

Developing Cognitions about Race: White 5- to 10-Year-Olds' Perceptions of Hardship and
Pain

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Rebecca A. Dore¹, Kelly M. Hoffman², Angeline S. Lillard³, and Sophie Trawalter³

¹ University of Delaware, ² Northwestern University, ³ University of Virginia

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Author note

Correspondence about this article should be addressed to Rebecca Dore, School of Education,
University of Delaware, 113 Willard Hall Education Building, Newark, DE, 19716. Email:
rdore@udel.edu, Phone: 302-831-2073, Fax: 302-831-4110

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Abstract

White American adults assume Blacks feel less pain than do Whites, but only if they believe Blacks have faced greater economic hardship than Whites. The current study investigates when in development children first recognize racial group differences in economic hardship, and examines whether perceptions of hardship inform children's racial bias in pain perception. Five- to ten-year-olds ($N = 178$) guessed which of two items (low- vs. high-value) belonged to a Black and a White child, and rated the amount of pain a Black and a White child would feel in 10 painful situations. By age 5, White American children attributed lower value possessions to Blacks than Whites, indicating a recognition of racial group differences in economic hardship. The results also replicated the emergence of a racial bias in pain perception between 5 and 10. However, unlike adults', children's perceptions of hardship do not account for racial bias in pain perception.

Keywords: racial bias, pain perception, hardship, children, development

Developing Cognitions about Race: White 5- to 10-Year-Olds' Perceptions of Hardship and Pain

Human beings are naturally empathic. They empathize with others' pain and suffering with little thought or effort (Jackson, Meltzoff, & Decety, 2005). Yet, empathy has clear boundaries. Extant research has shown that it is more difficult for people to empathize with the pain and suffering of outgroup members, particularly if the outgroup is disliked or threatening (Avenanti, Sirigu, & Aglioti, 2010; Dovidio et al., 2010; Forgiarini, Gallucci, & Maravita, 2011; Gutsell & Inzlicht, 2012; Mathur, Harada, Lipke, & Chiao, 2010; Xu, Zuo, Wang, & Han, 2009). More recently, research has shown that adults have more difficulty recognizing the pain of those who have faced great economic hardship (Hoffman & Trawalter, 2016; Trawalter, Hoffman, & Waytz, 2012). They seem to believe that "what doesn't kill you makes you stronger," that those who have faced great economic hardship are physically tough and less sensitive to pain. This bias is not trivial. Many of our world's most pressing problems call for empathy and the recognition of others' pain and suffering. At the writing of this manuscript, the world is facing a massive refugee crisis and many world leaders, including American President Barack Obama and German Chancellor Angela Merkel, have issued an international call for empathy. In the United States, Black Americans in the Black Lives Matter movement are demanding that their pain and suffering be recognized and that inequities in pain and suffering be addressed. In the present work, we document the developmental trajectory of racial bias in the recognition of others' pain and test whether children's perceptions of economic hardship mediate the bias.

Development of Racial Bias in Pain Perception

Children notice race quite early in development. Studies have shown, for example, that infants as young as 3 months exhibit an own-race preference, spending significantly longer looking at own-race than other-race faces (Kelly et al., 2005) and that by 6 months, infants, like adults, show an own-race effect in face recognition, by better recognizing own-race faces than other-race faces (Anzures, Pascalis, Quinn, Slater, & Lee, 2011). With age, children begin to show more explicit recognition of race: 3-year-olds sort individuals by race when asked to put “people who go together” in the same pile (Nesdale, 2001). This classification ability is a prerequisite for the type of explicit preference and racial biases that begin to emerge during early childhood. Specifically, around age 5, White children show a pro-White bias by attributing more positive traits to Whites and more negative traits to Blacks (Doyle & Aboud, 1995), and an own-race social preference by preferring to be friends with other White children rather than with Black children (Kinzler, Shutts, Dejesus, & Spelke, 2009; Kinzler & Spelke, 2011). Finally, by age 6, White children appear to know about and apply specific stereotypes to Blacks, for example, that Blacks are aggressive and are good at basketball (Pauker, Ambady, & Apfelbaum, 2010). Although many types of explicit ingroup bias, like pro-White attitudes and social preferences, decline during middle childhood, underlying implicit attitudes appear to remain stable throughout development (Dunham, Baron, & Banaji, 2008).

A recent study suggests that by age 10, children exhibit a racial bias in perceptions of others' pain; they assume that Blacks feel less pain than do Whites (Dore, Hoffman, Lillard, & Trawalter, 2014). In this study, children (ages 5, 7, and 10 years) rated their own pain and the pain of both Black and White target children in response to painful events, such as stubbing one's toe or getting hit on the head. Whereas 5-year-olds rated the two targets as feeling approximately equal amounts of pain, 7 year-olds showed a weak bias, and by age 10,

children showed a strong and reliable racial bias, rating the Black child as feeling less pain than the White child. This work by Dore et al. (2014) conceptually replicates previous work with adults, in which participants were shown a photograph of either a Black or a White target person and asked to rate how much pain this person would feel across various situations. Results revealed that participants rated the Black target's pain as significantly less than the White target's pain (Trawalter et al., 2012; see also Mathur, Richeson, Paice, Muzyka, & Chiao, 2014 ; Wandner, Scipio, Hirsh, Torres, & Robinson, 2012).

