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Developmental Differences in the Malleability of Implicit Racial Bias Following Exposure to Counterstereotypical Exemplars

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Research suggests that exposure to stories about Black adults who are contributing positively to their community can reduce implicit pro-White/anti-Black racial bias in older children (ages 9–12). The aim of the current research was to replicate and extend this finding by investigating whether a different child-friendly manipulation exposing children to positive Black exemplars and negative White exemplars could decrease implicit pro-White/anti-Black racial bias in children aged 5 to 12 years, both immediately following the intervention and 1 hr later. In addition, a second aim of this research was to examine whether child-friendly positive exemplar exposure would similarly reduce adults' implicit racial bias. In a sample of White and Asian Canadians ($N = 478$; 182 male, 296 female), recruited from a community science center (children) and a public university in Vancouver (adults), 9- to 12-year-old children's racial bias was reduced up to 1 hr after this new intervention, while the effectiveness of the intervention on 5- to 8-year-old children's bias was less clear. Interestingly, this intervention did not reduce adult levels of bias. The results of a follow-up study ($N = 96$; 23 male, 72 female, 1 nonbinary) indicate that exposure to child exemplars can reduce bias in adults, but only when additional instructions are provided to internalize the presented association. Thus, the current study provides evidence that depicting counterstereotypical exemplars can reduce implicit racial bias in children for up to 1 hr after exemplar exposure, but there may be important developmental differences in the conditions required to change this bias.

Keywords: social cognition, implicit bias, racial bias, prejudice, cognitive development

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Over the past decade, a growing number of studies have provided evidence for the early emergence of implicit racial bias (see Aboud & Steele, 2017; Baron, 2015; Dunham et al., 2008 for reviews), conceptualized as an automatic association between a racial group and positive or negative valence (e.g., Cvencek et al., 2012; Greenwald & Banaji, 1995; Nosek & Banaji, 2009). Although there is outstanding debate on the conceptualization of implicit attitudes, and relatively little research on the nature of implicit bias across development, recent research suggests that implicit attitudes may be experienced as spontaneous affective reactions that can diverge from their self-reported attitudes when they are not being used as the basis for these explicit judgments (Gawronski & Bodenhausen, 2006; Hahn & Gawronski, 2019).

Children as young as 3 years of age show implicit bias based on race (Dunham et al., 2006, 2013; Qian et al., 2016). These biases appear to be partially driven by ingroup favoritism and, by at least 5 years of age, are also due to a preference for culturally high-status racial groups (Dunham et al., 2006, 2007; Newheiser et al., 2014; Qian et al., 2016; Setoh et al., 2017; Steele et al., 2018). For example, while children from high-status racial groups tend to demonstrate ingroup racial preference, children from lower-status racial groups do not show this preference when the comparison group is higher status within that culture. Importantly, when cultural messages about high- and low-status racial groups are pervasive, these biases remain developmentally stable, with school-age children showing comparable levels of bias to adults (Baron, 2015; Baron & Banaji, 2006; Dunham et al., 2013; cf. Williams & Steele, 2019).

For example, in North America, where systemic bias and cultural messages from media sources perpetuate negative stereotypes of people who are Black, White children demonstrate an implicit

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preference for White over Black racial groups across development (e.g., Baron & Banaji, 2006; Dunham et al., 2013; Gonzalez, Steele, et al., 2017; Newheiser & Olson, 2012). This bias persists into adulthood and has been linked to anti-Black behavior, including unfriendliness in interracial interactions, biased voting, and disparate health care decisions (Dovidio et al., 2002; Green et al., 2007; Greenwald et al., 2009; Payne et al., 2010), as well as discriminatory behavior in childhood (Rae & Olson, 2018). Understandably, recent research has examined whether these implicit racial biases can be changed.

Although a number of studies have found that children and adults have a similar magnitude of bias, this does not preclude the possibility of developmental differences in the malleability of implicit bias (Baron, 2015; Steele et al., 2018). Given the well-documented difficulty of changing adults' implicit racial bias (e.g., Lai et al., 2016), researchers have hypothesized that due to potential differences in the cultural reinforcement of racial biases across the life span, it may be easier to change these attitudes in childhood as compared to later in development (Devine, 1989; Greenwald & Banaji, 1995; Rudman, 2004). It has further been suggested that late childhood, when children have increased levels of cognitive flexibility (see Bigler & Liben, 1993, 2007; Ruble et al., 2007) but relatively less exposure to cultural bias, might be an optimal time period for bias change (Baron, 2015; Gonzalez, Dunlop, et al., 2017). Consistent with this possibility, several studies with children aged 10–12 years have successfully reduced implicit racial bias immediately following an intervention, and these effects appear to have lasted days, weeks, and even years (Neto et al., 2015; Vezzali et al., 2011).

