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The nature and consequences of essentialist beliefs about race in early childhood

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Abstract

It is widely believed that race divides the world into biologically distinct kinds of people – an essentialist belief inconsistent with reality. Essentialist views of race have been described as early emerging, but the present study found that young children (n = 203, M_{age} = 5.45) hold only the more limited belief that the physical feature of skin color is inherited and stable. Overall, children rejected the causal essentialist view that behavioral and psychological characteristics are constrained by an inherited racial essence. Although average levels of children's causal essentialist beliefs about race were low, variation in these beliefs was related to children's own group membership, exposure to diversity, as well as children's own social attitudes.

Keywords: Racial essentialism, diversity, prejudice

Evidence from multiple scientific disciplines, including genetics (Nei & Roychoudhury, 1982), evolutionary biology (Lewontin, 1972), and anthropology (Hirschfeld, 1996), confirms that race is a socially constructed category. Nevertheless, people often think about race as if it is deterministically rooted in biology (Haslam, Rothschild, & Ernst, 2000; Jayartne et al., 2006). The beliefs that racial categories reflect real distinctions found in nature, and that race is an inherently meaningful part of identity, are widespread (e.g., Markus, 2008). These beliefs reflect psychological essentialism – a set of cognitive biases that lead people to view members of a category as sharing a deep, underlying essence that causes them to be fundamentally similar to one another in both obvious and non-obvious ways (Gelman, 2003; Medin & Ortony, 1989).

People around the world hold essentialist beliefs about a range of social categories (e.g., gender, ethnicity, caste), and in the United States, where there is a historical precedent of categorizing people according to skin color, essentialist beliefs about race are especially common. Among adults, such beliefs have serious consequences for intergroup relations: they are associated with racial stereotyping (Bastian & Haslam, 2006; Keller, 2005), prejudice (Allport, 1954; Haslam, Rothschild, & Ernst, 2002; Mandalaywala, Amodio, & Rhodes, 2017; Yzerbyt, Corneille, & Estrada, 2001), and the decreased desire for cross-race interaction (Williams & Eberhardt, 2008). Given these implications and efforts by scientists and policy makers to reduce them, research on the developmental origins of racial essentialism is crucial to better understand how and when essentialist beliefs about race might have pernicious outcomes. However, relatively little is known about the degree to which children view race in essentialist terms, or about the experiences that might lead them to do so, and whether essentialist beliefs about race have similarly pernicious consequences in children as they do in adults. The present research therefore examines three main questions: (1) to what extent do young children hold

63 essentialist views of race? (2) how do these beliefs develop? and (3) what are the implications of
64 such essentialist beliefs for the early development of racial attitudes?

65 **Measurement of essentialist beliefs in children**

66 Essentialist beliefs in early childhood are often tested with "switched-at-birth" tasks – a
67 task originally developed to test beliefs about animal species in young children (Gelman &
68 Wellman, 1991). In the animal version of this task, for example, a child might be told that an
69 animal born to parents from one category (e.g., pigs) has been raised by members of a different
70 category (e.g., cows) and asked to predict what the baby animal would be like when it grows up.
71 Test items include questions about what it will *look* like (i.e., will it possess the physical
72 properties of pigs or cows?), what it will *act* like (i.e., will it possess the behavioral properties of
73 pigs or cows?), and what *kind* of animal it will be (i.e., will it be a pig or cow?) (e.g., Atran et al.,
74 2001; Sousa, Atran, & Medin, 2002; Waxman, Medin, & Ross, 2007). These tasks provide a
75 strong test of essentialism, assessing the extent to which individuals believe that category
76 members share an inherited and *causally powerful* essence that determines their physical and
77 behavioral properties. These studies have shown that by age 4-5, children hold causal essentialist
78 views for animal species (e.g., Waxman et al., 2007), as well as for human gender (e.g., Taylor,
79 Rhodes, & Gelman, 2009).

80 In the first major developmental investigation of essentialist representations of race,
81 Hirschfeld (1995) adapted the switched-at-birth task to examine children's beliefs about the
82 extent to which race is inherited or determined by the environment. This adapted task differed in
83 one crucial way from the switched-at-birth tasks for animals described above, however, in that it
84 only asked about physical properties (e.g., heritability and stability of skin color). In Hirschfeld's
85 (1995) task, children were told a story about a baby who is born to parents of one race (shown in

an image to be Black), but directly after birth is adopted and subsequently raised by parents of a different race (shown in an image to be White, or vice versa). Children were then asked to think about this baby when it's grown up, specifically, what it will *look* like (i.e., will it possess the skin color of the birth or adoptive mother?). By age four, children reliably chose the image with skin color that matched that of the birth parents, which has been broadly interpreted as indicating that young children have causal essentialist views of race. Further, the early emergence of racial essentialist beliefs – as revealed by this task – has been taken to support the broader theoretical claim that intuitive conceptual biases make the human mind particularly likely to essentialize race, and therefore that such beliefs take relatively limited cultural input to develop (Astuti, Solomon, & Carey, 2004; Atran, 1998; Gil-White, 2001; Hirschfeld, 1996). From this perspective, we might predict that essentialist beliefs about race emerge early in childhood and to a similar extent across diverse contexts.

However, because the test items in previous work asked only about skin color, this work indicates only that young children view skin color as heritable and stable – there were no measures of whether children viewed race in causally powerful terms (e.g., that members of a racial category share an inherited and causally powerful essence that also determines what a person will *be like*) or whether race represents coherent and meaningful categories of people. In this way, the type of belief about race examined previously in young children is much more limited in scope than the essentialist beliefs that children have been found to hold about animal categories (Gelman & Wellman, 1991; Waxman et al., 2007) or human gender categories (Taylor, 1996; Taylor et al., 2009). Moreover, the types of essentialist beliefs about race that have been linked to stereotyping and prejudice in adult populations are characterized as beliefs about the causality, naturalness, and inductive potential of race, not as beliefs only about the

heritability of skin color (Jayartne et al., 2006; Mandalaywala et al., 2017; Williams & Eberhardt, 2008). Indeed, the belief that a child will possess the skin color of its birth parent might not reflect an essentialist view of racial categories at all, but rather a more general belief about inheritance (e.g., a belief that babies resemble their biological parents with respect to some physical properties; Springer, 1996). Indeed, Rhodes (2013) found that children reason about skin color on these scenarios in a manner very similar to how they reason about hair color, eye color, or other physical properties – that is, they expect these properties to be inherited and stable, but do not view them as informative regarding other properties of people and do not attribute particular social significance to them.

In contrast to the view that essentialist beliefs about race are widespread, several studies using other measures have revealed a more protracted and variable developmental trajectory of racial essentialism. For example, tasks assessing the belief that race marks an objectively meaningful way of categorizing people reveal that this type of belief emerges later in childhood, between 7 and 10 years of age, and more so in some cultural communities (Rhodes & Gelman, 2009; see also Diesendruck & Haber, 2009; Diesendruck, Goldfein-Elbaz, Rhodes, Gelman, & Neumark, 2013). Further, preschool-age children have been found not to use race to make inductive inferences about what individuals will be like, unless race is highlighted within the experiment itself (e.g., with verbal category labels; Waxman, 2010; for related evidence that children make inferences based on ethnic categories when they are highlighted by labels, see Diesendruck & haLevi, 2006). Even on measures focusing on beliefs about the physical features associated with race, which test if children expect skin color to be stable over time, younger children (ages 5-6) appear less certain that skin color will remain constant when it is pitted against other individual characteristics, such as language (Kinzler & Dautel, 2012) or emotional

expression (Roberts & Gelman, 2016). Also, when children are asked to explain judgments of why skin color would remain stable over time, younger children often do not express essentialist reasoning to support their judgments (Gaither, Schultz, Pauker, Sommers, Maddox, & Ambady, 2013; Pauker, Ambady, & Apfelbaum, 2010; Pauker, Xu, Williams, & Biddle, 2016).

The development of racial essentialism

The protracted developmental trajectory of children's essentialist beliefs about race, and even the lengthy development of beliefs about racial stability, are consistent with the proposal that it takes rather extensive developmental experiences for children to apply their basic essentialist intuitions to particular ways of grouping people (Deeb, Segall, Birnbaum, Ben-Eliyahu, & Diesendruck, 2011; Diesendruck & Haber, 2009; Rhodes, Leslie, & Tworek, 2012; Rhodes, Leslie, Bianchi, & Chalik, 2017; Rhodes & Mandalaywala, 2017; Segall, Birnbaum, Deeb, & Diesendruck, 2015; Smyth, Feeney, Cole Eidson, & Coley, 2017; Waxman, 2010). Also consistent with this proposal, the developmental trajectory of children's beliefs about race show marked individual and cultural variability. For example, Black children often develop beliefs that race is a stable feature of identity at an earlier age than White children in the United States (e.g., Kinzler & Dautel, 2012; Roberts & Gelman, 2016), and children growing up in more racially homogenous cities exhibit stronger racial stability beliefs than their counterparts in more diverse cities (e.g., Pauker et al., 2016). The belief that race demarcates a meaningful way of categorizing people emerges in some cultural contexts (e.g., the United States), but not others (e.g., Israel; Diesendruck et al., 2013), and even within the United States, emerges more strongly in communities that are more racially and ethnically homogeneous (Rhodes & Gelman, 2009). This kind of variation has been found for other social categories as well; for example, children who are exposed to more social diversity because they attend purposefully integrated schools

155 develop fewer essentialist beliefs about religious (Smyth et al., 2017) and ethnic (Deeb et al.,
156 2011) differences in communities where those distinctions have particular cultural significance.
157 Further, among individual children, essentialism about specific social categories varies in
158 relation to parental beliefs and attitudes (Rhodes & Gelman, 2009; Diesendruck et al., 2015), and
159 parental transmission of essentialist beliefs is thought to occur through subtle linguistic means
160 (e.g., through verbal marking of category members: Gelman, Taylor, & Nguyen, 2004; Rhodes et
161 al., 2012; Segall et al., 2015). Overall, these studies suggest that beliefs about specific social
162 groupings – including race – develop in response to the local environment and after protracted
163 experience.

