome cases that went to criminal court between 2001 and 2015 were either dropped, dismissed, or resulted in overturned convictions because secondary analyses showed other causes of death (Cenzipper, 2015).

Despite growing concerns about medical misdiagnosis of abuse, little research has examined how medical personnel make such egregious errors. Kirschner and Stein (1985) identified the "uniform failure of the hospital staff either to elicit a careful history from the parents or to believe the parents' story" and "an attitude of suspicion and/or hostility toward the parents" (p. 875) as possible contributing factors. It is notable, however, that 60% of the cases they reviewed involved Black children at a time when no more than 40% of the study site's population was Black (Yonek & Hasnain-Wynia, 2011), indicating that race may have played a role, too. This would be consistent with other research showing that doctors and hospitals are

more likely to identify and report a child's injuries as resulting from abuse when the child is Black rather than of any other race (Flaherty et al., 2008; Hampton & Newberger, 1985; but see Laskey et al., 2012). For example, a retrospective chart review of infants and toddlers who were hospitalized for skull or long-bone fractures showed that children were more likely to be subjected to a skeletal survey and reported to child protective services for suspected abuse if they were Black or Hispanic rather than White (Lane et al., 2002). In a more recent study, Hymel et al. (2018) concluded that disparities in the rates of evaluating and reporting young children for abusive head trauma in pediatric intensive care units manifested only among children who were not ultimately classified as having experienced abuse; no similar racial difference emerged among children who were determined to be abuse victims. An experimental study of mandated reporters yielded similar results. Specifically, Zellman (1992) examined responses to several vignettes describing potential physical or sexual abuse and found that the reporters were more likely to label a child's injury as abuse and perceived the incident as more serious and deserving of a report to authorities when the child's family was described as Black rather than White. Taken together, the research indicates that decision-making related to maltreatment is permeated by greater suspicion of Black families.

The potential for abuse to be misdiagnosed disproportionately more often in Black versus White children is concerning for three reasons. First, it subjects Black children and families to unwarranted child welfare and criminal investigations, thereby contributing to racial disparities in wrongful convictions. In support, even though research suggests that innocent Black individuals who are convicted of crimes are less likely to be exonerated compared to their White counterparts (Gross et al., 2017), Black individuals compose 18% of defendants exonerated for shaken baby syndrome (National Registry of Exonerations, 2020) but only 13% of the United States population (U.S. Census, 2018). The second reason that a link between race and medical misdiagnosis of abuse is alarming is that it leads other causes of Black children's symptoms to be overlooked, potentially contributing to racial health disparities that have been broadly documented in medical research (Jarquin et al., 2011; Lewis & van Dyke, 2018). For example, research has shown that even when Black and non-Black children are treated by the same doctor, Black children are less likely to be diagnosed with respiratory tract infections and less likely to receive antibiotic treatments (Gerber et al., 2013). Third, to the extent that suspicion is disproportionately targeted at Black rather than White children, there is a risk that doctors may underdiagnose abuse affecting White children. In fact, there is evidence that actual abusive head trauma is more likely to go unrecognized in White than minority children (Jenny et al., 1999). For all of these reasons, it is critical that the underlying mechanisms that produce more medical misdiagnosis of abuse for Black than White children be understood.

Racial Stereotyping as an Explanatory Mechanism

Balsa and McGuire (2003) outline three explanations for general racial health disparities that are also relevant to understanding misdiagnosis of abuse. The first is that physicians are prejudiced and have less concern for Black individuals than others. However, many studies have revealed no explicit preference among medical professionals for White versus Black patients, and levels of explicit bias do not relate to decisions about who should be treated (e.g., Green et al., 2007; for review, see Smedley et al., 2003). The second mechanism relates to the uncertainty that clinicians face in their decision-making process. On the one hand, such uncertainty may be amplified by miscommunications or misunderstandings that occur between non-Black doctors

and their Black patients, given that only 5% of all active physicians in 2018 were Black (Association of American Medical Colleges, 2019). On the other hand, doctors may use the patient's racial category in and of itself as a cue to reduce uncertainty. Black children may in fact be more likely than others to experience maltreatment (e.g., Hussey et al., 2006; Sedlak, 1997). Such data about group rates and probabilities may facilitate accurate diagnosis in some cases, but it is likely to lead to inaccurate decision-making about other individuals (Balsa & McGuire, 2001). This point is closely related to the third factor contributing to racial disparities, which is that negative and exaggerated stereotypes may automatically and nonconsciously influence medical decision-making in ways that result in disparate treatment of racial groups. The purpose of this research is to explore the role of stereotypes associating race and child abuse in generating medical misdiagnoses of abuse.

It has long been recognized that child abuse is a socially constructed phenomenon subject to being identified on the basis of stereotypes about the types of people who are likely abusers (Gelles, 1975). Moreover, stereotypes that link crime and violence with Black race have been documented (see, e.g., Devine, 1989), and other studies have shown that medical professionals associate child abuse specifically with Black individuals. For instance, Krowchuk's (1989) survey of registered nurses revealed that they believe child abusers are stereotypically Black (Krowchuk, 1989). More recently, Najdowski and Bernstein (2018) performed two studies with samples of doctors, nurses, and other medical professionals to identify the content and strength of the race-abuse stereotype. Their research revealed a considerable level of consensus across participants' responses and, thus, about the existence and substance of beliefs in the medical community that Black children are more likely than others to be abused. Those findings are unsurprising, given that negative stereotypes portraying Black infants and children as "damaged creatures" have been common throughout history (Hoberman, 2012, p. 72). How, though, might they affect diagnostic decision-making by medical professionals?