Specifically, two intensive interventions lasting several weeks reduced implicit racial bias in late childhood for a period of up to 2 years. In one such intervention, Portuguese children took part in 20 music classes aimed at decreasing anti-dark-skin prejudice by exposing children to music and musicians from Cape Verde (Neto et al., 2015). Children in this music program showed significantly less implicit anti-dark-skin prejudice 2 years later, as compared to a control group of children who did not receive this intervention. Another intervention involved multiple sessions of imagined outgroup contact over the course of 3 weeks to decrease anti-immigrant prejudice in Italian children (Vezzali et al., 2011). These children had lower levels of implicit bias 1 week following the conclusion of the program as compared to those in a control condition. Taken together, these studies provide preliminary evidence that intensive multiday interventions involving exposure to positive associations and intergroup contact may be able to reduce children's implicit bias for longer periods of time.

While these intensive interventions are promising, they require extensive resources to design and implement. It is important, therefore, to examine whether brief interventions, which are more efficient and scalable to administer, can successfully reduce implicit racial bias. There is promising evidence that they can be successful; implicit racial bias in children as young as 3 years of age has been reduced following approximately 20 min of perceptual individuation training (Qian et al., 2017; Xiao et al., 2015). This method builds on the perceptual-social linkage hypothesis, which posits that difficulties in individuating other-race faces facilitates the generalization of racial bias across outgroup members (Lee et al., 2017). Thus, teaching children to individuate other-race faces should interrupt this process and decrease their negativity toward racial outgroups. Children in these studies were trained to individuate different Black faces (Xiao et al., 2015). Following the individuation training, children had significantly lower levels of anti-Black racial bias relative to before training and as compared to children who were trained to individuate own-race faces. Furthermore, when this intervention was administered more than once, levels of bias in children were significantly lower 70 days after the final training session (Qian et al., 2017).

In a further study examining the malleability of implicit bias in childhood, Gonzalez, Steele, et al. (2017) employed an alternate brief intervention: exposure to counterstereotypical exemplars, or exemplars who contrast with cultural stereotypes about a racial group. This type of intervention is practical to implement and has been shown to temporarily reduce implicit racial bias in adults across several studies (e.g., Columb & Plant, 2011; Dasgupta & Greenwald, 2001; Lai et al., 2014, 2016). In the first study examining this method of bias reduction in children, 5- to 12-year-olds were exposed to short stories about unknown Black adults who contributed positively within their community (Gonzalez, Steele, et al., 2017). Compared to children in control conditions, which exposed children to positive White exemplars or positively valenced descriptions of flowers, this brief exposure to positive Black exemplars reduced implicit pro-White/anti-Black racial bias in children 9 to 12 years old. However, for children aged 5 to 8 years, this exposure did not successfully reduce bias. To our knowledge, no other studies have attempted to examine age-related differences in the malleability of implicit race bias.

It is possible that this intervention failed to be effective for this younger age group because they did not predominantly categorize the positive exemplars according to their race, which would be a critical process for this intervention to be successful. For children's associations between a social category and valance to change through exemplar exposure, it is essential that they encode the presented individuals as members of that category. There is some research to suggest that younger children may not be as likely as older children to spontaneously categorize others by race, instead focusing on other social categories like age or gender (Kinzler et al., 2010; Pauker, Williams, & Steele, 2016; Rhodes & Gelman, 2009; Shutts, 2015; Williams & Steele, 2019). Indeed, research suggests that it may not be until ages 7–10 years that children view race as an objective marker of categorical difference. As such, it is possible that younger children simply saw the targets of the stories as adults who were contributing to the community, as opposed to viewing them as primarily as members of their racial group, during the intervention. It is also possible that younger children were less interested in the stories because they featured adult characters.