164 However, whether beliefs about both the heritability of skin color as well as stronger
165 causal essentialist beliefs about race require similar experiences to develop, and even whether
166 they develop along similar timelines, is currently unknown. Despite the rich literature on the
167 development of different types of beliefs about race, none of the previous studies have directly
168 compared children's beliefs about the heritability of skin color to the belief that race reflects an
169 intrinsic, causally-powerful essence within the switched-at-birth paradigm (as has been done in
170 studies of essentialist beliefs about biological and gender categories: e.g., Taylor et al., 2009;
171 Waxman et al., 2007; but see Diesendruck & Haber, 2009 and Diesendruck & haLevi, 2006 for
172 studies that have compared multiple aspects of essentialist thinking in other paradigms). Because
173 of this, it is unclear whether both types of beliefs about race depend on similar cultural input to
174 develop, as well as whether they develop along similar developmental trajectories.

175 **The implications of racial essentialism for racial attitudes**

176 Clarifying how experience shapes causal essentialist beliefs about race (beyond beliefs
177 about the heritability of skin color) is particularly important because it is these causal essentialist

beliefs – that race marks meaningful categories that are determined by intrinsic, causally powerful essences – that has been proposed to contribute to stereotyping and prejudice (Allport, 1954; Haslam et al., 2002; Yzerbyt et al., 2001). Indeed, the belief that race is an informative, coherent, and natural category relates to racial prejudice among both White (Jayaratne et al., 2006; Martin & Parker, 1995; Williams & Eberhardt, 2008) and Black (Mandalaywala et al., 2017) adults. Whether essentialism contributes to racial attitudes just as prejudice begins to emerge in early childhood (Clark & Clark, 1947; Raabe & Beelman, 2011), and how the implications of essentialism for racial attitudes might vary for children from racial minority or majority groups, have never been examined (but see Pauker et al., 2010, 2016; for evidence relating beliefs about racial stability to racial stereotyping). Thus, in the present research, we test whether beliefs about the heritability of skin color and the belief that race is tied to a causally powerful essence contribute to the early development of racial attitudes.

The present research

The first goal of this research was to examine the extent to which young children hold essentialist views of race, focusing on the strong case of causal essentialism where people expect that skin color is tied to a causally powerful essence that determines what a person will be like, in comparison with children's belief that skin color is heritable. Given that children's own experiences as members of particular groups are important factors in the developmental trajectories of both types of beliefs (e.g., Diesendruck et al., 2013; Kinzler & Dautel, 2012; Rhodes & Gelman, 2009; Roberts & Gelman, 2016), we recruited a relatively large sample of both White and Black children. To test the extent to which the development of beliefs about the heritability of race and the belief that race is tied to a causally powerful essence vary across experience, we also gathered data on parental essentialist beliefs (Deeb et al., 2011; Rhodes et

al., 2012; Rhodes & Gelman, 2009; Segall et al., 2015) and on the demographic diversity of children's neighborhoods (Pauker et al., 2016; Rhodes & Gelman, 2009; Roberts & Gelman, 2015). As children as young as 4-years-old reliably view skin color as heritable (Hirschfeld, 1995; Rhodes, 2013), but the view that race demarcates a meaningful way of grouping people develops later and with substantial cultural variation (Rhodes & Gelman, 2009; Diesendruck et al., 2013), we predicted that children's causal essentialist views of race might vary more than their skin color judgments in relation to neighborhood diversity and parental beliefs.

In order to compare children's causal essentialist beliefs about race to their beliefs about the heritability and stability of skin color, we made two modifications to the switched-at-birth task used by Hirschfeld (1995). First, in addition to asking children to predict the skin color of the grown-up adopted child (i.e., what it would *look like*), we also asked them to make predictions about whether the child's psychological and behavioral characteristics (i.e., what it would *be like*) would be determined by the birth parent or adoptive parent. Second, we compared responses to scenarios where the birth and adoptive mother were of different races to those where the birth and adoptive mothers were of the same race (for a similar approach used for gender, see Taylor, 1996). This allowed us to examine the extent to which responses to these questions about behavioral and psychological properties were due to the belief that race is tied to a causally powerful essence (when the races of the birth and adoptive mother were different), and when they were due to more general beliefs about the heritability of these characteristics (when the races of the birth and adoptive mother were the same).

The second goal of this research was to examine the implications of beliefs about both the heritability and causal essence of race for racial attitudes in early childhood, and particularly the extent to which such implications might vary depending on children's own experiences as

members of certain groups. To test these relations in early childhood, as negative racial attitudes begin to emerge (e.g., Clark & Clark, 1947; Raabe & Beelman, 2011; Shutts, 2015), children ages 5-6 years old were included in this study. We compare the responses of children in this age group to those of adults, for whom the effects of essentialism on prejudice have been previously examined (e.g., Jayaratne et al., 2016; Mandalaywala et al., 2017; Williams & Eberhardt, 2008). By focusing on young children, we can clarify precisely which types of beliefs contribute to the formation of racial attitudes. Although overall levels of the belief that race is tied to a causally powerful essence, and perhaps even beliefs about the heritability of skin color, might be quite low among children in this age range, we can test whether variation in these beliefs already explains variation in the development of children's racial attitudes. This will allow us to determine whether these types of beliefs have implications for intergroup phenomena as soon as each emerges, or whether they begin to shape racial attitudes and interactions only later as children accumulate more experiences and stereotypes (in which case we might expect them to have implications for attitudes among adults, but not among young children who are just developing these beliefs). Moreover, by examining how racial attitudes relate to participants' responses both when the race of the birth and adoptive mother were different (a measure of causal racial essentialism), as well as when the race of the mothers were the same (a measure of more general behavioral heritability), we can assess whether these two types of beliefs are differently affected by environmental input, as well as whether they differentially predict racial attitudes.

Method

Participants

Participants were Black (M = 5.49 years, SD = .50, 53% male, n = 81) and White (M = 5.41 years, SD = .49, 44% male, n = 122) children (age range = 5.00 – 6.99; n = 203), as well as

Black (*M* = 33.6 years, *SD* = 12.0, 37% male, *n* = 137) and White (*M* = 39.6 years, *SD* = 13.4, 39% male, *n* = 293) adults (age range = 18 – 71; *n* = 430). Preliminary analyses revealed no effects of child age (in months) on essentialist beliefs about race across this sample; therefore, children were considered as a single group for the main analyses. Child race was determined by parental report, and adult race was determined by self-report. Child participants were recruited from and tested at the Children's Museum of Manhattan (CMOM) – a private, not-for-profit museum located in a large (pop. ~ 8.5 million) city – in a single research session (approximately 20 minutes long) conducted between January 2015 and March 2016. Written parental consent was obtained for all participants and children provided oral assent. Adult participants were recruited via Amazon's Mechanical Turk (AMT); adult participants were required to live in the United Statues (based upon IP address) and provided written consent. For a subset of the child participants, data were collected from one parent as well (*n* = 66, 76% mothers). Data were collected from only a subset of all participants as parents sometimes had other responsibilities (e.g., watching other children) that precluded them from participating in the parent part of the study. Data from parents were considered separately from those of the adult participant sample (i.e., they were not included in analyses designed to test effects of age). All study procedures were approved by the university's Institutional Review Board.

Procedures for children

The full study protocol with scripts and images is available at Open Science Framework (OSF; DOI: https://osf.io/92pxv/).

Beliefs about heritability of properties. Participants were told two stories in which a baby was born to one mother (shown in an image) but adopted and raised by another (also shown in an image). In one story, the birth mother and adoptive mother were the same race (e.g., both White or

both Black: same race scenario) and in the other they were of different races (e.g., one was White and the other was Black: different race scenario); the order of these stories was counter-balanced across participants, as was the race of the birth mother. Preliminary analyses revealed no effects of counter-balancing order, so this feature of the design was not considered further. Participants were then asked a series of questions about what the adopted child would both *look like* and what it would *be like*, as the child grew older. Because the use of category labels can lead children to use categories within experimental tasks when they would not otherwise do so (Dunham, Baron, & Carey, 2011; Roberts & Gelman, 2017; Waxman, 2010), children were not provided with racial labels at any point in the procedure. This approach permitted us to examine children's spontaneous use of racial categories.