Follow-up studies have investigated factors that might explain racial bias in pain perception in adulthood (Hoffman & Trawalter, 2016). In two experiments, adult participants received information about a Black and/or White target person's life hardship and then rated the target person's pain. Of note, hardship information was directly tied to economic and not physical hardship. Participants reported that the target individual would feel less pain if s/he had experienced greater hardship. Importantly, racial bias emerged but only when hardship information was consistent with expectations about race and life hardship; that is, participants reported that the Black (vs. White) target individual would feel less pain only if s/he had experienced greater hardship (Hoffman & Trawalter, 2016, Experiments 1 & 2). In another experiment, participants reported that the Black (vs. White) target individual would feel less pain but only if they endorsed the belief that hardship leads to toughness; in other words, if they endorsed the notion that "what doesn't kill you makes you stronger" (Hoffman & Trawalter, 2016, Experiment 3). Research has not yet examined whether a similar process might contribute to racial bias in children's perceptions of others' pain. In the present work, we fill this gap. We consider whether perceptions of economic hardship mediate racial bias in perceptions of pain among children.

Development of Race-based Perceptions of Economic Hardship

Some research suggests that children notice racial group differences in economic hardship early in development. For example, children in South Africa associate Whites with high-value belongings (e.g., big houses, fancy cars) and Blacks with low-value belongings (e.g., small shacks, older cars; Olson, Shutts, Kinzler, & Weisman, 2012). Specifically, in this study Black, White, and multiracial South African children ages 3 to 10 were shown pictures of high-value and low-value belongings and asked to match each belonging with a White or Black target. Across multiple trials, children matched White targets with high-value belongings and Black targets with low-value belongings more often than the reverse. Another study has found that Black American first-graders rate the same novel occupation as lower in status when performed by Blacks than Whites (Bigler, Averhart, & Liben, 2003).

Importantly, these two specific populations (Black American children and children in South Africa) might learn about race-hardship associations at an earlier age than White American children, perhaps because Black American parents highlight race for children more than do White American parents (Hughes et al., 2006), and in South Africa, because vestiges of apartheid—legal sanctioned status differences in race—prevailed well into the 20th century. In fact, Bigler et al. (2003) found that children living under economic hardship were more likely than children not living under economic hardship to believe that Blacks performed low-status jobs, suggesting that socioeconomic status may also be related to awareness of race-status associations.

Two other studies have examined White American children's perceptions of racial group differences in economic hardship. In one study, Newheiser & Olson (2012) used an Implicit Association Test paradigm and found that White children ages 7 to 11 implicitly associated Whites with wealth and Blacks with poverty more so than the reverse. In a more recent study, Shutts, Brey, Dornbusch, Slywotzky, and Olson (2016) presented 4- and 5-year-

olds with images of high- and low-value belongings and asked them to match the belongings to White and Black families. White children matched the White families with high-value belongings (e.g., a brand new luxury car) and the Black families with low-value belongings (e.g., noticeably used older car) more often than the reverse. The current study uses an adapted version of Olson et al.'s (2012) task to document the developmental trajectory of White children's race-hardship associations across middle childhood.

The Present Study

In sum, past research has documented a racial bias in pain perception: Both adults and children as young as 10 perceive the pain of Blacks to be less than the pain of Whites. In adulthood, this bias is mediated by perceptions of hardship; adults have this biased perception to the extent that they believe Blacks have experienced greater hardship than Whites. If racial bias in pain perception among children is also predicted by perceptions of hardship, it would suggest that this bias is rooted in beliefs that hardship confers toughness. If it is not, it would suggest that the racial bias in perception of pain is rooted in other beliefs in childhood and then transforms in adulthood.

The present study replicates and extends previous research in three key ways. First, it documents the developmental trajectory of White children's perceptions of racial group differences in economic hardship. Second, it replicates the age-related increase in the racial bias in pain perception between the ages of 5 and 10. And third, it determines whether perceptions of economic hardship contribute to the development of racial bias in pain perception across middle childhood. This is important for both understanding the development of this bias and for developing interventions. If racial bias in perceptions of pain is mediated by perceptions of economic hardship, as it is in adults, then it would suggest that the bias is not about race per se. As such, it would suggest that interventions ought to focus on teaching children that those who face greater hardship do not feel less pain. In other

words, it would focus on teaching children that the popular notion of “what doesn’t kill you makes you stronger” is untrue; all people feel pain, including those who experience great hardship. On the other hand, if racial bias in pain perception during childhood is not mediated by perceptions of economic hardship, then it would suggest that this bias may be about race per se, but then transforms in adulthood. It would suggest that interventions may need to focus on race and the understanding that people of different races all feel pain.

To examine our research questions, we measured children’s perceptions of a Black and a White child’s economic hardship and of a Black and a White child’s pain, and assessed the relationship between perceptions of hardship and perceptions of pain. The procedures used in this research were approved by the Institutional Review Board and data will be preserved on a secure server at the University of Virginia for at least 10 years following publication. We chose to focus on White children because previous research (Dore et al., 2014) has documented racial bias in pain perception in White children and our goal was to investigate whether perceptions of economic hardship in that population might explain the development of the bias. Furthermore, as a starting point, it is generally useful to consider how racial bias is expressed among Whites, given that Whites are a high status group in American society and, as such, are in a position of power. Similarly, we recruited 5- to 10-year-old children as participants based on previous research: Dore et al. (2014) found that the bias in pain perception increased across this age range. Furthermore, although Shutts et al. (2016) found that 4- and 5-year-olds showed evidence of an association between race and economic hardship, no research to our knowledge has investigated whether this association might strengthen across middle childhood, and thus potentially contribute to racial bias in pain perception.

In addition to the primary tasks of interest, we also administered a task to validate our use of economic hardship as a proxy for perceptions of hardship more broadly. In this task, we asked children to think about a child who has or has not “had a hard life” in order to assess whether children indeed associate having a hard life with economic hardship.

We additionally administered a questionnaire asking parents to report their child’s race/ethnicity, parent education, their and their child’s contact with people of different races, and whether and how they discuss race with their child. These variables were included to assess whether they might relate to children’s racial cognitions. For example, children who have more contact with people of different races or those who receive parental messages about the importance of appreciating differences (akin to a multicultural ideology) may be less likely to show racial bias (Apfelbaum, Pauker, Sommers, & Ambady, 2010; Pahlke, Bigler, & Suizzo, 2012). Additionally, information about parental education was used to document the socioeconomic status of our sample.