To address these possibilities, in the current study, we exposed children to counterstereotypical child exemplars instead of adults. We based the current method of counterstereotypical exemplar exposure on previous work with children and adults (Gonzalez, Steele, et al., 2017; Lai et al., 2016). In contrast to the previous study, in which children were exposed to stories about positive Black adult exemplars, in the current research, participants were exposed to a pair (a boy and a girl) of positive Black child exemplars who were described as kind and friendly and who engaged in age-appropriate prosocial actions (e.g., helping a child when she fell down). In addition, as is typical of studies with adults (see Lai et al., 2016), we also included a pair (a boy and a girl) of negative White child exemplars who engaged in antisocial actions (e.g., refusing to help the girl when she asked for help), which could also serve to increase the salience of race in our manipulation for younger children (e.g., Degner & Wentura, 2010; Williams & Steele, 2019). As such, in our experimental condition, children were exposed to exemplars that countered cultural stereotypes about Black and White racial groups. In the control condition, both sets of exemplars were White. This allowed us to determine whether exposure to counterstereotypical exemplars could impact young children's (aged 5–8 years) implicit racial attitudes. This also allowed us to examine the robustness of previous findings with older children (aged 9–12 years), whose racial bias was reduced following exposure to counterstereotypical adults (Gonzalez, Steele, et al., 2017).

A second goal of the current research was to directly compare the efficacy of an implicit racial bias intervention between children and adults. The current body of literature suggests that childhood may indeed be an optimal point in development to reduce implicit racial bias as studies with children have been effective in bias change over time (Neto et al., 2015; Qian et al., 2017; Vezzali et al., 2011). Surprisingly, no study thus far has directly examined whether specific interventions to reduce implicit racial bias are *more* effective with children as compared to adults. A direct comparison between adults and children would provide critical insight into developmental differences in the conditions required to elicit bias change and provide a foundation for further investigation into the nature of bias change across development.

Based on the results of previous research, where exposure to positive Black exemplars decreased bias in children aged 9 to 12 years (Gonzalez, Steele, et al., 2017), we hypothesized that at a minimum, older children who were exposed to counterstereotypical exemplars would show lower levels of implicit pro-White/anti-Black racial bias in comparison to those exposed to positive White exemplars. Although we did not have concrete predictions about developmental differences across childhood, given that other interventions have been effective with young children (Qian et al., 2017; Xiao et al., 2015), it seemed plausible that with the aforementioned modifications, this intervention could also be effective with younger children.

Our predictions for the effects of this intervention with adults were also less clear. Past research suggests that exposure to positive Black exemplars can reduce racial bias in adults (e.g., Dasgupta & Greenwald, 2001; Lai et al., 2016); however, to our knowledge, no interventions thus far have tested the effectiveness of exemplar exposure among adults using a more simplistic, child-friendly story. As a result, we also examined potential developmental differences in the efficacy of this intervention between younger children (ages 5–8), older children (ages 9–12), and adults. By keeping our manipulation and dependent measures consistent for all age groups, we were able to make direct age comparisons, a method common in studies examining developmental differences (e.g., Baron & Banaji, 2006; Dunham et al., 2013; Hussak & Cimpian, 2015; McCrink et al., 2010).

In addition to measuring the immediate postintervention effects of counterstereotypical exemplar exposure on implicit intergroup bias, we also assessed whether this method of bias reduction would last for 1 hr after the brief exposure session. Few studies have examined delayed effects of bias exposure (see Neto et al., 2015; Qian et al., 2017; Vezzali et al., 2011), and none thus far have examined delayed effects of exposure to counterstereotypical exemplars in children or across development. Thus, the implicit racial bias of children and adults was tested twice: first immediately after exposure to exemplar vignettes and then 1 hr after reading the vignettes. Thus, in the current study, we assessed whether exposure to counterstereotypical exemplars temporarily shifts implicit intergroup bias or whether this change is more long-lasting. If implicit bias reduction failed to last beyond 1 hr, this would suggest that this manipulation may not be powerful enough on its own to induce longer-term bias change.

Consistent with work by Gonzalez, Steele, et al. (2017), in the present research, we only included White and Asian children as these are two racial groups that have been found to display a bias for White over Black individuals (e.g., Dunham et al., 2006) and have a culturally higher status in our research setting. For consistency, across both studies, only adults from these two racial groups were recruited.

Study 1

Method

Participants

Child Participants. A total of 439 White and Asian participants who met our preregistered eligibility criteria were recruited from a community science center in Vancouver from August 2016 to November 2017 and received a sticker for participation in the study. Our study protocol received ethics approval from the University of British Columbia, H10-0047, "The Development of Social Cognition." Participants were recruited by research assistants walking around the science center or entered the lab space on their own and asked to participate. Parents provided consent for their child's study participation.