Behavioral properties. First, participants were told about four characteristics of the child (e.g., "This baby is now 6 years old. This baby is now very smart"), one at a time. Other test properties included the child now being *very nice, good at music*, and *good at sports*). Although these traits are sometimes associated with racial stereotypes, we did not find that the race of the birth mother systematically affected children's or adult's likelihood of viewing traits as heritable. Also, participants generally responded in a similar manner across the four types of properties, with one exception (described in the Supplemental Online Materials). For each property, participants were asked whether the trait was due to the birth mother (scored "1") or adoptive mother (scored "0"; e.g., "Is that because of this mom (*pointing to birth mother*) or this mom (*pointing to adoptive mother*)?).

Skin color. After completing items regarding behavioral characteristics, participants were shown two images of children, one White and one Black, and asked to choose the image depicting how the baby looked like when it grew up. Although children were asked this question in both scenarios (i.e., same race and different race scenarios), only responses in the different race scenario

were analyzed for this measure. Choosing the child that matched the birth mother in skin color was scored "1" and choosing the child that matched the adoptive mother was scored "0."

Racial attitudes. Participants were shown images of six children, each between the ages of 3 and 7 years old, displaying neutral expressions (3 White and 3 Black, taken from the CAFÉ dataset: LoBue, 2014; LoBue & Thrasher, 2015), one at a time and in randomized order. Child stimuli were gender-matched to the participant. For each image, participants were asked, "Do you like this kid, or do you not like this kid?" followed by, "How much do you like/not like this kid? Do you sort of like/not like them, like/not like them, or really like/not like them?" (scored such that 1 = really dislike, 6 = really like). Each participant then received an average score for the warmth of their feelings towards all three White children and all three Black children separately. We examined feelings toward White and Black targets separately to determine whether racial essentialism was related to ingroup feelings or outgroup feelings for children from each group.

Additional measures. In addition to the tasks described here, children also completed an Implicit Association Test and a self-categorization test. For details of these procedures and a description of why they are not analyzed for this paper, see the Supplemental Online Materials.

Outgroup exposure. We measured the extent of outgroup exposure for White and Black child participants in each child's current residential neighborhood. These analyses included a subset of the child participants (n = 97). Parents provided their child's current residential zip code, from which we determined the number of inhabitants in each child's total neighborhood population that identified as White or as Black/African-American, based upon publicly available census information (2010 census). In this way, we estimated outgroup exposure for each child (i.e., for a White child, the

315 percentage of their total zip code population that identified as Black/African-American, and for a
316 Black child, the percentage of their total zip code population that identified as White).

317 **Procedures for adults**

318 We collected data from parents of a subset of participating children (n = 66, 76% mothers),
319 and from separate samples recruited and tested online via Amazon's Mechanical Turk (n = 430, 62%
320 female). Procedures for adults were very similar to procedures for children, but modified in some
321 cases to be more appropriate to adult participants and for online administration. Although there are a
322 variety of scale measures used to assess essentialist beliefs about race in adults (see Haslam et al.,
323 2002; Mandalaywala et al., 2017; Williams & Eberhardt, 2008), we elected to administer the same
324 switched-at-birth task to adults and children as essentialism is a multifaceted construct and different
325 measures are likely to tap into different components of essentialist beliefs. By using the same
326 essentialism measure across both age groups, we maximized our chances of assessing comparable
327 components of essentialism in children and adults, and then examining how these particular
328 components of essentialist beliefs relate to social phenomena, such as racial attitudes. We did not
329 collect data from adults on their beliefs about the heritability of skin color, nor did we ask for their
330 current residential zip code; therefore adult data are not included in those particular analyses. The
331 adult protocol is available at OSF (DOI: https://osf.io/92pxv/).

332 **Results**

333 To examine children's beliefs about whether properties were determined by the birth or
334 adoptive mother we implemented quasibinomial generalized linear models in R, except where
335 noted below. This approach was appropriate because children gave binary responses (0 adoptive
336 mother; 1 birth mother) and were recruited from a convenience (not random) sample (Wilson &
337 Lorenz, 2015). To compare responses to chance, we examined intercept-only models

implemented in this manner. When analyses required examining a within-subjects factor, we instead implemented Generalized Estimating Equations with a binomial distribution. For all of these analyses, we report Odds Ratios (OR) as indicators of effect size. All of our data and analytic code are available at OSF (DOI: https://osf.io/92pxv/).

Beliefs about heritability of properties

Skin color. Overall, children predicted the character would share the skin color of the birth mother 62% of the time. The odds of giving a birth mother response on the skin color question were 1.60 (*CI* = 1.21, 2.14) times as high as expected by chance, $p = 001$. We next examined participant race and birth mother race (and their interaction) as possible predictors of children's beliefs about the heritability of skin color. The model was only a marginal improvement over the null model, Likelihood Ratio Chi Square $\chi^2(3) = 7.35$, $p = .06$. Nevertheless, this model identified birth mother race as a significant predictor, $\beta = .83$, $SE = .38$ $t = 2.15$, $p = .033$; Wald $\chi^2(1) = 7.32$, $p = .007$. The odds of predicting that skin color was determined by birth were 2.29 (*CI* = 1.08, 4.93) times as high when children were shown White than Black birth mothers. There were no main or interactive effects of participant race in this model, and as shown in Figure 1 the patterns were very similar for Black and White children. To account for the effect of birth mother race, whenever heritability of skin color was included in subsequent models, birth mother race was also included as a predictor.

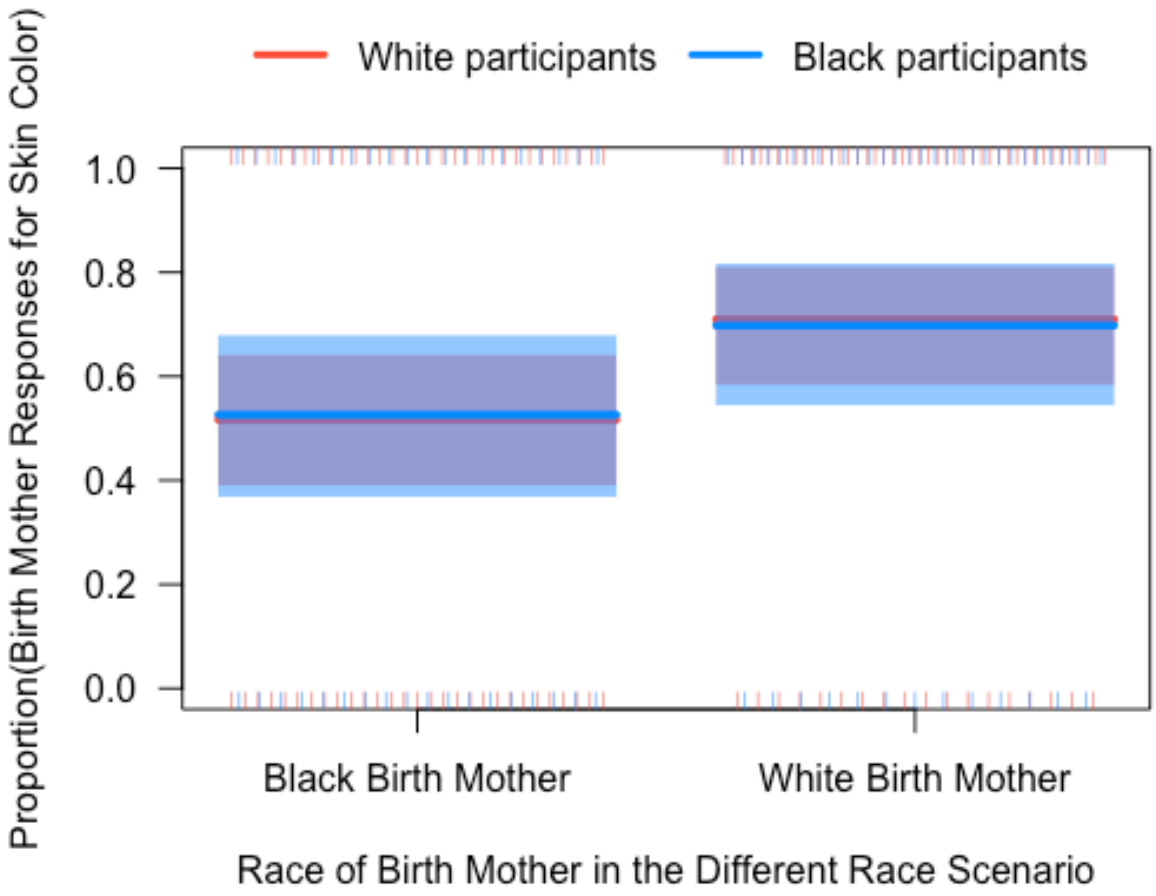


Figure 1. Proportion of birth mother responses on skin color questions as a function of birth mother race, for Black and White child participants. Shaded areas show 95% confidence bands around the means; thin dashes represent individual participants.