Method

Participants

Participants were 178 children between the ages of 5 and 10 years (M age = 7;6, SD = 1;9, range = 5;0 to 10;0, 91 girls). We recruited participants with a goal of achieving approximately equal representation across this age range and generally used age as a continuous variable in analyses. For purposes of conveying results, we also conducted some analyses using three age groups, split for convenience into 2-year windows; there were 68 five- and six-year-olds, 56 seven- and eight-year-olds, and 54 nine- and ten-year-olds. Six additional children completed the study but were excluded from analyses due to experimenter error ($n = 3$), technical difficulties ($n = 2$), or refusing to respond to questions ($n = 1$). Children were drawn from a database of families willing to have their children participate in research. Thirteen parents (7%) did not provide their child’s ethnicity; of the 165 who did,

85% identified their child as Caucasian, consistent with representation in the sampled community (83%). Of the remaining children, 8 (5%) were identified as Asian, 4 (2.4%) as African-American, and 1 (0.6%) as Hispanic; 11 (7%) parents chose the “other” response option to identify their child’s ethnicity or chose more than one response option. Fourteen parents (8%) did not provide information about parental education; of the 164 who did, parents’ education level was high: 46% of fathers and 48% of mothers had a post-college degree, 36% of fathers and 41% of mothers had a 4-year-college degree, and only 18% of fathers and 11% of mothers had less than a 4-year-college degree. Given that our participants come from mostly upper middle class families, we cannot meaningfully examine differences in the variables of interest related to socioeconomic status.

Procedure and Materials

Children first completed a pain rating task and a hardship perception measure in counter-balanced order. As described above, because the hardship perception measure focused on perceptions of economic hardship as a proxy for perceptions of hardship more broadly, children also completed a validation task designed to explicitly test whether children do in fact associate economic hardship (operationalized as owning or using low-value items) with general life hardship. They always completed the validation task third. Each task is described in turn below.

Stimuli for pain rating and hardship perception tasks.

The target stimuli for the pain rating task and the hardship perception measure were 12 color photographs of faces with neutral facial expressions (LoBue & Thrasher, 2015), 3 of each possible gender and race combination (Black/White, Girl/Boy). Each child saw two photos during the procedure: one photo of a Black child and one photo of a White child throughout both tasks. That is, target race was a within-subjects factor for both the pain rating and the hardship perception task. Across the sample, 3 photos of each gender and race were

used to guard against the possibility that any effects were specific to a particular photo. An approximated Latin Squares design was used to assign pairs of faces for each participant. The experimenter was unaware of which target (Black or White) was being shown to the child while administering the tasks.

Pain rating task. To assess racial bias in pain perception, children completed a pain rating task adapted from Dore, Hoffman, Lillard, and Trawalter (2014). First, children were trained to use an adapted 4-point version of the FACES Pain Rating Scale (Wong & Baker, 1988) through a short story about a child experiencing events resulting in different levels of pain. Children responded to four comprehension questions relating to their understanding of each point on the scale (e.g., “Can you point to the face that shows someone hurting a lot?”). Out of 178 children, 145 responded to all comprehension items correctly, 32 children responded to three items correctly, and 1 child responded to two items correctly. Mistakes were corrected and all children were included in the analyses. Thirty-one out of thirty-four mistakes were due to children choosing the face showing "someone hurting as much as you can imagine" on the question that asked them to point to the face showing "someone hurting a lot." After being corrected, children seemed to understand the distinction and all children later used all four points of the scale in their ratings.

After training, children first rated the amount of pain they themselves would feel following each of 12 events, which were read to them aloud. Children were allowed to respond either verbally using a phrase from the pain scale or by pointing to a face on the pain scale. To introduce the target pain rating items, children were told that they would now be asked about all those same things that might happen to another boy/girl and should indicate how much those things might hurt him/her. They were then shown a picture of a Black or White target child and the items were repeated in the same order, but referring to the target

child. Finally, similar instructions were repeated to introduce the ratings for the second target child. Target order was counterbalanced between children.

The painful event items were adapted from corresponding research with adults (Trawalter et al., 2012) and included 10 test items such as, “You burn your tongue on some really hot food” and “You bang your toe on a chair.” Two control items were inserted (“You hug a teddy bear,” and “You play with a puzzle”) during each item set (self, Black target and White target) to ensure that children were paying attention and responding to the items in a meaningful way; the control items were not included in analyses. Out of 178 children, 164 answered all six control items correctly. Eleven children answered five items correctly, two children answered four items correctly, and one child answered three correctly. All children were corrected and included in the analyses. Mistakes appeared to be due to children not paying attention or intentionally answering incorrectly to be silly. Number of mistakes was not correlated with children's pain rating sums for any target or with racial bias in pain perception, and the pattern of results for this measure was similar excluding children who made mistakes.

To score this task, the response chosen on the pain rating scale for each item was given a score from 0 to 3 (see Figure 1). We summed the scores for the 10 items for each target (self, White, Black), resulting in three scores for each child ranging from 0 to 30.