It is well-established that stereotypes can have a subtle yet biasing influence on the way people perceive others, process information, and form judgments, regardless of the extent to which they consciously endorse the stereotypes (e.g., Devine, 1989). Although it has been hypothesized that stereotypes contribute to racial disparities in diagnostic decision-making, the validity of this proposition has only rarely been tested empirically. Moskowitz et al. (2012) demonstrated that even subliminally exposing physicians to faces of Black men so quickly that they could not be consciously registered was sufficient to activate stereotypes about the types of diseases and disorders with which Blacks are likely to present. Other studies indicate such stereotype activation can translate into less favorable perceptions of patients, diagnoses, and treatment recommendations. For instance, Abreu (1999) experimentally manipulated whether a sample of clinical therapists were subliminally exposed to lists of words that were either related to stereotypes about Blacks or neutral. All participants then read the same vignette describing a fictional patient. Results showed that those who were exposed to the racial-stereotype-relevant words, as compared to the neutral words, perceived the fictional patient to be more hostile. In other research, Green et al. (2007) showed that the more physicians implicitly or automatically and nonconsciously exhibited preferences for White people, the less likely they were to recommend a potentially life-saving intervention (i.e., thrombolysis) in response to a clinical vignette involving suspected myocardial infarction when the patient was Black versus White. These effects transcend the research context to affect real-world decision-making, too: van Ryn et al. (2006) found that physicians who reported greater endorsement of negative stereotypes in relation to their own Black patients' personal habits were less likely to recommend heart bypass

surgery for them relative to their White patients. Combined, these studies suggest that patient race “can influence providers’ beliefs about and expectations of patients independent of other factors” (van Ryn & Williams, 2003, p. 497), thereby contributing to more negative health outcomes for Black and White patients. The findings also point to the possibility that medical professionals may rely on the stereotype associating race and abuse when evaluating children’s symptoms in ways that lead them to be more likely to misdiagnose children who are Black as opposed to White.

Our study tests that hypothesis and explores the psychological mechanisms that could underlie the effect. Specifically, we rely on theory and research on confirmation bias to understand how stereotypes might translate into misdiagnoses in cases involving Black children. Confirmation bias involves the tendency to search for evidence that supports an existing hypothesis (for review, see Nickerson, 1998). Part of this process involves assuming the hypothesis is true and asking questions that are designed to bolster the hypothesis. As reviewed by Bornstein and Emler (2001), medical professionals are not immune to developing this kind of “tunnel vision.” This is concerning because stereotypes can fuel confirmation bias and tunnel vision. For example, people more readily attend to and more deeply process evidence when it is consistent rather than inconsistent with a stereotype (e.g., Bodenhausen, 1998). Further, people require less evidence to make judgments that are consistent with a stereotype (e.g., Biernat et al., 2008). As Nickerson (1998) stated, “once a person is convinced that members of a specific group behave in certain ways, he or she is more likely to seek and find evidence to support the belief than evidence to oppose it, somewhat independently of the facts” (p.183). Thus, stereotypes about who is likely to be a victim of abuse might become the hypothesis that medical professionals unwittingly try to prove. Therefore, we predict that, when medical professionals encounter Black children, stereotypes associating race and child abuse are activated. As a result, we expect that medical professionals engage in selective information-processing strategies aimed at—intentionally or unintentionally—confirming the stereotype-derived hypothesis that the child’s symptoms are the result of abuse. Ultimately, we anticipate that this process will increase the probability of an abuse diagnosis when the child patient is portrayed as Black versus White.

Racial Stereotyping in the Context of CPS Involvement

Unfortunately, medical professionals often have to make judgments about abuse based on an incomplete picture of their child patient’s history; in these circumstances, they may use whatever information is explicitly available to guide them (Nouman & Alfandari, 2020). As a result, their decisions may be “vulnerable and dependent on extraneous contextual information” (Lockhart & Satya-Murti, 2017, p. 1537). Thus, a patient’s race and related stereotypes are especially likely to influence medical decision-making when compelling evidence does not exist to support a particular diagnosis or course of action (for reviews, see Balsa & McGuire, 2003; Dovidio et al., 2008). In fact, Burgess et al. (2006) distinguished between two stereotyping effects: automatic stereotyping, whereby stereotypes influence perceivers’ judgments outside of their conscious awareness, and secondly, goal-modified stereotyping, whereby the need to comprehend a situation increases the likelihood that a perceiver will apply stereotypes in that situation. We hypothesize that emergency medical professionals use racial stereotypes to fill in the gaps in ambiguous cases and increase their certainty for making a diagnosis for their child patients.

Yet, once medical professionals have information that more clearly points to a diagnosis of abuse, it remains unclear how stereotypes may influence their decision-making. A child's family history of CPS involvement is a frequent red flag for suspicion of abuse to medical professionals (Nouman & Alfandari, 2020), so we considered how this factor might moderate the effect of race on diagnostic decision-making. On the one hand, once medical professionals become aware of CPS involvement, given that this information on its own supports the hypothesis of abuse, they may no longer rely on the race-abuse stereotype to disambiguate a child's symptomatology. This may reduce racial bias in information-processing and increase the likelihood of an abuse diagnosis at a similar rate for Black and White children. On the other hand, however, it is also possible that upon learning about CPS involvement, medical professionals may find the race-abuse stereotype relevant and useful for further disambiguating information (see Kunda, 1990). Thus, the contextual cue of CPS involvement may exacerbate stereotyping effects and increase risk of misdiagnoses for Black versus White children. We test these competing predictions in the current research, too.

Overview and Hypotheses

The current study conforms to a 2 (infant patient race: Black, White) X 2 (CPS history: involved, uninvolved) between-subjects experimental design. Our goal was to advance theoretical knowledge related to race, intergroup perceptions, stereotyping, and the influence these factors have on decision making as well as applied knowledge about racial disparities in medical misdiagnoses and wrongful convictions. Specifically, we sought to reveal the underlying psychological mechanisms that explain how racial stereotypes lead to medical misdiagnosis, particularly related to child abuse. Therefore, we examined the effects of an infant's race and the family's involvement with CPS on emergency medical professionals' diagnostic decision-making and to identify the psychological mechanisms that would explain the effects. Based on prior theory and research (e.g., Balsa & McGuire, 2003; Devine, 1989; Najdowski & Bernstein, 2018; van Ryn et al., 2006), we predicted that emergency medical professionals would be more likely to find that the infant's symptoms were caused by abuse when the infant was Black versus White. We further hypothesized that the effect of infant race on decision-making would be explained by greater activation of the race-abuse stereotype and, in turn, more selective information-processing aimed at confirming abuse. Because prior work suggested that CPS involvement could on its own support a hypothesis of abuse (Nouman & Alfandari, 2020), we also tested whether participants would be more likely to diagnose abuse when the infant's family was involved with CPS as compared to when it was not, regardless of the infant's race. However, we also explored whether the tendency for emergency medical professionals to be more suspicious of abuse when the infant was Black would be reduced or exacerbated when the family had a history of CPS involvement, as the confluence of that contextual cue with the race-abuse stereotype could result in tunnel vision (see, e.g., Nickerson, 1998).