Our study plan and exclusion criteria were preregistered on the Open Science Framework. As outlined in our preregistration, we excluded a total of 60 participants who failed to answer at least four out of the six story comprehension questions correctly (n = 1), showed significant lack of understanding or random button pressing on the Implicit Association Test (IAT; n = 14), had experimenter errors in study protocol (n = 10), reported developmental delays (n = 10), had technology errors (n = 5), had parent interference with the study (n = 1), or failed to complete the study at Time 1 (n = 16). These attrition rates are comparable to other studies that have tested participants in museum settings (e.g., Dunham et al., 2016; Gonzalez, Dunlop, et al., 2017; Gonzalez, Steele, et al., 2017). As with previous research, we also planned to remove children who had more than 25% of their response latencies under 300 ms; however, this was not true for any of our child participants. After these exclusions, there were a total of 379 participants (162 male, 217 female) who completed the measures at Time 1. Of these 379 participants, 61% identified as White (n = 230), 29% identified as East Asian (n = 111), and 10% identified as mixed race (White and East Asian, n = 38). The mean age of the 189 younger participants (ages 5–8) was 6.9 years (SD = 1.15), and the mean age of the 190 older participants (ages 9–12) was 10.8 years (SD = 1.06).

Our lab space is set up as an exhibit, and as such, we ran a number of participants who completed the first portion of the study but were unable to complete Time 2 measures (n = 140). This left us with a total of 239 usable participants with both Time 1 and Time 2 data (99 male, 140 female). Of these 239 participants, 60% identified as White ($n = 144$), 31% identified as East Asian ($n = 74$), and 9% identified as mixed race (White and East Asian, $n = 21$). The mean age of the 119 younger participants (ages 5–8) was 6.9 years ($SD = 1.10$), and the mean age of the 120 older participants (ages 9–12) was 10.8 years ($SD = 1.04$). There were no significant differences in levels of bias between children who did not return for the second part and the subsample of children who did (see Table 1 for means and online supplemental materials for analyses).

Adult Participants. A total of 122 White and Asian participants who met our preregistered eligibility criteria were recruited from the University of British Columbia human subject pool from August 2016 to November 2017 and received either course credit or $10 as compensation for study participation. Our study protocol received ethics approval from the University of British Columbia, H10-0047, "The Development of Social Cognition." Again, in accordance with our preregistration and previous research, prior to any analyses, we excluded participants for whom there were technology/study protocol errors ($n = 6$), who had more than 25% of their response latencies under 300 ms or errors on 25% or more of trials ($n = 4$), or who failed a basic attention check asking participants to intentionally select a specific multiple-choice answer ($n = 13$). No participants answered fewer than five of our comprehension questions correctly.

After these exclusions, we had a total of 99 adult participants (20 male, 79 female) who completed measures at Time 1. Of these 99 adult participants, 68% identified as East Asian ($n = 67$), 30% identified as White ($n = 30$), and 2% identified as mixed race (White and East Asian, $n = 2$). The mean age of participants was 21.8 years ($SD = 3.88$), and all participants were in the process of completing or had a university degree. Three participants (one White, two East Asian) completed measures at Time 1 but not Time 2, and these participants were excluded from Time 2 analyses, leaving us with 96 participants who completed measures at Time 1 and Time 2. A post hoc power analysis using G*Power indicated that our total sample size at Time 1 ($N = 478$) would give us greater than 95% power to detect a medium-sized between-subjects interaction (Erdfelder et al., 1996).

Procedure

Child participants were tested individually in a designated space at a local science center. A single experimenter guided the child through all sections of the study. Participants were randomly assigned to either our experimental condition, where they were read stories about Black prosocial and White antisocial characters, or our control condition, where they heard about White prosocial and White antisocial characters. After the stories, children answered comprehension questions to ensure that they had been listening to the stories. Next, children completed the Child IAT. After the IAT, for the next hour, children explored the science center with their parents as they normally would. After 1 hr, we buzzed them using a pager system to get them to return to our lab. We then administered another Child IAT, as well as the same explicit questions.

Adult participants were tested individually in our university lab space. The order of tasks was the same as with child participants. Experimenters read directions for each individual portion of the task, but adult participants read the stories themselves and completed the tasks on their own. For the hour between Time 1 and Time 2 assessments, participants were permitted to leave the testing room.