One concern that might arise in interpreting age differences in this measure is whether children used the scale differently across development. As in previous work (Dore et al., 2014) we took several steps to mitigate this concern. First, we measured and controlled for self-ratings of pain, such that if children of different ages used each point on the scale differently, our results control for these differences. Second, the high proportion of appropriate responses to all control items (e.g., ‘You hug a teddy bear’), indicate that younger children were paying attention and were not responding randomly across the items. Finally,

there was a moderate level of agreement across all age groups regarding which events would be most and least painful. For example, children of all age groups rated getting your fingers caught in the car door as very painful ($M_s = 2.53, 2.67, \text{ and } 2.71$ for 5- and 6-year-olds, 6- to 7-year-olds, and 9- and 10-year-olds respectively, on the 0 to 3 scale, averaged across self and targets) and rated biting your tongue as not very painful ($M_s = 1.47, 1.52, \text{ and } 1.43$, for 5- and 6-year-olds, 6- to 7-year-olds, and 9- and 10-year-olds respectively, on the 0 to 3 scale, averaged across self and targets). The difference between the ratings for these two items was significant for all age groups, 5- to 6-year-olds: $t(133) = 11.65, p < .001$; 7- to 8-year-olds: $t(104) = 12.46, p < .001$; 9- and 10-year-olds: $t(105) = 16.31, p < .001$. These data suggest that comparisons across age groups are indeed meaningful.

Hardship perception. To assess perceptions of hardship, children completed two tasks adapted from Olson, Shutts, Kinzler, and Weisman (2012): an individual task and a matching task, in that order.¹ The materials for both tasks were six pairs of photos of low-value (e.g., old and run-down looking) and high-value (e.g., new and nice looking) versions of the same items (houses, cars, swimming pools, beaches, playgrounds, and toys, in that order; see Figure 2). In the individual task, children were shown each pair of items and asked which one they thought belonged to or was associated with the target child (e.g., “Which of these houses do you think this girl/boy lives in?”). After responding to 6 items for the first target child, the task was repeated (with different photos) for the second target child. The matching task was similar but the two target children were presented simultaneously, and participants were asked which item from each pair belonged to or was associated with each target child. Thus, whereas in the individual task a child could always assign the high-value item to both children, in the matching task the child had to assign each lower value item to one of the two children. Notably, data from the matching task cannot distinguish between

¹ Eleven children were tested using only the individual task before the matching task was added to the procedure.

ingroup favoritism (“My group has high status”), outgroup derogation (“The other group has low status”), or both (“Whites have high status and Blacks have low status.”). In other words, an association between Whites and wealth and Blacks and poverty may be apparent in White children’s responses on this measure simply because of a tendency to associate their own racial group with positive stimuli. The individual task avoids this confound by testing the extent to which children associate each racial group with economic hardship independently.

The individual task yielded a hardship score for both the Black and White targets, whereas the matching task yielded a single score. To score the individual task, the number of low-value items chosen for each target was recorded, such that the possible range was 0 - 6 for each target, with higher numbers indicating a higher hardship rating. To score the matching task, the number of low-value items matched to the Black target was recorded, such that the possible range was 0 - 6 with higher numbers indicating a stronger association between race (Black) and hardship.

Validation task. To ensure that children’s choice of low- vs. high-value objects in the hardship perception task accurately reflected perceptions of hardship more broadly, not only economic hardship, children were asked to pair the aforementioned objects with children who were explicitly described as having low or high levels of hardship. Two tasks were used: an individual task and a matching task.² Cards with written names Eric/Erica and Brandon/Brittany (gender matched to child) were used during the task, such that children could point rather than respond verbally if preferred. These names were chosen because they are about equally popular in Black and White populations (Levitt & Dubner, 2005), and thus should not predispose children to infer race. In the individual task, children were first told about a boy/girl of the child’s own gender named Eric/Erica who “has had a really hard life.” Then, as in the hardship perception task, children were asked which item from pairs of low-

² Eleven children were tested using only the individual task before the matching task was added to the procedure.

and high-value objects they thought belonged to or was associated with Eric/Erica. In the matching task, children were told about a boy/girl of the child's own gender named Brandon/Brittany who "has *not* had a really hard life" and were asked to match which item from each pair of objects belonged to or was associated with Eric/Erica and Brandon/Brittany.

To score the individual validation task, the number of low-value items chosen for the hard life child was recorded, such that the possible range was 0 - 6, where higher numbers indicate a stronger association between low-value items and hardship. To score the matching validation task, the number of low-value items matched to the hard life child vs. the not hard life child was recorded, such that the possible range was 0 - 6 where higher numbers indicate a stronger association between low-value items and hardship.

Parent questionnaire. Parents completed a questionnaire asking about their and their child's contact with people of different races (e.g., "How many friends does your child have of another race?"). We included these questions for purely exploratory purposes. None of them were significantly related to the dependent variables; descriptive statistics and correlations are reported in the Online Supplementary Material. Parents also responded to an open-ended question³ about their conversations with their children about race and reported their highest levels of education. We included this information about education to characterize our sample and to determine whether our sample was upper-middle class.

³ The question read: "There are many ways that people in the U.S. think and talk about the topic of race. For example, some people might say that we should look beyond race, recognizing people as individuals rather than by their race. Other people might say that we should appreciate differences between racial groups, recognizing people as members of their racial group. We are interested in the types of things you say to your child about this topic. Do you talk to your child about race and if so, what types of things do you say?"

◀ We coded for whether the parents said they talked to their child and then, of those who reported doing so, whether they talked about similarities (akin to colorblind ideology) and whether they talked about appreciating differences (akin to multicultural ideology).

Results

First, we will discuss the analyses pertaining to children's racial bias in pain perception. Next, results of the validation task will be described to establish the validity of the measure used to assess hardship. Then, analyses relating to children's perceptions of racial differences in hardship will be discussed. Finally, we will present analyses examining the relationship between these constructs. Although our sample was primarily White, in order to make claims about White children specifically, we conducted primary analyses with both the full sample ($N = 178$) and the subsample of children who parents identified as Caucasian ($N = 141$). Given the wide age range represented here, it is important to determine whether any effects that include the whole sample also hold for the youngest children. Thus, relevant analyses are repeated with just the 5- and 6-year-old subsample ($N = 68$).

Throughout the results, we report unstandardized effect size estimates (B s) for regression analyses.