Method

Participants

Participants were 167 non-Black emergency medical professionals (99% doctors, 1% nurse practitioners). Thirty-three percent of the sample identified as women and 80% as White or Caucasian (with 13% Asian, 3% Hispanic or Latino, and 5% who self-identified as "other")

racess/ethnicities). On average, participants were 46 years old ($SD = 11$, range = 28 to 72 years old) and had practiced medicine for 15 years ($SD = 9$, range = 2 to 39 years). Forty-nine percent of participants worked in community hospitals, 27% in university hospitals, 21% in teaching hospitals, and 3% in other settings. The majority of facilities were located in urban settings (53% versus 38% in suburban and 9% in rural).

Examination of manipulation checks revealed that 15 participants did not correctly perceive the race of the infant, 19 missed the experimental manipulation of CPS involvement, and 4 did both. Twenty-one participants failed to answer one or both of the manipulation checks altogether. These 59 participants were excluded from analyses, reducing the final sample to 108 participants. A series of chi-square analyses and t-tests ensured there were no significant differences between participants who were dropped versus retained in the final sample in terms of demographic or background characteristics, all $\chi^2s(1-4) \leq |2.04|$, $ts(147-149) \leq |0.32|$, $ps \geq .21$.

Materials

The materials, derived from the actual criminal court trial of Adrian Thomas (*People v. Thomas*, 2014), included a case summary and an ambulance report.

Case summary. The summary described an ambiguous case involving an infant patient who suffered from a variety of symptoms that could have resulted from either infection or abuse. Specifically, to suggest the infant was suffering from some sort of infection, he was described as having a mild fever, being tired and restless, crying more than usual, and vomiting in the day preceding his admittance to the emergency department. To suggest that an abusive incident may have occurred, the summary stated that the mother reported the infant had been crying loudly from the bedroom he was in with his father but the crying stopped abruptly, and when she checked on him she saw the infant lying in his crib, apparently fine, while the father stood over him looking upset. The summary otherwise described the decline in the infant's health throughout the night, the decision to call 911 after finding him "lifeless, limp, and not breathing," the initial interventions by the emergency medical technicians, and arrival at the hospital.

The summary included the experimental manipulation related to the infant's race, which was never explicitly stated. Instead, the infant was portrayed as either Black or White via use of race-appropriate names, following Laskey et al. (2012), and an image of the infant. Specifically, the Black infant was named Darnel Washington and the White infant was named Andrew Becker, based on the association of the first names (Glaser et al., 2015) and the prevalence of the last names with respect to each race (Gaddis, 2017). Images of the infant were selected through a pretest of 28 medical professionals who were recruited via snowball sampling. Participants viewed four images of infant patients obtained from public online sources. For each infant, they first responded to an open-ended question that asked how many months old they thought the baby was. They then indicated how sick the child appeared to be (on a 10-point scale ranging from 1, *very healthy* to 10, *very sick*) and identified the baby's race (*White, Black, or Hispanic/Latino*). The images selected for use as stimuli were those that depicted infants who were (a) most frequently identified as Black and never identified as White and (b) most frequently identified as White and never identified as Black. Paired sample t-tests showed that ratings for the two infants did not differ significantly in terms of perceived health ($M = 7.65$, $SD = 2.04$ and $M = 7.48$, $SD = 1.97$, respectively), $t(22) = -0.34$, $p = .73$; however, the Black infant was perceived as approximately one and a half months older than the White infant ($M = 7.05$ months, $SD = 3.97$ versus $M = 5.41$ months, $SD = 2.65$), a statistically significant difference, $t(21) = -2.08$, $p = .05$.

The summary also included the experimental manipulation of CPS involvement. In the CPS-involved condition only, the summary additionally noted that the infant patient's mother asked the admitting nurse in the emergency room to "contact her social worker at Child Protective Services," revealing that "the family currently had an open case."

Ambulance report. The summary was supplemented with an ambulance report that reiterated some information from the summary and provided additional details regarding the infant patient's condition (e.g., heart rate, blood pressure, etc.).

Measures

Stereotype activation. Following past studies (Goff et al., 2008; Najdowski et al., 2015; Steele & Aronson, 1995), we developed a word-stem completion task to measure stereotype activation. In preliminary research (Najdowski & Bernstein, 2018), 53 medical professionals listed words associated with the stereotype that Black children are more likely than other children to be abused by their parents. Participants generated 131 words which we then organized into 25 construct groups based on relatedness (e.g., "uneducated," "no education," "lack of education," "uninformed," "illiterate," and "education" were grouped together for the construct of "uneducated"). Eight construct groups that included responses from only one participant were dropped to ensure results were not influenced by any single participant's idiosyncratic beliefs. The final 17 race-abuse stereotype constructs were "drugs," "stressed," "poor," "neglect," "ghetto," "cycle," "uneducated," "batterer," "culture," "unskilled," "hood," "spank," "misbehaving," "unmarried," "scary," "strict," and "lazy." These words were given to a separate sample of 40 medical-professionals, who rated how strongly each word related to the stereotype linking race to child abuse. The five words rated as most strongly related to the stereotype were *drugs*, *stressed*, *poor*, *neglect*, and *ghetto*. We omitted at least two letter spaces from each word so that the word stem could be completed with other, non-stereotype-related words (e.g., ST_E_ED). The stereotype-related word stems were then intermixed randomly with five filler word stems that could not be completed as words that would fit the stereotype (i.e., product, sheet, glove, reason, mover). Participants were instructed to complete all 10 word stems with the first real words that came to their minds and to work quickly as they did so.

Stereotype activation was calculated as the ratio of target word stems the participant filled out in a stereotype-related manner (e.g., STRESSED instead of STEEPLED) divided by the total number of target word stems the participant completed. Therefore, higher scores on this measure reflect greater activation of the race-abuse stereotype.