In contrast to the overall findings for skin color, in the *different race* scenarios, children responded that the character would share behavioral properties with the birth mother only 31% of the time; the odds of children making birth mother responses for questions about behavioral properties 0.44 (*CI* = .37, .53) times as high as expected by chance, $p < .001$. To directly compare responses to questions about skin color and behavioral properties, we next ran a Generalized Estimating Equations (GEE) binomial model predicting birth mother responses from question-type (skin color vs. behavioral), birth mother race, and the interaction. In this model, the odds of children giving birth mother responses were 2.85 (*CI* = 1.73, 4.70) times as high

when they were asked about skin color than a behavioral property, $\beta = 1.05$, $SE = .26$, Wald $\chi^2(1) = 16.96$, $p < .001$. There were no main or interactive effects of birth mother race in this model, indicating that children distinguished between physical and behavioral properties, regardless of whether the birth mother was White or Black. Subsequent analyses confirmed that there was no effect of birth mother race on predictions about behavioral properties, therefore, this factor was not considered further in subsequent models focusing on those properties.

Behavioral properties. We next examined the effects of age and participant race on birth mother responses on questions about behavioral properties (collapsed across same and different race scenarios, to start). This model was a significant improvement over the null model, Wald $\chi^2(3) = 72.60$, $p < .001$. The odds of giving a birth mother response to questions about behavioral properties were 1.45 ($CI = 1.13, 1.87$) times as high for Black participants as for White participants, $\beta = .37$, $SE = .13$, $t = 2.76$, $p = .006$, Wald $\chi^2(1) = 7.1$, $p = .03$, and 1.82 ($CI = 1.49, 2.23$) as high for adults as for children, $\beta = .60$, $SE = .10$, $t = 5.87$, $p < .001$, Wald $\chi^2(1) = 62.20$, $p < .001$. There was no interaction between participant race and age (see Figure 2).

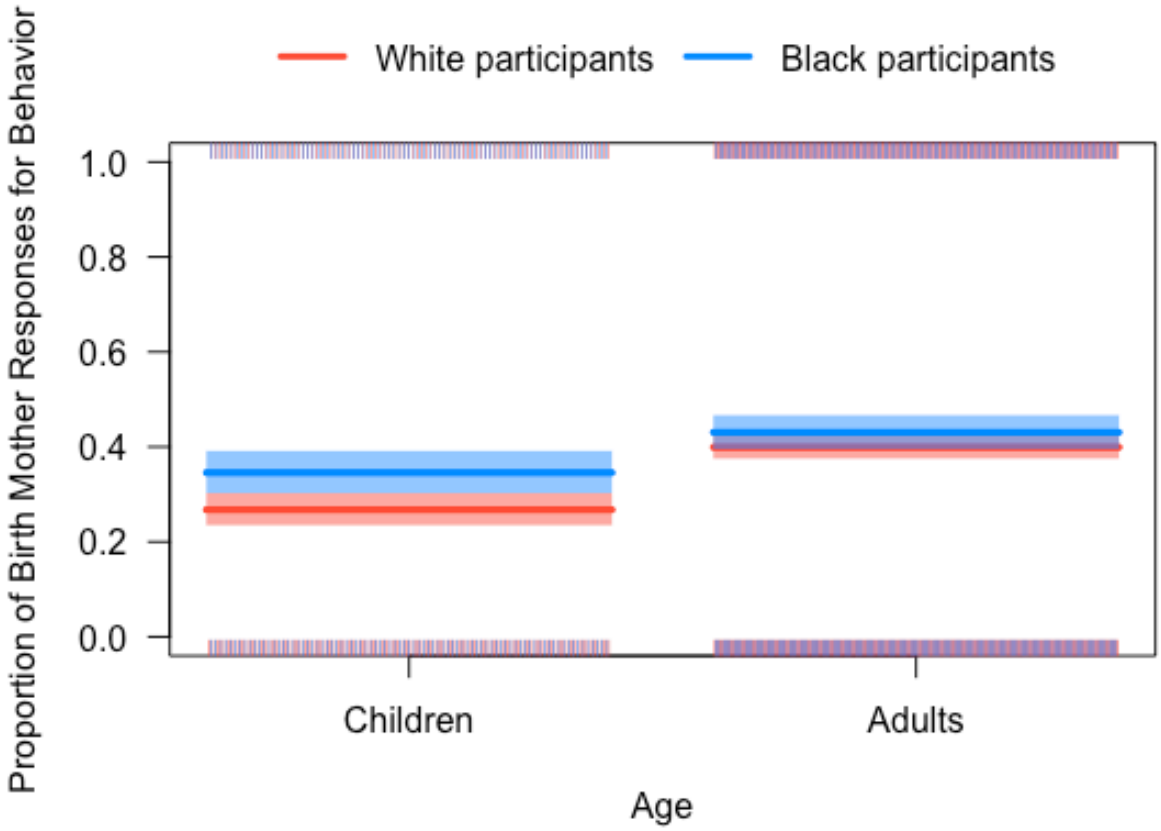


Figure 2. Proportion of birth mother responses on behavioral questions for participants as a function of participant race and age. Shaded areas show 95% confidence bands around the means, thin dashes indicate individual responses.

We next ran a GEE model to examine the within-subjects effect of scenario-type (same-race vs. different-race mothers) on participants' birth mother responses on behavioral questions (along with age, participant race, and also possible interactions). There was again a main effect of age as described above, $\beta = .63$, $SE = .15$, $p < .001$, Wald χ^2 (1) = 17.49, $p < .001$ such that adults were more likely to view behavioral properties as heritable than children. There was no longer a significant main effect of race, $p = .15$. There were no main or interactive effects of scenario-type (all ps > .10), indicating that average levels of birth mother responses were similar regardless of whether the mothers in the stories were the same or different races.

Role of experience on the development of beliefs

Although children responded similarly to situations where the birth and adoptive mothers were of the same or different races (as described above), we considered that different processes could give rise to beliefs about the heritability of behavioral properties in these two scenarios, and also that beliefs about heritability in these two scenarios could have different implications for racial attitudes. Thus, we considered responses to the same race and different race scenarios separately for the remainder of analyses.

Outgroup exposure. We examined the effects of outgroup exposure on children's birth mother responses to behavioral questions in the scenario where mothers were of different races (also including participant race in the model). Greater outgroup exposure was associated with reduced birth mother responses to behavioral questions, β = -1.05, SE = .53, t = -1.97, p = .051. Although on average Black children lived in neighborhoods with a higher proportion of outgroup members than White children did (Black participants: M = .46, CI = .38, .54; White participants: M = .21, CI = .15, .27), $t(90)$= 5.11, p < .001, D = 1.03), as shown in Figure 3, the relation of outgroup exposure to racial essentialism was very similar across participant race. In contrast to the findings shown in Figure 3, there were no main or interactive effects of outgroup exposure on participants' responses to behavioral questions in scenarios where the birth and adoptive mothers were the same race (ps > .05), or on their beliefs about the heritability of skin color (ps > .05), suggesting that outgroup exposure only affected the belief that race is tied to a causally powerful essence (as detected by the different race scenario-type questions), not to more general beliefs about heritability.

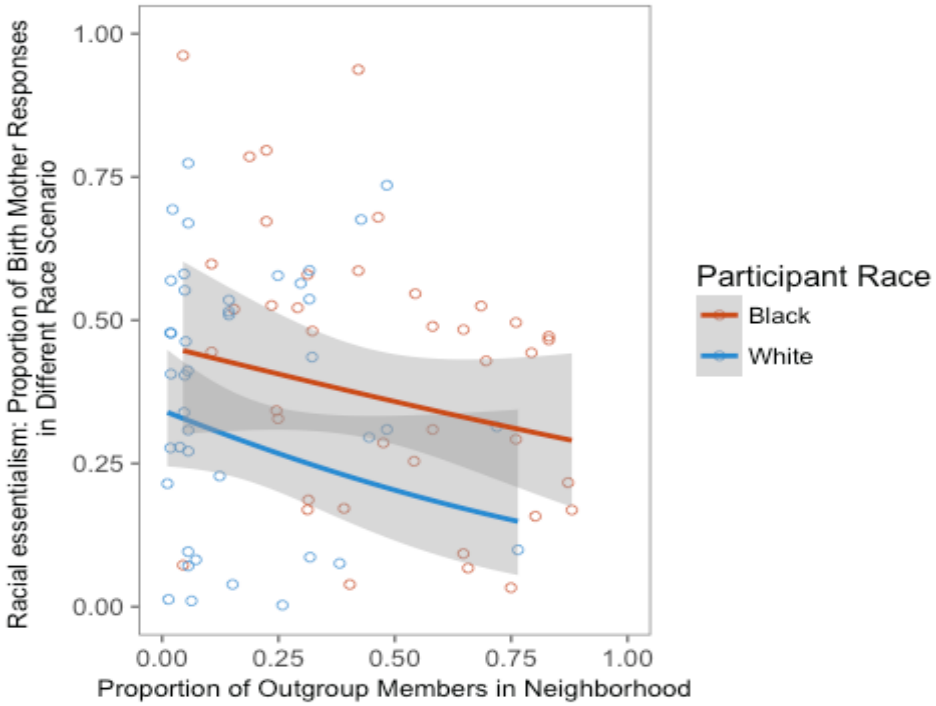


Figure 3. Lines of best fit from a quasibinomial generalized linear model predicting racial essentialism from participant race and the proportion of outgroup members in children's neighborhood. Shaded areas show 95% confidence bands around the regression lines; dots represent individual participants.