Vignettes. All participants were presented with three different stories using the same characters (see online supplemental materials). Two characters were a pair of children who engaged in antisocial behavior. These children were White in both conditions. The other two characters were a pair of children who engaged in prosocial behavior. Depending on condition, these positive child exemplars were either Black (experimental condition) or White (control condition). The stories were presented in the same order. Stories also included images of the characters. Drawings of the prosocial characters were matched in posture and affect.

Attention and Manipulation Checks. After each of the three stories, participants were asked two questions to ensure that they understood which of the characters acted in antisocial and prosocial ways (see online supplemental materials). We used this measure as an attention check. As a manipulation check, after the third story and corresponding comprehension questions, we presented children with a set of questions to assess whether they preferred the prosocial characters over the antisocial characters, regardless of race. Children were presented with an image of either the two boy characters or the two girl characters from the stories that they had been read and were asked which character they liked more. They were then asked the same question for the next set of characters (e.g., half of participants were asked about the boy characters first and the girl characters second). In the same manner, they were again presented with either the two boy characters or the two girl characters and asked which character they were more similar to. They were then asked the same questions for the next set of characters.

Child Implicit Association Test. Implicit racial bias was measured using the child-friendly IAT (see Gonzalez, Steele, et al., 2017). This test measures the strength of an association between a target category and an attribute. In this IAT, we measured associ-

Table 1
Means and Standard Deviations for Study 1

	Positive white exemplars			Positive black exemplars		
Sample	Younger	Older	Adults	Younger	Older	Adults
T1 (full sample)	.17 (.44)	.22 (.53)	.26 (.55)	.04 (.47)	.06 (.50)	.22 (.49)
T1 (subsample)	.18 (.48)	.16 (.51)	.26 (.55)	.05 (.48)	.03 (.47)	.23 (.49)
T2 (subsample)	.11 (.48)	.29 (.47)	.25 (.56)	.09 (.43)	.10 (.53)	.28 (.54)

ations between race (Black/White) and affect (good/bad). The IAT was modeled after that reported by Gonzalez, Steele, et al. (2017).

Results and Discussion

Data Preparation

For each participant, an IAT *D* score was calculated such that higher scores indicate greater preference for White versus Black racial groups (see Baron & Banaji, 2006; Greenwald et al., 2003). Analyses were preregistered on the Open Science Framework (https://osf.io/rjpmz). See the online supplemental materials for preregistration details.

Manipulation Check (Explicit Questions)

We conducted a series of binomial tests for each of our manipulation check questions to ensure that the majority of participants preferred the prosocial character and rated themselves as being more similar to the prosocial character. As expected, at Time 1, we found that 98% of participants preferred the prosocial boy character ($p < .001$) and 98% of participants preferred the prosocial girl character ($p < .001$). Additionally, 96% of participants rated themselves as more similar to the prosocial boy character ($p < .001$), and 96% of participants rated themselves as more similar to the prosocial girl character ($p < .001$). At Time 2, we found that 99% of participants preferred the prosocial boy character ($p < .001$) and 98% of participants preferred the prosocial girl character ($p < .001$). Additionally, 96% of participants rated themselves as more similar to the prosocial boy character ($p < .001$), and 97% of participants rated themselves as more similar to the prosocial girl character ($p < .001$). These results did not differ when including only the subsample that completed measures at Time 1 and Time 2 (see online supplemental materials for these analyses and results by condition).