Preliminary diagnosis. Participants' spontaneous preliminary diagnoses were assessed with the open-ended question, "Based on your first impression of this case, what do you think is the cause of the child's condition? That is, what is your preliminary diagnosis?" Two independent raters coded a random sample of responses (20%) to determine whether the diagnoses were consistent with abuse (e.g., shaken baby syndrome, non-accidental trauma), non-abuse-related causes (e.g., influenza, sudden infant death syndrome), or both abuse- and non-abuse-related causes. Interrater agreement was achieved (Krippendorff's $\alpha = .96$), disagreements were resolved by discussion, and then the remaining data were coded by one rater. This variable was further dichotomized to indicate whether participants made any mention of abuse or not.

Likely causes of symptoms. Next, participants were provided a list of 11 potential diagnoses and asked, "Based on the information you have, which of the following are the most likely causes of the child's symptoms?" They were instructed to rank their top five choices, with "1" being the most likely diagnosis. The causes listed were grouped for analyses as (a) incriminating abuse-related causes, comprising intracranial trauma, trauma secondary to abuse,

and blunt force trauma; (b) exonerating infection-related causes, including meningitis, streptococcus infection, and septic shock; and (c) nondeterminative causes, with intracranial abnormality, neurogenic pulmonary edema, cerebral edema, coagulopathy, and subdural hemorrhage. Proportions were calculated to indicate how many of the three abuse-related causes and three infection-related causes were listed as the top five most likely explanations for the child's symptoms. Also, we coded whether participants ranked an abuse-related cause or infection-related cause as the top most likely diagnosis.

Participants' confidence in judgment about the top most likely cause of the child's symptoms also was assessed using the item, "how confident are you that your top-ranked diagnosis is correct?" Responses were given on a scale ranging from 0 (*not at all confident*) to 10 (*extremely confident*).

Additional testing. Participants were asked, in light of their top-ranked diagnosis, "what tests would you order to determine if that preliminary diagnosis is correct or incorrect?" They were instructed to select up to three out of eight possible tests. As with the likely causes of symptoms, the tests were grouped for analyses as (a) incriminating abuse-related tests, including a skeletal survey or ophthalmology consult; (b) exonerating infection-related tests, with lumbar puncture or blood results; and (c) nondeterminative tests, comprising a neurological exam, physical exam, chest x-ray, or cranial CT scan or ultrasound. Proportions were computed to reflect how many of the two abuse-related tests and two infection-related tests were selected.

Surprise recall. In line with Bodenhausen (1988), participants completed a surprise recall task. They were instructed to "write down everything you can remember about the child's case, no matter how small the detail, regardless of whether you think the information was relevant to your diagnosis or not." They were encouraged to use as close to the original wording as possible. Two independent raters coded a random sample of responses (20%) for references to specific pieces of evidence, including (a) the infant's race and name, (b) CPS involvement (among participants in the CPS-involved condition only), (c) abuse-related details (e.g., that the father looked upset while in the bedroom with the infant crying, that the infant was slightly shaken up and down when found nonresponsive), (d) fabricated abuse details (e.g., that the infant was screaming; that the father was frustrated, not concerned about the infant's wellbeing), and (e) infection-related details (e.g., fever, wheezing, no obvious injuries). Interrater agreement was achieved (all Krippendorff's $\alpha \geq .85$), disagreements were resolved by discussion, and then the remaining data were coded by one rater. Following Bodenhausen, proportions were calculated to reflect the number of details recalled out of those that were presented for abuse (with and without including fabrications) and infection.

Evidence importance. Also following Bodenhausen (1988), participants rated details from the case summary and ambulance report in terms of "how important it was to your ability to reach a diagnosis" using a 5-point scale ranging from -2 (*Unimportant*) to +2 (*Important*). Two evidence items were related to the experimental manipulations—the race of the infant and, for participants in the CPS-involved condition, the open social work case. Abuse-related details included the mother's and father's behavior, which would be rated as important only if they were used as incriminating evidence due to their irrelevance to an infection-related diagnosis. Ratings for the mother's and father's behavior were averaged to create a reliable scale for abuse-related detail importance ($\alpha = .75$, inter-item correlation = .60). Infection-related details included poor appetite, fever, respiratory distress, duration of symptoms, and that there were no visible signs of trauma. Ratings for these five items were averaged to yield a reliable scale for infection-related detail importance ($\alpha = .69$, *M* inter-item correlation = .37). Six other evidence items (i.e., shock,

crying, vomiting, child's age, pupils fixed and dilated, nonresponsiveness) would not help to distinguish between abuse or infection as the cause of the child's symptoms and are not considered further.

Forced-choice diagnosis. Participants responded to an item adapted from Laskey et al. (2012) to assess their suspicion of abuse. Specifically, we presented a mock timer with the message "Please wait while we update our results..." to suggest that data was being tabulated (it was not). We then told participants that "Based on the data we have collected so far, the two most common diagnoses are *Septic shock* and *Trauma secondary to abuse*." We then asked, "Based on the material you read, which of these two diagnoses is the best explanation for the child's condition?" Participants then chose between the diagnoses of *Septic shock* or *Trauma secondary to abuse*.

Following Bodenhausen (1988), participants' confidence in their forced-choice diagnosis was assessed by the item, "how confident are you that this diagnosis is correct?" Responses were made on an 11-point scale ranging from 0 (*not at all confident*) to 10 (*extremely confident*).

Manipulation checks. A series of manipulation check questions were administered to ensure that participants were paying attention to the details that had been presented to them. Specifically, we asked participants, "How old was the child you read about?" Response options were either *less than 1 year old* or *more than 1 year old*. Participants then answered, "What was the race of the child you read about?" (*Black/ African American* or *White/Caucasian*) and "According to the materials you read, did the child's mother ask a nurse to contact her Child Protective Services social worker?" (yes or no).

Demographic and background characteristics. Participants also reported their professional title, gender, racial/ethnic background, age, number of years of practicing emergency medicine, and type and setting of work institution.

Procedure

Emergency medical professionals were recruited through invitations distributed by email to members of the American Medical Association listserv, following past research (see, e.g., Braithwaite et al., 2003). Considering that nonresponse is common for web surveys Dillman et al., 2014), with physicians' response rates ranging between 1% and 3% (S. Painter, personal communication, May 3, 2017), we distributed invitations to 15,000 individuals twice with the goal of achieving a sample of approximately 150 participants.