Parental beliefs. There were no significant associations between children's and parents' beliefs about the heritability of behavioral properties in the different race scenario, $p = .54$ ($n = 64$). Further models confirmed that parent responses on these measures did not predict child responses on these measures, either on their own, $p = .77$, or via interactive effects with participant race, $p = .99$. There were also no main or interactive effects of parental beliefs on participants' responses in the same race scenario, $ps > .05$. Thus, parent's beliefs did not appear to relate to children's belief that race is tied to a causal essence, nor to children's belief about the heritability of behavioral properties more generally. Among adults, parents' beliefs about the heritability of behavioral properties were significantly lower than the beliefs of adults on AMT across both scenario types (in the different race scenario, Parents: $M = .32$, $CI = .27, .38$; AMT: $M = .40$, $CI = .38, .43$, Wald $\chi^2(1) = 5.91$, $p = .015$; in the same race scenario, Parents: $M = .33$,

CI = .27, .39; AMT: *M* = .41, *CI* = .39, .44, Wald $\chi^2(1) = 6.86$, $p = .009$), which could reflect either differences in sampling or in testing procedures (i.e., completing the study anonymously online, or in person at CMOM).

Racial attitudes

We tested the extent to which participant race, age, and birth parent responses to behavioral questions in the different race scenario were associated with participants' feelings of warmth towards White and Black targets (z-scored values) in a linear regression model (child n = 83; adult n = 430). There were a number of main effects and interactions, which were all subsumed under a three way interaction among participant race, birth mother responses to behavioral questions (in the different-race scenarios), and age, $\beta = .46$, $SE = .21$, $t = 2.13$, $p = .03$ (Fig. 4). Among adults, the relation of birth mother response to attitudes did not vary by race, p = .83; as illustrated in Figure 4, more birth parent responses to behavioral questions were associated with less warmth towards Black targets among adults**,** β **=** -.10, SE = .05, t = -2.03, p = .04, and the pattern was very similar across Black and White participants. Among children, however, the relation of birth mother responses to prejudice varied by participant race**,** β = -.47, SE = .20, t = -2.32, p = .03. As shown in Figure 4, this interaction arose because the relation of birth mother responses to feelings of warmth towards Black targets was negative among Black children, $\beta = -.28$, $SE = .14$, $t = -1.96$ $p = .057$, as was found among White and Black adults, but positive among White children, $\beta = .19$, $SE = .14$, $t = 1.35$, $p = .18$ (although it is important to note that the slope for White children did not differ from 0). In contrast to the findings in Figure 4, birth mother responses to behavioral questions in the scenarios where the birth to adoptive mother were the same race did not predict feelings towards Blacks, $ps > .05$, suggesting that only the belief that race is tied to a causal essence is related to racial attitudes toward Blacks and

illustrating the value of separating a more general belief in the heritability of behavioral properties from the belief that race is tied to a causally powerful essence.

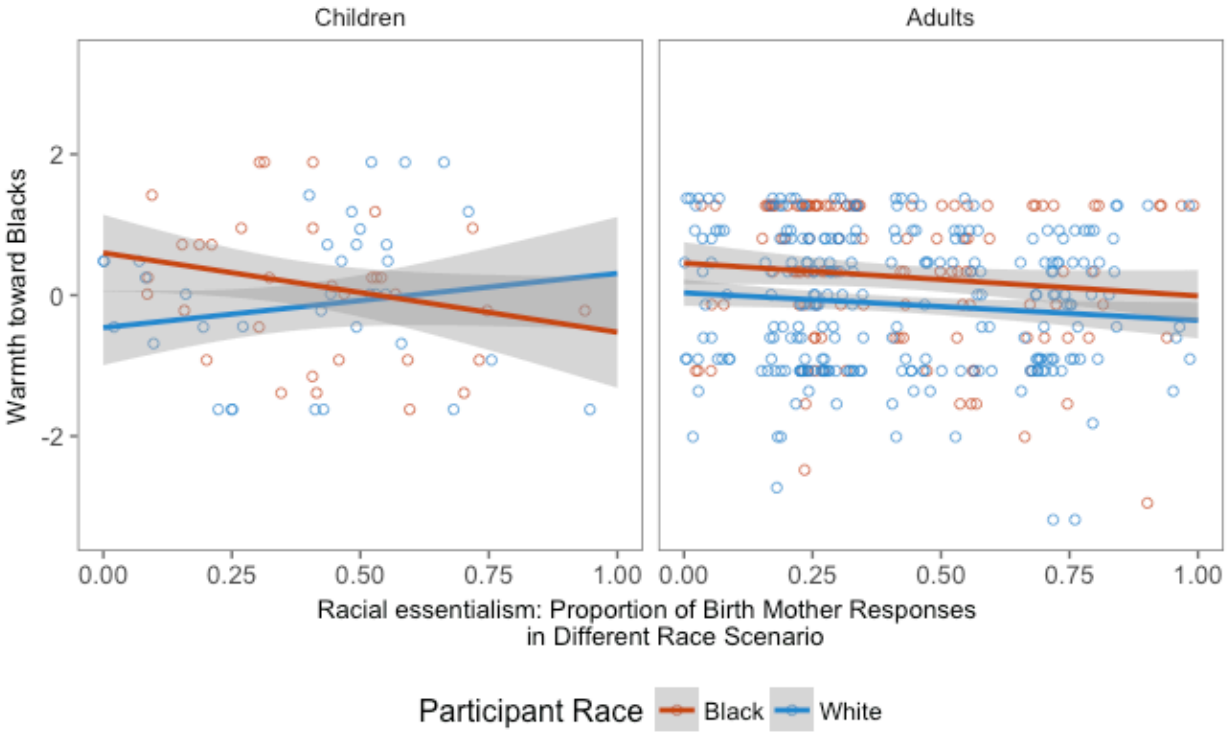
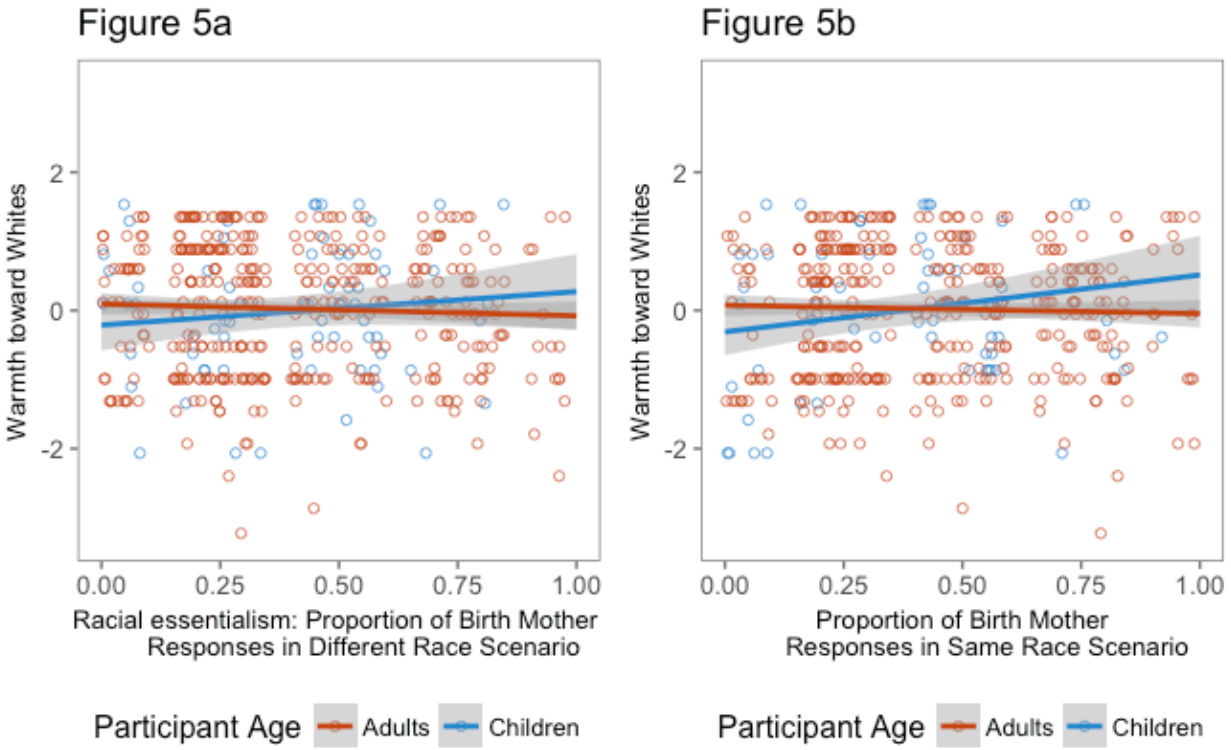


Figure 4. Regression lines from linear models predicting warmth toward Blacks from racial essentialism and participant race, separately by age. Shaded areas show 95% confidence bands around the regression line; dots represent individual participants.