Racial bias in pain perception

On average, children's self pain rating sum was 18.5 out of 30 ($SD = 3.7$), whereas average pain rating sums for the Black target was 19.5 out of 30 ($SD = 3.9$) and for the White target was 20.4 out of 30 ($SD = 4.0$). Children's ratings for self, Black target, and White target were highly interrelated (Self/White: $r = .45, p < .001$; Self/Black: $r = .37, p < .001$; Black/White: $r = .53, p < .001$), presumably due to individual differences in scale use and overall attitudes towards painful events.⁴ Thus, we controlled for self pain ratings in the

⁴ As in Dore et al. (2014), children rated their own pain as closer to the predicted ratings for the Black targets than to those for the White targets. Indeed, children's ratings for their own pain are lower than their ratings for either target. As discussed in Dore et al. (2014), it is likely that children want to appear tough or brave and so rate the items relatively low for themselves but are more realistic in their ratings of the targets' pain. Relatedly, although examination of the correlations shows that children's self-ratings were more highly correlated with the White target than with the Black target, the difference in the overlapping correlations was not statistically significant (Meng, Rosenthal, & Rubin, 1992). This suggests that children are unlikely to be differentially anchoring their pain ratings for the Black and White

primary analyses. Data from fifteen children were outliers on this scale (exceeding the mean of their age group by more than two standard deviations). These data were removed from analyses relating to the bias in pain perception, but the pattern of results is similar when they are included.

A mixed-effects regression model was conducted predicting target pain ratings from self pain ratings, target race, age, and the interaction between target race and age, as well as the random effect of subject to account for the repeated measures design. There was a Race by Age interaction, showing that with age, children increasingly rated the Black target as feeling less pain than the White target, $B = .021, p = .051$, [White participants/children only: $B = .029, p = .033$].

To examine at what age racial bias first emerged, we subtracted the pain ratings for the Black target from the pain ratings for the White target and conducted a regression model predicting this difference score from age (Figure 3). Then, we used the regression model to determine at what age the 95% confidence interval did not overlap with 0. In these data, the racial bias in pain perception was first reliably detectable around 80 months, or between 6.5 and 7 years of age. As another approach to this question, we conducted separate regression models for each age group. The 5- to 6-year-olds did not show racial bias, $p = .64$, whereas the 7- to 8-year-olds showed the bias at trend-level, $B = 1.27, p = .052, d = .15$, and the 9- to 10-year-olds clearly showed the bias, rating the Black target as feeling significantly less pain than the White target, $B = 1.5, p < .001, d = .48$, [White participants/children only: $p = .87, p = .17$ and $p < .001$, respectively]. These data replicate the findings of Dore et al. (2014) in the age-related increase in the bias across middle childhood and extend those findings by identifying more specifically the age at which the bias emerges.

target on their self-ratings. In fact, in Dore et al. (2014) there was a non-significant difference in the opposite direction, further suggesting that differences are due to random sampling variation rather than a meaningful pattern.

Hardship validation task

On the individual hardship validation task, children associated the child with a hard life with the low-value item on 4.9 out of 6 trials on average ($SD = 1.8$), significantly more often than would be expected by chance, $t(177) = 14.1, p < .0001, d = 1.04$, [White participants/children only: 4.9 out of 6 trials ($SD = 1.8$), $t(140) = 12.7, p < .0001, d = 1.06$].

This pattern held even for a subsample of only the youngest children (5- and 6-year-olds), $M = 4.3$ out of 6 trials ($SD = 2.1$), $t(67) = 16.5, p < .0001, d = .60$. Children also exhibited this tendency on the matching task, associating the child with a hard life with the low-value item on 5.4 out of 6 trials on average ($SD = 1.4$), significantly more often than would be expected by chance, $t(166) = 22.0, p < .0001, d = 1.68$, [White participants/children only: 5.4 out of 6 trials ($SD = 1.5$), $t(134) = 19.2, p < .0001, d = 1.60$]. These results indicate that the association of individuals with low- vs. high-value items in the hardship task used here is related to children's abstract concept of hardship.

Hardship perception measure

Individual hardship task. A mixed-effects regression model was conducted predicting hardship ratings from target race, controlling for the random effect of subject to account for the repeated measures design. Although children tended to assign high-value items to both targets, they associated the Black child with low-value items ($M = 2.5, SD = 2.4$) significantly more often than they associated the White child with low-value items ($M = 1.5, SD = 1.9$), $B = -0.99, p < .001, d = .47$, [White participants/children only: Black child: $M = 2.3, SD = 2.3$, White child: $M = 1.6, SD = 1.9, B = -0.76, p = .003, d = .33$]. This pattern also held for the 5- and 6-year-old subsample: Black child: $M = 1.9, SD = 2.1$, White child: $M = 1.2, SD = 1.5, B = -0.72, p = .01, d = .39$.

To examine the relationship between children's performance on this task and age, we added age and the interaction between age and target race to the regression model. There was a significant interaction between age and target race, showing that older children had stronger perceptions of racial differences in hardship than did younger children, $B = -0.02, p = .03$, [White participants/children only: $B = -0.02, p = .04$]. Specifically, as age increased, children assigned more low-value items to Black targets whereas children's assignment of low value items to White targets did not change considerably with age. Figure 4 illustrates this effect.

Matching task. Recall that for this task, responses were coded with respect to whether the child chose the Black target instead of the White target for each item, and then summed across items; thus, target race is captured in the score. When forced to choose the low-value item for one of the two targets, children matched the Black target with the low-value item on 4.0 out of 6 trials on average ($SD = 2.1$), significantly more often than would be expected by chance, $t(166) = 5.9, p < .0001, d = .48$, [White participants/children only: 3.9 out of 6 trials ($SD = 2.1$), $t(134) = 4.8, p < .0001, d = .43$]. This pattern held for the 5- and 6-year-old subsample, $M = 4.0, SD = 2.0, t(62) = 3.8, p = .0004, d = .50$. Unlike for the individual task, children's tendency to match the low-value item with the Black target on the matching task did not change with age, $p = .85$, [White participants/children only: $p = .85$].