Interested individuals accessed an anonymous online survey at their convenience. Respondents were screened for eligibility based on professional credentials (i.e., medical professionals) and practice specialty (i.e., emergency medicine). Those who were eligible were given information about the study and asked to consent to participate. After providing consent, participants reviewed the case summary and ambulance report and completed the measures of stereotype activation, preliminary diagnosis, likely cause of symptoms, confidence in top-ranked diagnosis, additional testing, surprise recall, evidence importance, forced-choice diagnosis, confidence in diagnosis, manipulation checks, and demographic and background characteristics.

Finally, participants were debriefed about the purpose of the study, thanked for their time, and directed to a separate non-anonymous survey to indicate whether they would like to be compensated with a gift card to Amazon or Starbucks. We distributed \$25 gift cards in the preferred format by email.

Results

Two-way between-subjects analyses of variance (ANOVAs) were used to examine the main and interactive effects of infant race and CPS involvement on single continuous measures. For dependent measures that were meaningfully and statistically correlated, two-way between-subjects multivariate analyses of variance (MANOVAs) were employed. Log-linear models were used to test for main and interactive effects of infant race and CPS involvement on dichotomous measures. For analyses examining effects of race within the CPS-involved condition, independent samples t-tests were employed on continuous measures and chi-square analyses were used on dichotomous measures. All means and standard deviations for continuous measures are provided in Table 1, and all frequencies for dichotomous measures are presented in Table 2.

Bivariate correlation analyses explored whether any participant demographic or background characteristics were significantly associated with the dependent measures. When they were, additional analyses tested for effects of the independent variables on the relevant dependent measure while controlling for the implicated characteristic. Results of these supplementary analyses (available upon request) did not differ substantively from those presented next.

To preview, analyses revealed no evidence that the implicit race-abuse stereotype influenced emergency medical professionals to engage in heuristic decision-making by diagnosing abuse more often when the infant patient was Black rather than White, nor were diagnoses significantly affected by the family's involvement with CPS. Even so, participants reported significantly more actual and fabricated abuse-related details on the surprise recall task when the infant was portrayed as Black versus White, although this effect manifested only when CPS was involved with the family. Although the infant's race was perceived by participants to be a less influential factor in their decision making when the family was involved with CPS relative to when it was not, as predicted, participants perceived the parents' behavior to be significantly more important to their ability to reach a diagnosis when the infant was Black versus White.

Stereotype Activation

An ANOVA revealed that the degree to which stereotypes linking race and abuse were activated in participants' minds was not affected by the race of the infant, whether CPS was described as being involved with the family, nor the interaction of those two variables, all $F_s(1, 104) \leq .29$, $p_s \geq .59$, partial $\eta^2_s \leq .003$.

Preliminary Diagnosis

Overall, 75% of participants spontaneously mentioned a diagnosis involving an abusive incident. Log-linear modeling showed that the frequency of participants' spontaneous abuse diagnoses did not differ depending on the infant's race, whether CPS was involved, nor the interaction between the two, all $b_s \leq |.60|$, $z_s \leq |.97|$, $p_s \geq .34$.

Likely Causes of Symptoms

Because the proportion of incriminating abuse-related and exonerating infection-related causes listed in the top five most likely causes of the infant's condition were significantly correlated, $r(108) = -.53$, $p < .001$, a MANOVA was employed to test effects on these variables. Results revealed that the multivariate infant race main effect and infant race by CPS involvement interaction effect were both nonsignificant, all $F_s(2, 103) \leq .92$, $p_s \geq .40$, Wilk's $\lambda_s \geq .98$, partial $\eta^2_s \leq .02$. Although there was a marginally significant multivariate effect of CPS involvement, $F(2, 103) = 2.31$, $p = .10$, Wilk's $\lambda = .96$, partial $\eta^2 = .04$, univariate tests showed no statistical difference in the proportion of abuse- or infection-related causes identified as a function of whether CPS was previously involved or not, all $F_s(1, 104) \leq 1.44$, $p_s \geq .23$, partial $\eta^2_s \leq .01$.

Table 1
Means and Standard Deviations for Continuous Measures as a Function of Infant Race and CPS Involvement

	Black			White		
	No CPS Involvement	Prior CPS Involvement	Overall	No CPS Involvement	Prior CPS Involvement	Overall
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Stereotype activation	.34 (.18)	.35 (.22)	.35 (.19)	.35 (.23)	.31 (.20)	.33 (.22)
Proportion of...						
...abuse-related causes likely	.68 (.30)	.72 (.22)	.69 (.27)	.63 (.36)	.71 (.25)	.66 (.32)
...infection related causes likely	.44 (.41)	.52 (.35)	.47 (.38)	.38 (.37)	.46 (.35)	.42 (.36)
...abuse-related tests ordered	.23 (.31)	.30 (.34)	.25 (.32)	.29 (.31)	.27 (.33)	.28 (.31)
...infection-related tests ordered	.29 (.31)	.25 (.30)	.27 (.31)	.21 (.28)	.31 (.32)	.25 (.30)
... abuse-related info recalled	.20 (.22)	.22 (.13)	.21 (.18)	.24 (.15)	.16 (.14)	.21 (.15)
...abuse-related info recalled (including fabricated abuse)	.39 (.29)	.60 (.29)	.47 (.30)	.53 (.27)	.38 (.32)	.46 (.30)
... infection-related info recalled	.36 (.24)	.36 (.19)	.36 (.22)	.36 (.25)	.33 (.20)	.35 (.23)
Importance ^a of...						
...infant's race	-.87 (1.09)	-1.05 (.94)	-.94 (1.03)	-.70 (1.19)	-1.54 (.88)	-1.05 (1.14)
...open social work case	--	1.25 (.85)	--	--	1.08 (.93)	--
...parents' behavior	1.35 (.58)	1.43 (.63)	1.38 (.60)	1.29 (.73)	.88 (.94)	1.11 (.84)
... infection-related evidence	1.03 (.58)	.98 (.80)	1.01 (.67)	1.10 (.57)	.85 (.92)	.99 (.74)
Confidence ^b in...						
... top-ranked diagnosis	6.06 (2.83)	6.25 (2.53)	6.14 (2.69)	5.76 (2.44)	5.58 (2.48)	5.68 (2.44)
...forced-choice diagnosis	6.55 (2.50)	6.65 (2.21)	6.59 (2.37)	6.30 (2.35)	5.62 (2.32)	6.02 (2.34)

^a Evidence importance was rated on a five-point scale from 1 (*unimportant*) to 5 (*important*).^b Confidence in diagnoses was rated on an 11-point scale from 0 (*not at all confident*) to 10 (*extremely confident*).