We next examined feelings of warmth toward Whites in the same manner. This analysis revealed a significant interaction between birth mother responses for behavioral properties in the different race scenario and age, β = -.30, SE = .14, t = -2.11, p = .04 (although the inclusion of this parameter did not significantly reduce the deviance associated with the model compared to null, $F(2, 504) = 2.32$, p = .13). This interaction arose because the direction of the relation between birth mother responses and feelings towards Whites was positive among children, β =

476 .22, *SE* = .13, *t* = 1.63, *p* = .11 and negative among adults, *β* = -.08, *SE* = .05, *t* = -1.68, *p* = .09,
477 although neither slope differed from 0 (see Figure 5a).

478 There was also a significant interaction between birth mother responses to behavioral
479 questions and age on feelings toward Whites in scenarios where the birth and adoptive mothers
480 were the same race, *β* = -.38, *SE* = .15, *t* = -2.61, *p* = .009, *F*(1, 503) = 4.64, *p* = .03. Birth mother
481 responses for behavioral properties related to more positive attitudes among children, *β* = .36, *SE*
482 = .13, *t* = 2.72, *p* = .008, *F*(1, 77) = 4.49, *p* = .04, but did not relate among adults (see Figure 5b).
483 In other words, children's, but not adults', attitudes toward Whites were predicted by more
484 general beliefs in the heritability of behavioral properties.



485

486 Figure 5**.** Regression lines from linear models predicting warmth toward Whites from birth
487 mother responses in Different race (a) and Same race (b) scenarios. Shaded areas show 95%
488 confidence bands around the regression line; dots represent individual participants. Birth mother
489 responses related to more warmth toward Whites in children, but not adults.
490

Finally, we tested whether children's feelings of warmth toward Whites and Blacks was predicted by their beliefs about the heritability of skin color and participant race (adjusting for the race of the birth mother in the story, as noted above). For feelings towards Blacks, birth mother responses on the skin color question were associated with more warmth, $\beta = .77$, $SE = .32$, $t = 2.41$, $p = .02$. There was no interaction with participant race ($p = .15$), but as shown in Figure 6, White participants drove this effect. Among White children, birth mother responses were associated with more warmth toward Blacks, $\beta = .75$, $SE = .32$, $t = 2.35$, $p = .02$, whereas among Black children, there was no relation, $\beta = .11$, $SE = .34$, $t = .31$, $p = .76$.

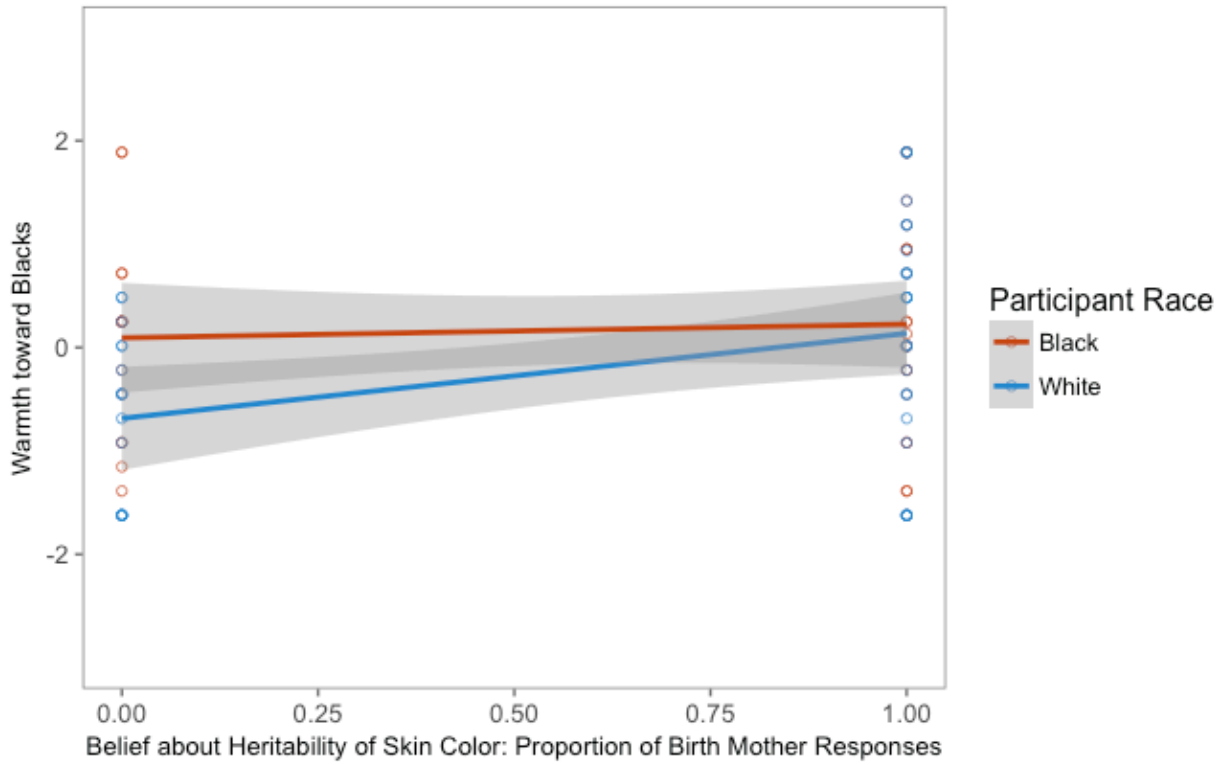


Figure 6. Regression lines from linear models predicting warmth toward Blacks from beliefs about the heritability of skin color. Shaded areas show 95% confidence bands around the regression line; dots represent individual participants. There was no participant race by birth mother response interaction; but the slope of the line is positive for White participants and did not differ from 0 among Black participants.

Discussion

The present research investigated the extent to which young children hold essentialist views of race and the implications of these beliefs for the early development of social attitudes. Our findings, based on a large sample of Black and White children in the United States, suggest that while young children view skin color as inherited, they do not hold strongly causal essentialist representations of race. On average, children expected what a person would be like (in terms of behavioral and psychological properties) to be determined by the environment of upbringing, not by inherited race. Thus, when strong causal essentialist beliefs about race do emerge (which seems to occur in some populations, e.g., Diesendruck et al., 2013; Rhodes & Gelman, 2009), these beliefs are the product of protracted developmental processes and require ample cultural input. The present data suggest that, by focusing on beliefs about heritability of skin color, previous studies (e.g., Hirschfeld, 1995) overestimated the extent to which young children hold essentialist views of race. In the present samples, adults also did not have strongly essentialist representations of race, although they generally viewed behavioral properties as more heritable than children did. Moreover, although low, the average levels of racial essentialism among adults in this sample were comparable to average levels found in previous work using other measures (e.g., Haslam et al., 2000; Mandalaywala et al., 2017; Williams & Eberhardt, 2008).

These findings suggest that the belief that race is tied to a causally powerful essence, an important component of racial essentialism, takes considerably longer to develop (when it does) than comparable beliefs about animal species (Waxman et al., 2007) or for human gender (Taylor et al., 2009) which emerge by ages 4-5 years old. The lengthy (relative to other categories) and culturally variable developmental trajectory of essentialist beliefs about race

(e.g., as found in Rhodes & Gelman, 2009; see also Kinzler & Dautel, 2012; Pauker et al., 2016) is consistent with the proposal that children require a fair amount of developmental and cultural experiences to apply their general essentialist intuitions to particular ways of grouping people (Deeb et al., 2011; Diesendruck & Haber, 2009; Rhodes et al., 2012; 2017; Segall et al., 2015; Smyth et al., 2017).

We also found that the essentialist belief that race is tied to a causally powerful essence varied by children's own experiences as members of particular groups (i.e., average levels were higher in Black children than White children) and neighborhood demographics. That is, increased outgroup exposure was associated with decreased likelihood of viewing race as tied to a causally powerful essence in children, regardless of their race (for similar findings see Deeb et al., 2011; Pauker et al., 2016; Rhodes & Gelman, 2009: Smyth et al., 2017). Notably, outgroup exposure predicted birth parent responses for the behavioral characteristics *only* in the scenario where the birth and adoptive mothers were of different races (the strongest and clearest indicator of racial essentialism). Outgroup exposure did not predict responses in the scenario when the mothers were of the same race (a measure of more general beliefs about heritability), or for responses regarding heritability of skin color.