Racial bias in pain perception and hardship

Children's scores on the two types of hardship tasks (individual and matching) were highly correlated ($r = .64, p < .0001$, [White participants/children only: $r = .68, p < .0001$]), so the standardized scores for each task were summed to create a composite score in which higher scores indicated a stronger perception of racial differences in hardship. To determine whether perceptions of hardship are related to racial bias in pain perception, we examined the correlation between the hardship composite score and the difference score between Black and White targets' pain ratings. The hardship composite was not significantly correlated with the

pain difference score, $r = .08$, $p = .33$, [White participants/children only: $r = .02$, $p = .79$], suggesting that perceptions of hardship do not explain the development of racial bias in pain perception. Additionally, a regression analysis predicting the pain difference score from the hardship composite revealed that when hardship bias is 0 (no bias), bias in pain perception remains significant, $B_0 = .86$, $p = .003$. As expected, this pattern was apparent in subsample analyses for the 7- to 8-year-olds and 9- to 10-year-olds, $B_0 = 1.1$, $p = .09$, and $B_0 = 1.4$, $p = .001$, respectively, but not for the 5- to 6-year-olds, $B_0 = .21$, $p = .62$.⁵

To examine whether the relationship between hardship and the racial bias in pain perception changes with age, we examined the interaction between age and hardship in predicting the pain difference score. Results showed that there was not a significant interaction between age and hardship, $p = .52$, [White participants/children only: $p = .22$], suggesting that hardship perceptions were not any more predictive of the pain bias in older children than in younger children. Hardship perception predicts the pain bias in adults, and although the two perceptions both exist by middle childhood, they appear to do so independently, or, at the least, are not directly related at the ages studied here.

Discussion

In the current research, we found that, like adults, children assume that Blacks have faced greater economic hardship than have Whites. We also found that, like adults and children in previous research, children assume that Blacks feel less pain than do Whites (Dore et al., 2014; Trawalter et al., 2012). Unlike adults, however, we found that children's perceptions of economic hardship did not mediate or even predict their perceptions of others' pain. Theoretically, this finding suggests that children's racial bias in pain perception is qualitatively different from adults' bias, and that something else undergirds the emergence of racial bias in pain perception in middle childhood.

⁵ We thank an anonymous reviewer for suggesting these illuminating analyses.

Notably, in addition to the primary measures we also included a task to validate our choice to use a measure of economic hardship. Although we believe this task provides evidence that children indeed associate having a hard life with economic hardship, we note that children's conceptions of hardship are likely to be fundamentally different from and less complex than adults'. Regardless, socioeconomic status and economic hardship are important components of an adult-like conception of hardship and were the focus of research with adults showing that perceptions of economic hardship mediate racial bias in perceptions of pain (Hoffman & Trawalter, 2016). Additionally, it was useful to focus on economic hardship in the current study due to the availability of a concrete and previously-tested measure for use with children (adapted from Olson, Shutts, Kinzler, and Weisman, 2012).

Given that economic hardship appears not to explain the development of children's racial bias in pain perception, we can think of at least two possible alternative accounts. One possible mechanism is a developmental increase in seeing Black children as less childlike and innocent. In research with adults, Goff, Jackson, Di Leone, Culotta, and Ditomasso (2014) have found that Black boys in particular are seen as less childlike and innocent than White boys. Whether children have this same bias is unknown. However, if this bias develops across middle childhood, it may be linked to the perception that Blacks are more resistant to pain. A second possible mechanism relates to cultural and parental messages about race. For example, many White adults hold false beliefs about biological differences between Blacks and Whites or think that Blacks have "superhuman" capabilities that Whites do not, which also contributes to a racial bias in pain perception in adults (Hoffman, Trawalter, Axt, & Oliver, 2016; Waytz, Hoffman, & Trawalter, 2015). Older children may have more exposure to testimony or media that include this type of cultural message, and with age, children could begin to internalize such perceptions. Notably, we attempted to measure parental messages to children about race, following research suggesting the value of multicultural messages

focusing on appreciating group differences rather than colorblind messages focusing on similarities (Pahlke et al., 2012). However, on our open-ended measure many parents (42%) reported not talking to their children about race. Of those who did, many (55%) of the messages could not be categorized as discussing either similarities or differences; thus, we had low power for detecting relationships between parent messages and children's racial cognitions. Future research could use these qualitative data to inform the development of a close-ended measure asking parents to endorse the extent to which they discuss these ideas with their children. Certainly, further research is needed to explore these and other equally plausible sources of the racial pain bias in childhood, and the developmental path by which pain and economic hardship become connected by adulthood.

Notably, both of these biases are unlikely to be driven entirely by ingroup preference. First, as discussed in more depth below, children's association between Blacks and economic hardship was apparent even in the more conservative individual task that dissociates ingroup favoritism and outgroup derogation. That is, although overall children tended to assign high-value items to both targets when possible, even on the individual task, in which children could choose high-value objects for both targets, children assigned more low-value items to Black targets than White targets. Second, if ingroup favoritism was driving the racial bias in pain perception, we would expect to see the strongest bias in the youngest children and a decreasing bias across middle childhood, in line with findings that explicit biases decline across this period (Dunham et al., 2008). However, we observe the opposite effect. Similarly, if the bias was an artifact of perspective-taking abilities, one would expect that the youngest children, who lack perspective-taking skills relative to older children (Apperly, Warren, Andrews, Grant, & Todd, 2011; Devine & Hughes, 2013; O'Hare, Bremner, Nash, Happé, & Pettigrew, 2009), would show the bias more strongly, and as children's skills improve, the

bias would decline. In fact, we report the opposite pattern, again suggesting that this bias exists independently from other racial attitudes and cognitive abilities.