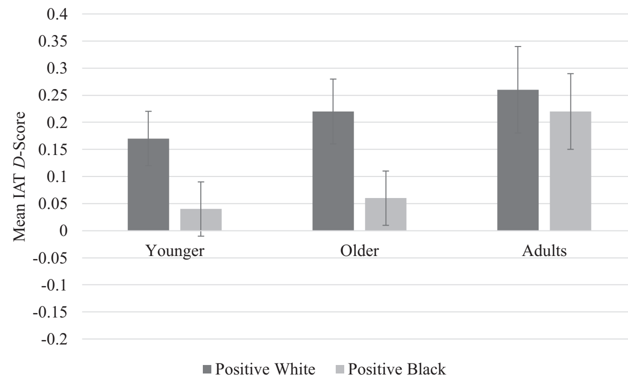
Time 1 Analyses

All Participants. A 2 (Condition: Experimental or Control) × 3 (Age Group: Younger, Older, Adult) analysis of variance (ANOVA) revealed a significant effect of condition, $F(1, 472) = 5.38$, $p = .02$, $\eta_p^2 = .01$. Participants who were exposed to counterstereotypical exemplars in the experimental condition ($D = .08$, $SD = .49$) showed lower levels of bias than those in the control condition ($D = .21$, $SD = .50$). There was also a marginal effect of age group, $F(2, 472) = 2.31$, $p = .10$, $\eta_p^2 = .01$, but no Condition × Age Group interaction, $F(2, 472) = 0.50$, $p = .61$, $\eta_p^2 = .002$; see Figure 1. These findings suggest that the intervention had the anticipated effect at Time 1, with participants who were exposed to counterstereotypical exemplars showing significantly less bias than those in the control condition. Despite the lack of significant interaction effect, we conducted follow-up simple-effects analyses using a Bonferroni adjustment for multiple comparisons with each individual age group (younger, older, and adults) to ensure that effects of condition were consistent. This approach is also similar to how data have been analyzed in previous related research (e.g., Gonzalez, Steele, et al., 2017).

Younger Children. Simple-effects analyses indicated a marginal effect of condition for younger children. Although the means were in the anticipated direction, children in the counterstereotypical exemplar condition ($D = .04$, $SD = .47$) did not have significantly less implicit pro-White/anti-Black racial bias than younger children in the control condition ($D = .17$, $SD = .44$), $p = .06$, Cohen's $d = 0.29$. However, testing mean levels of bias against chance ($\mu = 0$) indicated that immediately after the intervention (Time 1), younger children who were exposed to positive White exemplars ($D = .17$, $SD = .44$) had a significant level of pro-White/anti-Black implicit racial bias, $t(89) = 3.72$, $p < .001$, Cohen's $d = 0.39$, while those who were exposed to positive Black exemplars no longer demonstrated a preference for either racial group ($D = .04$, $SD = .47$), $t(98) = 0.80$, $p = .425$, Cohen's $d = 0.09$. This provides some, albeit mixed, evidence that the intervention was effective for younger children.

Figure 1

Implicit Association Test (IAT) D Scores for Children and Adults at Time 1 (Study 1)



Note. Higher scores represent greater pro-White/anti-Black racial bias.

Older Children. Simple-effects analyses indicated that older children in the counterstereotypical exemplar condition ($D = .06$, $SD = .50$) had significantly less implicit pro-White/anti-Black racial bias than younger children in the control condition ($D = .22$, $SD = .53$), $p = .029$, Cohen's $d = 0.31$. In addition, testing mean levels of bias against chance ($\mu = 0$) indicated that immediately after the intervention (Time 1), older children who were exposed to positive White exemplars ($D = .22$, $SD = .53$) had a significant level of pro-White/anti-Black implicit racial bias, $t(92) = 4.00$, $p < .001$, Cohen's $d = 0.42$, while those who were exposed to positive Black exemplars no longer demonstrated preference for either racial group ($D = .06$, $SD = .50$), $t(96) = 1.25$, $p = .21$, Cohen's $d = 0.12$. Thus, it appears our intervention was successful for children ages 9–12 years old.

Adults. Simple-effects analyses did not reveal a significant difference in mean levels of implicit pro-White/anti-Black racial bias between adults in the control condition ($D = .26$, $SD = .55$) and adults in the experimental condition ($D = .22$, $SD = .49$), $p = .71$, Cohen's $d = 0.08$. Testing mean levels of bias against chance ($\mu = 0$) indicated that immediately after the intervention (Time 1), adults who were exposed to positive White exemplars ($D = .26$, $SD = .55$) had a significant level of pro-White/anti-Black implicit racial bias, $t(48) = 3.28$, $p = .002$, Cohen's $d = 0.46$, as did those who were exposed to positive Black exemplars (D = .22, SD = .49), t(49) = 3.15, p = .003, Cohen's d = 0.45. These results suggest that for our sample of adults, exposure to counterstereotypical exemplars was not effective in reducing implicit racial bias.