This pattern suggests that outgroup exposure has implications particularly for the belief that race is tied to a causally powerful essence, but the potential mechanisms underlying this effect remain unclear. There are a number of possible explanations for why outgroup exposure is related to the strength of racial essentialism in children. Research on intergroup contact suggests that greater racial outgroup exposure could be a proxy for higher quality of cross-race relations (e.g., Tropp & Pettigrew, 2006; MacInnis & Page-Gould, 2015), which could facilitate more nuanced and individual – instead of group – oriented beliefs about people. It is important to note

that although increased outgroup exposure related to lower levels of essentialist beliefs in both Black and White children, it is possible that neighborhood demographics co-vary with other important demographic factors, such as socioeconomic status, in ways that differ for Black and White children (e.g., higher outgroup exposure for Black participants might signal proximity to gentrification and increasing SES). Thus, our findings here do not indicate whether the neighborhood feature that we measured relates to variation in essentialist beliefs via the same or different mechanisms for children from different backgrounds. For instance, as suggested in Pauker et al. (2016), it is possible that when diversity is experienced in the context of intergroup conflict – something that might not be experienced similarly by White and Black children – exposure to diversity might actually lead to greater essentialist beliefs. Future studies on the development of racial essentialism would benefit from collecting more nuanced and detailed data on the types and quality of social interaction children have, as well as more detailed data on children's environments themselves.

We found no relation between parents' and children's essentialist beliefs among either Black or White children, in contrast to Segall et al. (2015; on ethnic categories in Israel) and Gelman et al. (2004; on gender categories). There are several possible reasons why we did not find a relation here. In previous work, children's essentialist (or non-essentialist) beliefs about race begin to mirror those of adults in their communities only later in childhood (e.g., between ages 7-10, Rhodes & Gelman, 2009; for similar age-related changes in older childhood for other categories see Astuti et al., 2004; Diesendruck et al., 2013; Smyth et al., 2017). Thus, it is possible that relations between parent and child essentialist beliefs for race emerge at older ages than we studied here. Consistent with the possibility that older children are sensitive to their parents' beliefs about race, children ages 9-12 are less likely even to mention race when they

perceive their parents or teachers to be generally uncomfortable talking openly about race (Pauker, Apfelbaum, & Spitzer, 2015). Language that parents use to talk about or refer to race provides one possible mechanism by which parents could pass on their beliefs to children (see for example, Gelman et al., 2004; Gelman, Ware, & Kleinberg, 2010; Rhodes et al., 2012; Segall et al., 2015). Language used to discuss race, and the effects of language on children's beliefs, might both vary across racial majority and minority families. For example, explicit discussions of race increase with age among racial minority families in the United States (Hughes & Chen, 1997; Hughes et al., 2006), but remain rare in racial majority families (Vittrup, 2016). In future work, it would be useful to examine the relation between parent and child essentialism in older children, with a particular emphasis on mechanisms of transmission within families and how these might vary across families from different backgrounds.

It is also possible, however, that limitations in our sample size for our analysis of parental beliefs or the limited measures we had available from parents made it difficult to detect a relation between parents' and children's essentialist beliefs among children in this sample. In this sample, the only measure of essentialist beliefs that we had from parents was their responses to the switched-at-birth task. Although responses were not at floor – indicating that parents were willing to express some essentialist beliefs about race – it is possible that the task was somewhat transparent for adults and therefore was not a very sensitive measure of their beliefs. Indeed, among adults in this sample, levels of essentialist beliefs about race were relatively low for both parents and adults tested on AMT. Importantly though, it should be noted that levels of racial essentialism are often quite low in adults, even when assessed using measures designed for adults (e.g., Haslam et al., 2002; Mandalaywala et al., 2017; Williams & Eberhardt, 2008). Even if the present task (designed for children) underestimated adults' levels of essentialist beliefs

about race to some extent, it is important to note that variation in adults' responses still correlated with their racial attitudes. This is consistent with other studies that have found that even if switched-at-birth tasks underestimate mean levels of adults' essentialist beliefs, variation in adults' responses to these tasks track variation in adults' underlying beliefs (see Chalik, Leslie, & Rhodes, 2017, or Segall et al., 2014 for related evidence on this point, and Mandalaywala et al., 2017 for evidence on the relation between essentialism and racial attitudes in adults using additional measures).

Consistent with previous work showing that stability beliefs regarding race develop earlier in Black children than in White children (Kinzler & Dautel, 2012; Roberts & Gelman, 2016), we found that, on average, Black children in this study gave more birth parent responses for behavioral properties compared with White children (although the magnitude of this difference was small and responses were highly variable among children from both groups, as shown in Figure 2). Interestingly, they did so regardless of whether or not the adoptive mother was the same race as the birth mother, suggesting that average levels of beliefs about the heritability of traits in general may be slightly higher among young Black children. Neither of the two aspects of experience that we measured here can account for why Black children in our sample were more likely to view behavioral traits as heritable: parental beliefs did not correlate with child beliefs among either White or Black families in this sample. Moreover, although outgroup exposure related to decreased belief that race is tied to a causally powerful essence among both White and Black children, Black children in this sample on average experienced more outgroup exposure – a pattern that cannot account for the observed differences in essentialist beliefs. It is possible that children's experiences growing up as members of minority

groups makes race category boundaries more salient to them, which might reinforce general essentialist views of social structure (beyond those particular to race).

Even though levels of racial essentialism were fairly low among both children and adults, variation in these beliefs reliably predicted racial attitudes. Among adults, we found the same pattern as in previous work (Mandalaywala et al., 2017): more essentialist beliefs related to more negative feelings towards Blacks, among both Black and White adults, illustrating the validity of measuring essentialist beliefs using switched-at-birth tasks in adults. We found this same pattern in this sample of Black children. In contrast, viewing skin color as heritable was unrelated to feelings towards Blacks among Black children, and related positively among White children. In other words, in the present study, causal essentialism *specifically* was associated with more negative *in*group feelings among Black children and adults (but more negative *out*group feelings among White adults). At first glance, these findings might appear inconsistent with previous work on essentialism and intergroup attitudes in early childhood, which has found that essentialism contributes to more negative *out*group attitudes. For instance, Diesendruck and Menaham (2015) found that increasing the salience of religious-ethnic essentialism regarding Jews and Arabs led 6-year-old Jewish Israeli children to draw members of these two groups farther apart and to draw ingroup members with more positive affect than outgroup members.

One possible explanation for the present findings, in light of this previous work, is that the effect of essentialism on racial prejudice depends less on one's own group membership and more on the status and stigma associated with a group in society. From this perspective, developing essentialist beliefs about a category that is stigmatized within society could lead people to view negative stereotypes as fixed and inherent features of the category, and therefore to feel more negatively towards group members, even if one is a member of that group. On this

account, one possible reason why essentialism did not relate negatively to feelings toward Blacks among White children in our sample (and in fact, in some cases related to warmer feelings) is that White children at the ages we tested were not yet aware of negative societal stereotypes of Black Americans. This explanation is consistent with Rhodes et al. (2017), which found that inducing essentialist beliefs about a novel category (which was not associated with any negative stereotypes) did not lead children to feel more negatively toward members of this group. Also consistent with the possibility that essentialism interacts with information about social status or stereotypes to influence racial attitudes is that, in the present sample, more birth mother responses sometimes related to warmer feelings towards Whites, regardless of participant race. Moreover, this relationship varied across development, suggesting again that the incorporation of socially relevant information can alter the effects of essentialism on racial attitudes. Together, the present findings build on prior work to suggest that essentialism alone is insufficient to engender negative social attitudes. Rather, essentialism is more likely to shape racial attitudes only once it interacts with other features of children's knowledge and experiences, and thus essentialist beliefs can have very different implications for different children.

Although we found that viewing race as tied to a causally powerful essence was related to more negative attitudes toward ingroup members in Black children, this troubling outcome may represent the consequences of one specific component of essentialist beliefs. Racial essentialism is a multifaceted construct, and it is plausible that other components of essentialist beliefs have beneficial effects, perhaps particularly for members of minority groups. For example, by emphasizing category stability and within group commonalities, racial essentialism might increase ingroup identity and pride, which has been associated with positive outcomes in racial minority children (Spencer & Markstrom-Adams, 1990; Rivas-Drake et al., 2014), as well as in older

children and adults (Altschul, Oyserman, & Bybee, 2006; Ratner, Halim, & Amodio, 2013; Sellers, Copeland-Linder, Martin, & Lewis, 2006). More developmental research on how various components of essentialist beliefs relate to intergroup phenomena, as well how they relate to children's self- and group-identity beliefs, could clarify when and how essentialism has more positive or more negative outcomes (for detailed explanation, see Rhodes & Mandalaywala, 2017). Even with the myriad ways essentialist beliefs might shape racial attitudes, it is important to note that the only measure in our study that predicted prejudice toward a vulnerable social group was children's belief that race is tied to a causally powerful essence; negative attitudes toward Blacks were not predicted by their general beliefs about heritability of behavioral properties, or their beliefs about the heritability and stability of skin color. This further illustrates the importance of directly measuring specific features of essentialism in efforts to understand how essentialism shapes intergroup phenomena across development.