The results of this study also shed light on children's understanding of racial group differences, and suggest that even privileged White American children are keenly aware of racial differences in economic hardship. These findings replicate and extend previous research by Shutts et al. (2016) by showing that even when using a task that allows children to have independent responses for Black and White targets, children as young as 5 associate Blacks with greater economic hardship than Whites. As noted previously, this is important because the task used in previous research was essentially a forced-choice measure, rendering choices dependent. However, the association between Blacks and economic hardship in the current study emerged even in a conservative task in which children could assign high-value objects to both targets, indicating that the association is not simply a byproduct of an ingroup bias in which children associate their own racial group with wealth. More broadly, this finding is striking, because although White parents highlight race for their children less than do parents of other ethnicities and backgrounds (Hughes et al., 2006), upper middle class White American children still appear to recognize these racial differences in hardship at an early age. Notably, we focused on one specific component of hardship and status: economic hardship. Future research should investigate to what extent children conceptualize economic hardship as part of a broader historical inequality between groups and when in development they begin to recognize racial group differences in other aspects of status.

The fact that children link Blacks and economic hardship, in and of itself, may be consequential, even though it does not predict racial bias in pain perception in childhood. The presence of this association in early childhood is especially important to consider in light of past research suggesting that recognition of status differences may be related to children's intergroup attitudes (Bigler et al., 2001; Dunham, Baron, & Banaji, 2007; Newheiser et al.,

2014; cf Qian et al., 2015). Specifically, children's perceptions of racial group differences in status and wealth may contribute to intergroup attitudes in which children implicitly favor high-status groups, regardless of their own group's status. Furthermore, research is conflicting on the question of whether children tend to perpetuate social group inequalities (sharing more resources with individuals who started out with more than with those who originally had less; Olson, Dweck, Spelke, & Banaji, 2011), or rectify social group inequalities (sharing more resources with groups who started out with less than those who originally had more; Elenbaas & Killen, 2016; Elenbaas, Rizzo, Cooley, & Killen, 2016). Future research in this area should examine the relationship between children's awareness of racial group differences in economic hardship and their resource allocation decisions.

These present findings also make an important practical contribution. The fact that perceptions of economic hardship did not mediate racial bias in perceptions of others' pain suggests that, unlike adults, this bias may be about race per se in childhood. As such, it suggests that interventions may need to focus on race and the understanding that people of different races feel pain all the same. The present findings thus contribute to important debates around the role of schools and educational interventions in teaching children about both historical and current racism and race-based inequalities. Research suggests that learning about historical racism in an educational context can provide important benefits in the form of lower levels of bias and improved intergroup relations (Bigler & Wright, 2014; Hughes, Bigler, & Levy, 2007). Future research should investigate the effect of linking children's existing perceptions to information about historical and systemic racism.

One important limitation of the current study is that children's perceptions of only two racial groups were tested: Whites, an ingroup for the majority of the sample, and Blacks, an outgroup for the majority of the sample. Both the racial bias in pain perception and its relationship with children's perceptions of racial group differences in economic hardship may

differ in samples of children with more diverse backgrounds. For example, future research should explore these questions with samples of Black children, children from low-income families, and even White children who live in more diverse communities and have more regular contact with outgroups than the homogeneous sample in the current study. As discussed above, the salience of race and of differences in wealth in children's everyday lives might predict age of emergence and strength of association between racial groups and economic hardship. For example, these differences may be even more salient to children in countries like South Africa where there are extreme wealth and status hierarchies related to race, as well as Black children in the U.S., for whom the disparities in this country may be pervasive in their living situations and educational opportunities. These differences may also be more salient in countries dealing with interethnic issues (e.g., in Germany and Sweden, two countries getting large numbers of asylum requests from Syrian refugees, or in Germany and France, where immigrants are more than 10% of the population and where immigrants are blamed by a majority of French as the cause of increased unemployment and crime). We would predict that, in these contexts, children would also recognize the link between race or ethnicity and economic hardship at an early age. And, perhaps, in some of these contexts, children may also link hardship with toughness.

These limitations aside, the present work makes a number of important contributions. It replicates previous work, showing that, by age 7, children believe that Blacks feel less pain than do Whites and that, by age 5, children believe that Blacks experience greater economic hardship than do Whites. It extends beyond prior research in suggesting that the latter is not merely a matter of ingroup favoritism. Furthermore, it demonstrates that, in childhood, unlike in adulthood, these two biases are not related. This means that cultivating empathy by increasing children's recognition of Black people's pain and suffering is not going to be simple; it will not be a matter of explaining to children that hardship does not make one

stronger. More generally, this work demonstrates that racial bias—although seemingly stable across much of the lifespan—may have varied mechanisms across the lifespan. And like a mutating virus or a moving target, it may be all the more difficult to conquer.

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Accepted Article

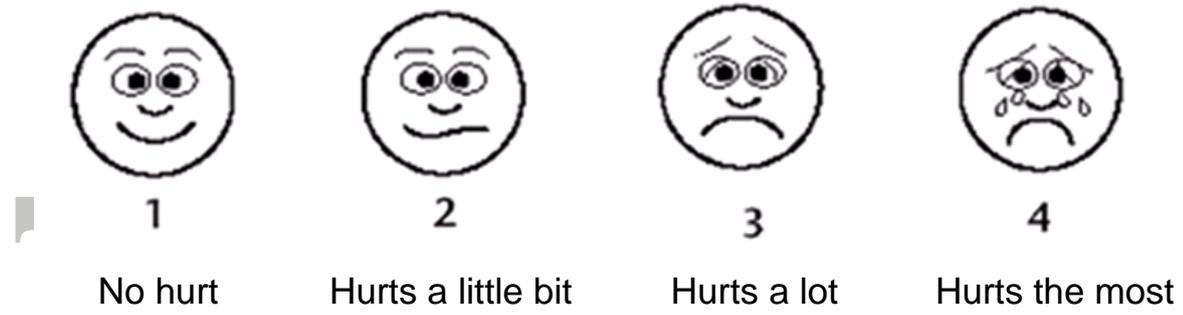


Figure 1. Adapted Wong-Baker FACES Pain Rating Scale.