Table 2
Effects of Infant Race and CPS Involvement on Categorical Measures

	Black			White		
	No CPS Involvement	Prior CPS Involvement	Overall	No CPS Involvement	Prior CPS Involvement	Overall
Preliminary abuse diagnosis	77%	65%	73%	79%	75%	77%
Forced-choice abuse diagnosis	74%	75%	75%	73%	75%	74%

With regard to the causes ranked as the top most likely explanation for the infant's symptoms, 59% of participants identified an abuse-related cause whereas 27% reported an infection-related cause (13% selected a cause that could be related to either abuse or infection). Log-linear modeling showed that the frequency with which participants selected either an abuse- or infection-related cause as the top most likely also did not differ depending on the infant's race, whether CPS was involved with the family, nor the interaction of those variables, all $b_s \leq |.29|$, $z_s \leq |.44|$, $p_s \geq .66$. An ANOVA also revealed no significant main or interactive effects on participants' confidence in their top-ranked diagnoses, all $F_s(1, 104) \leq .92$, $p_s \geq .34$, partial $\eta^2_s \leq .01$.

Additional Testing

The proportion of incriminating abuse-related and exonerating infection-related tests that participants indicated they would order were significantly correlated, $r(108) = -.48$, $p < .001$, so a MANOVA was used to investigate whether infant race, CPS involvement, or the interaction of the two affected these variables. Results showed no significant multivariate main or interactive effects, all $F_s(2, 103) < .71$, $p_s > .50$, partial $\eta^2_s < .01$.

Surprise Recall

No participants in the White infant condition recalled the infant's race or name, but of those in the Black infant condition, one reported remembering the infant's race and four others mentioned his racially stereotypic name. Only one of these five participants read that the family was involved with CPS.

Of the participants in the CPS involved condition, 57% ($n = 25$) made mention of CPS on the recall task. The likelihood of doing so did not differ significantly as a function of the infant's race, however (60% in the White infant condition as compared to 54% in the Black infant condition), $\chi^2(1, 44) = .15$, $p = .70$, $\phi = .06$.

A MANOVA was conducted to examine main and interactive effects of infant race and CPS involvement on the proportion of incriminating abuse-related and exonerating infection-related details that participants recalled, as these variables were significantly correlated, $r(108) = -.29$, $p = .003$. Again, there were no significant multivariate effects, all $F_s(2, 103) \leq 1.42$, $p_s \geq .25$, partial $\eta^2_s \leq .03$.

We also investigated whether participants fabricated details that were consistent with abuse, which 12% ($n = 13$) did (3 to 4 participants in each of the four experimental conditions). An ANOVA tested whether the race or CPS manipulations affected the proportion of abuse-related information recalled when accounting for participants' fabrications. The analysis revealed no main effects of infant race or CPS involvement, all $F_s(1, 104) \leq .55$, $p_s \geq .46$, partial $\eta^2_s \leq .005$. However, the infant race by CPS involvement interaction did reach significance, $F(1, 104) = 10.21$, $p = .002$, partial $\eta^2 = .09$. Simple effects analyses showed that, when there was no mention of CPS involvement, participants unexpectedly mentioned marginally fewer actual and fabricated abuse-related details when the infant was depicted as Black rather than White, $F(1, 104) = 3.69$, $p = .06$, partial $\eta^2 = .03$. However, when participants read that CPS was involved, as predicted, participants mentioned significantly more actual and fabricated abuse-related details when the infant was portrayed as Black versus White, $F(1, 104) = 6.49$, $p = .01$, partial $\eta^2 = .06$.

Evidence Importance

On average, participants rated the infant's race as unimportant to their diagnostic decision-making ($M = -1.00$, $SD = 1.09$). An ANOVA showed that, although the perceived importance of the infant's race did not vary depending on whether the infant was Black or White, $F(1, 104) = .59$, $p = .44$, partial $\eta^2 = .01$, it was rated as significantly more important when the

family was not involved with CPS as compared to when it was, $F(1, 104) = 6.13, p = .02$, partial $\eta^2 = .06$. This effect was not significantly moderated by infant race, $F(1, 104) = 2.59, p = .11$, partial $\eta^2 = .02$.

In contrast, overall, participants indicated that the family's open social work case was important to their ability to reach a diagnosis ($M = 1.16, SD = .89$). A t -test showed, however, that the perceived importance of this evidence did not depend on the race of the infant, $t(42) = -.62, p = .54$, Cohen's $d = .19$.

We used a MANOVA to test effects on evidence importance ratings in light of the significant correlation between ratings for the incriminating abuse-related details regarding the parents' behavior and the exonerating infection-related details, $r(108) = .24, p = .01$. There was no multivariate main effect of CPS involvement, nor was there a significant multivariate infant race by CPS involvement interaction effect, all $F_s(2, 103) \leq 1.49, p_s \geq .23$, partial $\eta^2_s \leq .03$. However, results showed a marginally significant multivariate main effect of infant race, $F(2, 103) = 2.35, p = .10$, Wilk's $\lambda = .96$, partial $\eta^2 = .04$. The univariate tests revealed that, although there was no statistical difference in the perceived importance of the infection-related evidence as a function of infant race, $F(1, 104) = .05, p = .83$, partial $\eta^2 < .001$, participants rated the parents' behavior as significantly more important when the infant was Black versus White, $F(1, 104) = 4.68, p = .03$, partial $\eta^2 = .04$.

Forced-Choice Diagnosis

Finally, when forced to choose between two options, 74% of participants suspected the infant's condition was caused by trauma secondary to abuse rather than septic shock. This rate did not vary significantly as a function of the infant's race, whether CPS was involved, or the interaction of those variables, all $b_s \leq |.08|$, $z_s = |.09|$, $p_s \geq .93$. Participants' confidence in their diagnosis also was not significantly affected by the experimental manipulations, all $F_s(1, 104) \leq 1.87, p_s \geq .17$, partial $\eta^2_s \leq .02$.