The present study found that the belief that race is tied to a causally powerful essence is endorsed at relatively low levels in early childhood and varies in relation to children's experiences and environment. These findings do not preclude the possibility that children might develop essentialist beliefs about race at an earlier age in communities that differ from those tested here (e.g., in communities where race and racial stereotypes are more salient) or even that children in the present context might have stronger essentialist beliefs about properties other than those that we asked about here (e.g., if there are properties that they associate more strongly with racial stereotypes). Given the sheer number of ways in which people can be classified, however, as well as abundant cultural and historical variability in racial and ethnic classification systems, it is reasonable that children would require ample time and cultural input to develop essentialist beliefs about the particular groups in their community. Moreover, we found that the development

and consequences of this component of racial essentialism is variable, illustrating the value of exploring these relations in a more diverse sample of children and adults than have traditionally been included.

Future research should continue to explore the mechanisms by which racial essentialism relates to racial attitudes, both positive and negative, and whether the particular mechanisms in play vary by people's own experiences in particular groups. By better understanding both the factors that contribute to the development of essentialist beliefs about race, as well as the mechanisms by which they exert their downstream effects, we can develop ways of maximizing positive impacts while minimizing negative ones to improve outcomes for everyone.

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877

Supplementary Online Materials

Method

Procedures for children

Children completed the following tasks in the order listed:

1. Two switched-at-birth tasks, with the order of the scenario types (i.e., whether the moms were the same race or different races) counterbalanced across participants.
2. Implicit Association Test (with presentation order – congruent or incongruent first – counterbalanced between participants, see below for more details).
3. Six feelings thermometers (with order of presentation randomized across six target stimuli, three White and three Black).
4. Self-reported child race (see below for more details).

The full study protocol with scripts and images is available at the Open Science Framework (DOI: https://osf.io/92pxv/).

Details of tasks administered, but not included in the main text

Implicit Association Test. Participant's implicit attitudes were measured with an evaluative version of the Implicit Association Test (IAT: Greenwald, McGhee & Schwartz, 1998), modified to be appropriate for children (chIAT; Baron & Banaji, 2006). This task measures the strength of mental associations between social categories of White and Black people and positive relative to negative images (smiley and frowny cartoon faces). Notably different from other studies that examine implicit attitudes in children of these ages, explicit racial labels were never given during training or as feedback. Participants were instead instructed to press the appropriate key whenever a "kid who looks like this" appeared in the

middle of the screen (*while pointing to an image of a Black child in one corner of the computer screen*), repeating these instructions with the second image in the other corner of the screen (*pointing to an image of a White child in the other corner of the computer screen*). Following two initial training blocks, in which participants practiced the classification of words and faces separately, participants completed two different types of critical trials (organized in two blocks each). On "compatible" trials, White faces and smiley faces were classified with one key, and Black faces and frowny faces were classified with the other key. On "incompatible" trials, these pairings were crossed. These critical blocks were completed in counterbalanced order and were separated by a face-only training block. IAT *D* scores were computed following Greenwald, Nosek & Banaji (2003), such that positive scores reflect a relative pro-White/anti-Black association and negative scores reflect a pro-Black/anti-White association. Overall, 135 children completed the IAT (Black $n = 50$, White $n = 85$), however, any participant who made incorrect responses on more than 30% of trials was excluded ($n = 50$, final child $n = 85$). Although we used established exclusion criteria, our exclusion rate was much higher than in previous studies (e.g., Gonzalez, Steele, & Baron, 2017; Newheiser, Dunham, Merrill, Hoosain, & Olson, 2014). This high exclusion rate was likely due to procedural changes (e.g., not providing racial labels), which made the task considerably more challenging and confusing to children. This high exclusion rate suggests that children did not fully understand the task, and thus makes it difficult to interpret with respect to previous studies using IATs in children; therefore, these data were not analyzed.

Self-reported child race. Children were also asked to self-report race by pointing to a picture of the child that was "most like you", when presented with images of 5 children who matched the participant in gender but varied in race/ethnicity (Black, White, Hispanic, East

Asian, South Asian). Both White and Black children overall chose their race match (White: 85%; Black: 78%), and there were no effects in any models of whether children did or did not match parent-reported child race when children's response on this question was included in models.

Procedures for adults

Procedures for adults were very similar to those used with child participants, but modified in some cases to be more appropriate to adult participants and for online administration. Adult data were collected either on Amazon's Mechanical Turk, where participants completed the 15-minute study for compensation, or at the Children's Museum of Manhattan (for parent participants only) where participants completed the tasks while their child participated in the child-appropriate version. Procedures for adults were the same regardless of the testing location, with the only difference being whether participants provided demographic information at the start (CMOM) or end (AMT) of the study. Participants first completed a short demographics form (i.e., age, sex, racial-ethnic background, also answering comparable questions for their child when applicable) and then completed all tasks. All survey questions can be accessed via Open Science Framework (DOI TBD).

Combining data from child and adult participants

On the switched-at-birth- task, adults were asked the same behavioral questions as children, but answered using a 7-point Likert scale to indicate whether each trait was due to the birth or adoptive mother, from 1 (completely due to the birth mother) to 7 (completely due to the adoptive mother). To make data from adult participants directly comparable to data from children, adult scale responses for each behavioral trait separately were rescored so that a score of 1 – 3 was considered essentialist (1) and a score of 4-7 was considered non-essentialist (0). Adults were not asked about the heritability of skin color (i.e., whether the baby would grow up

to look like the birth or adoptive mother). On the feelings thermometers, adult participants indicated on a scale of 0 (very cold) to 100 (very warm) how they felt toward *African Americans* and *European Americans*, separately and in counterbalanced order (as in Amodio & Devine, 2006). Values were z-scored to allow direct comparison to children's responses; however the raw scores are presented in Table SOM1.

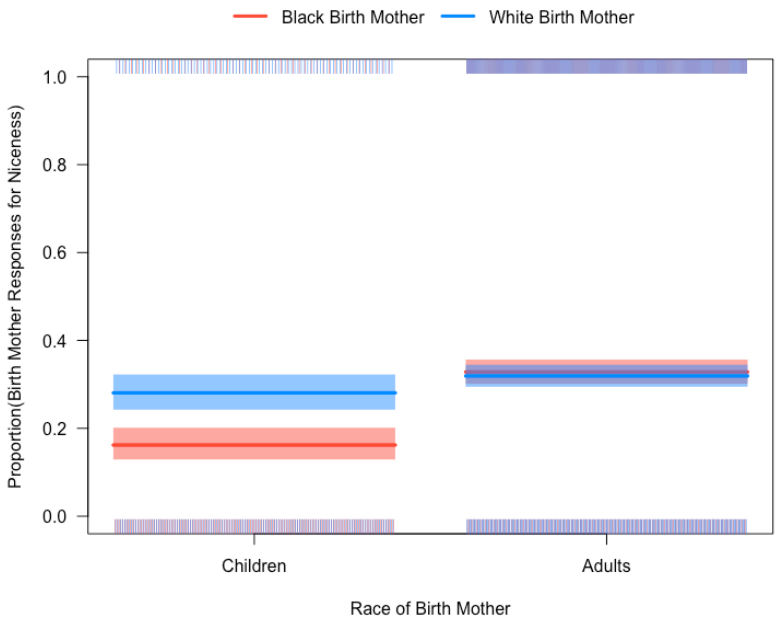
Table SOM1. Raw feelings thermometer scores for child (possible range: 1-6) and adult (possible range: 0-100) participants. For both children and adults, higher scores indicate greater warmth toward the noted racial group. For difference scores, a positive value indicates relatively greater warmth toward Whites, and a negative score indicates relatively greater warmth toward Blacks.

	Children *M (CI)*		Adults *M (CI)*	
	Black	White	Black	White
Feelings toward Whites	3.67 (3.20, 4.13)	3.98 (3.55, 4.41)	68.61 (64.79, 72.44)	75.43 (73.08, 77.78)
Feelings toward Blacks	3.58 (3.10, 4.07)	3.08 (2.60, 3.57)	78.32 (74.72, 81.93)	68.84 (66.42, 71.25)
Feelings thermometer difference score	.0811 (-.626, .789)	.898 (.358, 1.44)	-9.71 (-13.39, -6.03)	6.59 (4.80, 8.37)

Analysis examining the effects of property-type

We implemented a Generalized Estimating Equation with a binomial distribution and an exchangeable correlation matrix to test for effects of participant race, age, birth mother race, scenario-type (same race birth mothers, different race birth mothers), and property-type (athleticism, intelligence, niceness, and musicality). This analysis revealed a number of main effects and interactions—none involved whether the scenario asked about same-race or different-race birth mothers, but all pointing to effects involving the property *nice.* We therefore ran a follow-up analysis predicting responses on *nice* from participant race, age, and birth mother race via a quasibinomial generalized linear model. This analysis revealed an age by birth mother race interaction, $\beta = -.744$, $SE = .19$, $t = -3.91$, $p < .001$. As shown in Figure SOM1, children were

969 more likely to attribute niceness to the birth mother when the birth mother was White than Black,
970 whereas adults did not respond differentially according to birth mother race; this effect did not
971 interact with participant race.



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973 Figure SOM1. Proportion of birth mother responses on behavioral question about niceness as a
974 function of birth mother race, for Black and White child and adult participants. Shaded areas
975 show 95% confidence bands around the means; thin dashes represent individual participants.

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