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Figure 2. Examples of low- and high-value item pairs.

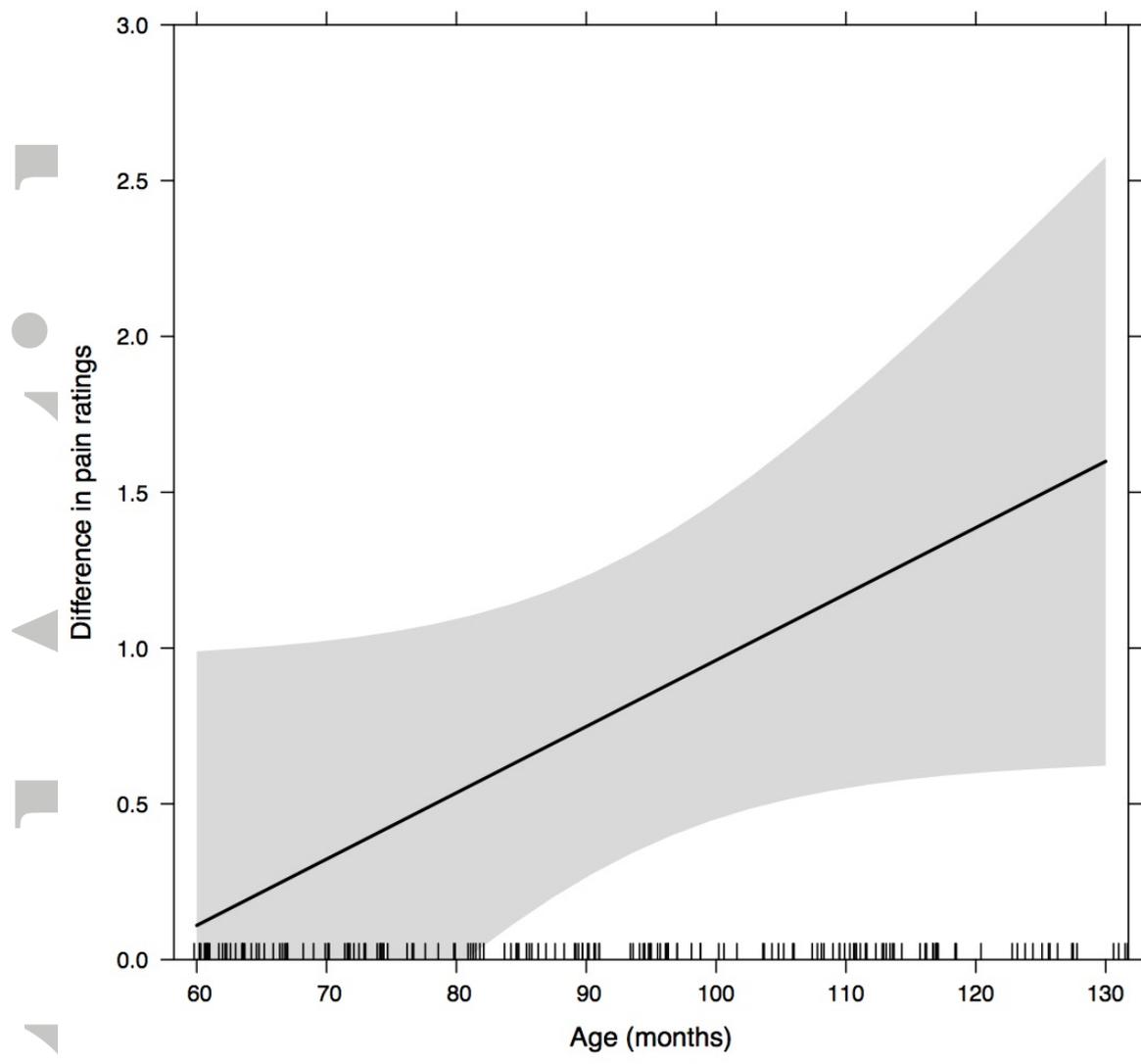


Figure 3. Difference in pain ratings (White target minus Black target) by age.

Accep

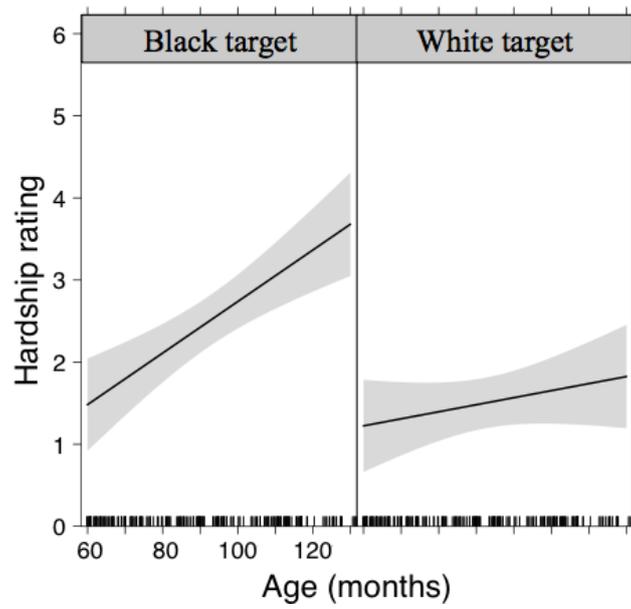


Figure 4. Hardship rating by race and age. Shading represents 95% confidence intervals.