Discussion

We predicted that emergency medical professionals would be more likely to conclude that an infant had been abused when he was depicted as Black rather than White. This hypothesis was not supported. Specifically, our analyses revealed no evidence of differential medical response to our experimental manipulation of the infant's race when participants spontaneously generated a diagnosis for the infant, when they ranked the likely causes of his symptoms, or when they were forced to choose between an abuse-related or infection-related diagnosis. Moreover, the infant's race did not affect the extent to which the stereotype linking race and abuse was activated for participants or participants' likelihood of ordering tests that would be consistent with the hypothesis that the infant had been abused.

Even so, our study showed that emergency medical professionals reported being significantly more likely to consider the parents' behavior when reaching a diagnosis for a Black versus White infant. This is notable as it provides empirical evidence that race affects the way families are evaluated in the medical context, with Black parents receiving greater scrutiny and consideration relative to their White counterparts, even when all other facts are held constant. This is in line with studies suggesting that medical professionals are more likely to look for evidence of abuse in cases involving Black rather than White children (Lane et al., 2002), even when the children have the exact same symptoms (Zellman, 1992), and even when suspicion of abuse may be unfounded (Hymel et al., 2018).

Of note, although ratings of the perceived importance of the father's and mother's behavior were analyzed together due to their being strongly correlated, that correlation was unexpected, as the materials were designed to implicate that the father may have abused the infant, not the mother. It is consistent, however, with research showing that when fathers abuse their children, mothers are perceived as responsible for the abuse, even when they are unaware of the abuse and do not condone it (Ford et al., 2001; Kalichman, 1992). In some situations, mothers are even seen as more responsible for stopping abuse than the fathers who are perpetrating it (Kalichman, 1992). This appears to be especially true for Black families, as our results showed that the perceived importance of the father's and mother's behavior were more strongly associated when the infant was Black than White ($r_s = .65$ versus $.56$, $p_s < .001$). These findings are logical when considered in the historical evolution of perceptions of racial identities, as Black and White women have been viewed through separate lenses consistently over time and, consequently, held to different standards (see, e.g., Dow, 2015; Roberts, 2014). As specifically related to abuse, Black women are simultaneously perceived as less empathetic victims and more responsible for its occurrence (Donovan & Williams, 2002; Esqueda & Harrison, 2005; Willis et al., 1986). Such judgments may extend to Black mothers, who may be seen as more responsible than White mothers for the abuse of their children even when they did not perpetrate the abuse, as seen in the present research.

We also found that information about the infant's family having an open case with CPS had no effects on emergency medical professionals' diagnostic decision-making, despite having other influences on the way they reacted to the case. Past theory and research led us to competing hypotheses about whether CPS involvement would reduce or magnify the impact of the infant's race on participants' information-processing (see, e.g., Kunda, 1990; Nouman & Alfandari, 2020). Our findings do little to settle the debate. On the one hand, the CPS case was perceived as important to participants' ability to reach a diagnosis regardless of the infant's race. Moreover, participants rated the infant's race as a significantly more important piece of evidence when no mention of CPS was made than when materials referred to the family's open CPS case, regardless of whether the infant was portrayed as Black or White. This is consistent with theory and research suggesting that the more ambiguous the situation, the more likely people are to rely on heuristic-decision making to help them make sense of the world (see, e.g., Duncan, 1976). Our results support the idea that CPS involvement may reduce ambiguity about the causes of the infant's condition and lessen medical professionals' reliance on the race of the patient in their decision-making.

Yet, this stands in contrast with our other findings showing that CPS involvement interacted with infant race to affect the number of actual and fabricated details suggesting that the infant had been abused that emergency medical professionals recalled. Specifically, when CPS was not involved, participants unexpectedly recalled a lower proportion of actual and fabricated abuse-related details for a Black than White infant. When participants read that the family had an open CPS case, however, the pattern reversed in a way that was consistent with the race-abuse stereotype: they recalled a higher proportion of actual and fabricated abuse-related information for a Black versus White infant. These results are more consistent with prior work finding that expectations about a case formed from extraneous information can lead to confirmation bias and corruption of judgments in the domain of forensic science (for review, see Kassin et al., 2013). In our study, emergency medical professionals who learned that the infant patient came from an abusive family environment were more likely than others to not only attend to evidence that was consistent with the hypothesis that the infant's symptoms were caused by

abuse, but also to misperceive and manufacture evidence in line with that hypothesis. In fact, this pattern did not emerge when considering recall for only actual abuse-related details, nor when considering recall for infection-related details. This is deeply concerning as false or misleading forensic evidence contributed to all of the wrongful convictions involving allegations of shaken baby syndrome reported to date by the National Registry of Exonerations (2020).

Future research will need to replicate our findings and discern whether contextual cues such as CPS involvement in fact mitigate or exacerbate racial stereotyping. We consider a few points of which such work must be mindful. First, how can we resolve the contradiction between (a) participants' self-reports of being uninfluenced by the infant's race on average and especially when the family was involved with CPS and (b) the actual differences found in the importance attributed to Black versus White parents' behavior and recall of abuse-related details (both true and false) to the detriment of the Black family who had an open CPS case? One possibility is that participants may simply have been reluctant to recognize or honestly report that they respond to children Black and White families differently for fear of behaving or being perceived as a racist (see Sommers & Ellsworth, 2001). In support, the Green et al. (2007) study we previously described showed that the negative association between physicians' implicit racial bias and racially disparate treatment of patients emerged only when the physicians were unaware that the study was focused on understanding racial health disparities. When physicians inferred this focus, however, higher levels of implicit bias were instead correlated with increased treatment recommendations for Black patients, indicating that physicians corrected for their bias in their decision-making. To combat the potential for this social desirability bias in our research, we attempted to mask the study's purpose by subtly implying the infant's race through names and images, as previous studies have confirmed that using stereotypically Black and White names is sufficient to successfully manipulate race categorization without stating race outright (Glaser et al., 2015; Holbrook et al., 2016). However, only participants who perceived the infant's race as intended were retained in analyses, and it remains possible that any notice of race may activate motivation to control biased responding. Further, we developed a word-stem completion task that we hoped would be sensitive to participants' implicitly held stereotypes about race and abuse, even in the event that they were unable or unwilling to express those stereotypes explicitly (see Fisher, 1993). However, even though some of our findings were in line with the race-abuse stereotype, we did not find any difference in stereotype activation as a function of infant race. Future research should aim to determine whether our word-stem completion task was in fact a valid measure of this construct, and if not, more creative work will be needed to address this challenge.

A second issue that will need to be examined in future work is that none of the effects of infant race or CPS involvement on information-processing actually translated into biased decision-making. This is encouraging as it suggests that medical professionals may not believe that suspicion of abuse based on these factors—either individually or in tandem—should justifiably impact their decision-making. As racial disparities have become a topic of concern in the medical community, it may be the case that emergency medical practitioners in our study did not rely on racial stereotypes to reach a diagnosis because they are already aware of and check their biases. In support, studies have shown that the majority of physicians are aware that racial biases can impact their interactions with patients and treatment decisions below the level of conscious awareness (Green et al., 2007; Tsai & Michelson, 2017). Our findings suggest that emergency medical professionals may be self-aware enough to of this possibility to ensure that even when non-medical contextual factors affect their perceptions and information-processing,

they do not impair their ability to reach an unbiased diagnosis. Future research might explore the strategies that doctors and other practitioners employ to avoid racial bias and remain focused only on relevant factors that reliably reduce uncertainty in cases in which abuse is a possible cause of their child patient's symptoms.

Methodological Strengths and Limitations

Like all studies, the present research has a number of methodological strengths and limitations that should be taken into account while interpreting the results. To begin, our study was ecologically valid in many regards. Our participants were actual emergency medical professionals, and the case summary that they reviewed was based on an actual wrongful conviction case involving a misdiagnosis of child abuse (see *People v. Thomas*, 2014). We also used images of hospitalized infants and an ambulance report as stimuli to increase the realism of the study relative to others that used only written materials (e.g., Lane et al., 2002; Zellman, 1992).

Still, caution is warranted in generalizing from our results to actual cases. Participants completed the study at their convenience under conditions that do not mirror the real-world environment in which they would actually be treating patients. That is, our study lacked the urgency, competing demands on attention, and other stressors that may accompany diagnostic decision-making as it occurs in an emergency department (see Munro, 2019). As a result, our study may not have taxed participants' cognitive resources to a representative degree, and they may have had more opportunity to engage in systematic rather than heuristic, stereotype-based decision-making (see Chaiken, 1980; Lockhart & Satya-Murti, 2017; Teal et al., 2012). Therefore, our null findings do not necessarily mean that medical decision-making is not influenced by the race-abuse stereotype, but rather that the design of the study did not allow the effects to become apparent. Future research should extend from the present study by using more ecologically valid methods to better understand how emergency medical professionals make decisions when real children's lives are at stake.

Another factor that may have inhibited our ability to detect effects of infant race and CPS involvement on diagnoses is the level of ambiguity presented in the stimuli. Although we intended the case to be highly ambiguous, three out of four participants spontaneously mentioned abuse-related causes on an open-ended question asking for a preliminary diagnosis. Future research may find it fruitful to increase ambiguity by bolstering the scenario with more details that implicate an infection as the cause of the infant's condition. Moreover, as Nouman and Alfandari (2020) noted, certain individuals in the medical community may simply be more suspicious of or sensitive to the possibility of abuse than others due to their own professional or personal experiences. It may be the case that emergency medical professionals always consider abuse as a potential cause when evaluating infant patients, reducing the perceived ambiguity of their situations. Future studies with medical professionals from different settings or with different levels of concern over the issue may reveal differences in their likelihood of being a source of unwarranted reports of child maltreatment.

Finally, many participants were dropped due to missed manipulation checks (either because they failed to answer altogether or answered incorrectly), which, while not altogether surprising given that we never explicitly mentioned the infant's race, did result in a smaller than expected sample. Our analyses may not have been sufficiently powered to detect effects (see Barnes et al., 2019). Even so, it is unlikely a larger sample would have altered our findings as the nonsignificant differences were small, with effect sizes ranging from less than .01 to .04. Still, future research is needed to determine whether our findings replicate with larger samples.

Conclusion

Our study sought to illuminate issues that should be taken into consideration in wrongful conviction cases based on unfounded allegations of child abuse. Because Black children are overrepresented in reports of suspected abuse (Hill, 2007) and three out of four cases reported by the medical community are not deemed worthy of investigation (Sedlak & Ellis, 2014), we investigated whether racial stereotyping by emergency medical professionals could contribute to disproportionality in unwarranted reports. It is now well-accepted that confirmation bias and tunnel vision can cause innocent people to be wrongfully accused and convicted (Findley & Scott, 2006), so we also analyzed these psychological phenomena in diagnostic decision-making. Overall, our findings provide mixed evidence about the role that the race-abuse stereotype (Najdowski & Bernstein, 2018) plays in this process. Specifically, we found that an infant's race and his family's involvement with CPS affected emergency medical professionals' attention to and interpretation of information, but not their ultimate diagnoses.

More work is needed to elucidate whether and when racial stereotyping influences this potential pathway to miscarriages of justice, but our findings do call for interventions that educate medical professionals about the possible ways that stereotypes may contribute to misdiagnosis of abuse. The fact that we found effects on our participants' information-processing but not decision-making is consistent with prior work suggesting that many medical practitioners are already aware of the need to ensure that bias does not contaminate their judgments (Green et al., 2007; Tsai & Michelson, 2017). In fact, bias training and other interventions designed to enhance racial sensitivity appear to be prevalent in hospitals throughout the United States (e.g., Tsai & Michelson, 2017) and evidence suggests they can be effective (e.g., Devine et al., 2012; FitzGerald et al., 2019; Zeidan et al., 2019). Our findings suggest that it might be beneficial to expand existing training to address the potential for racial bias in the context of child abuse cases. In particular, effective strategies are needed to reduce the racial disparities we found in the level of scrutiny to which medical professionals' subjected parents as well as their likelihood of going beyond the facts of the case.

It remains to be seen whether policy safeguards should also be implemented to reduce the likelihood that medical professionals' biased information-processing translates into misdiagnosis of abuse. There has been at least enough evidence of racial disparities in this outcome (e.g., Hymel et al., 2018; Zellman, 1992) to show the need for reviews within the child welfare system to better understand why it occurs, and why it has sometimes led to wrongful convictions in the criminal justice system (e.g., *People v. Thomas*, 2014). Now that we have shined a light on this problem, we hope that researchers, medical professionals, and policymakers will continue to identify the issues that contribute to it and work to develop solutions.

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