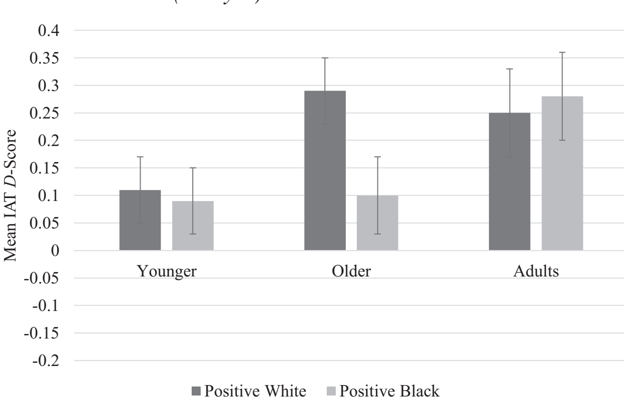
Change From Time 1 to Time 2

All Participants. To examine differences in IAT score directly after our manipulation (Time 1) as compared to 1 hr later (Time 2), we first conducted a 2 (Time: Time 1 or Time 2) × 2 (Condition: Experimental or Control) × 3 (Age Group: Younger, Older, Adult) mixed-factorial ANOVA. We found no significant main effect of time, F(1, 329) = 0.96, p = .33, η_p^2 = .003, a marginal effect of condition, F(1, 329) = 3.66, p = .06, η_p^2 = .01, and a significant effect of age group, F(2, 329) = 4.28, p = .01, η_p^2 = .03. No interactions between any of the variables were significant (ps > .32). The marginal effect of condition suggested that, overall, participants in the experimental condition (D = .13, SD = .38) showed lower levels of bias than those in the control condition (D = .21, SD = .39). Furthermore, simple-effects analyses indicated that, overall, adults showed significantly higher levels of bias (D = .26, SD = .38) than younger children (D = .11, SD = .38, p = .005) and older children (D = .14, SD = .38, p = .03). There was no significant difference between younger and older children (p = .48). Again, to examine potential age differences for children, we ran separate repeated-measures ANOVAs for each age group (younger, older, adults).

Younger Children. There was no main effect of time, F(1, 117) = 0.08, p = .78, η_p^2 = .001, or condition, F(1, 117) = 1.58, p = .21, η_p^2 = .013, and no significant Time × Condition interaction, F(1, 117) = 1.53, p = .22, η_p^2 = .008. To further examine potential effects of time delay on bias, we tested mean levels of bias against chance (μ = 0) for results at Time 2, 1 hr after the initial intervention; see Figure 2. Younger children who were exposed to positive White exemplars had marginally significant levels of bias (D = .11, SD = .47, Cohen's d = 0.23) 1 hr after the stories, t(58) = 1.77, p = .08. Younger children who were exposed to positive Black exemplars also had marginally significant levels of bias 1 hr later (D = .09, SD = .43), t(59) = 1.63, p = .11, Cohen's d = 0.21. These results suggest that after 1 hr, younger children did not show racial bias in either condition.

Figure 2

Implicit Association Test (IAT) D Scores for Children and Adults at Time 2 (Study 1)



Note. Higher scores represent greater pro-White/anti-Black racial bias.

Older Children. There was a marginally significant effect of time, F(1, 118) = 2.65, p = .11, η_p^2 = .022, such that children's levels of bias were marginally higher at Time 2 (D = .19, SD = .36) compared to Time 1 (D = .09, SD = .35). There was also a significant effect of condition, F(1, 118) = 5.80, p = .02, η_p^2 = .05, such that children who were exposed to counterstereotypical exemplars had significantly lower levels of implicit racial bias (D = .06, SD = .36) than children in the control condition (D = .22, SD = .36). We found no significant Time × Condition interaction, F(1, 118) = 0.29, p = .59, η_p^2 = .002.

To further examine potential effects of time delay on bias, we tested mean levels of bias against chance (μ = 0) for results at Time 2, 1 hr after the initial intervention; see Figure 2. Older children in the control condition had significant levels of bias (D = .29, SD = .47) 1 hr after the stories, t(59) = 4.78, p < .001, Cohen's d = 0.62. By contrast, older children who were exposed to counterstereotypical exemplars did not display significant levels of bias 1 hr later (D = .10, SD = .53), t(59) = 1.40, p = .17, Cohen's d = 0.19. Taken together, these results suggest that for older children, levels of implicit racial bias remained reduced 1 hr after story exposure.

Adults. When an ANOVA was conducted with adults only, there were no effects of time, F(1, 94) = 0.12, p = .73, η_p^2 = .001, condition, F(1, 94) = 0.001, p = .98, η_p^2 < .001, or a Time × Condition interaction, F(1, 94) = 0.29, p = .59, η_p^2 = .003, suggesting that adult levels of implicit racial bias were not different between Time 1 and Time 2, and bias was not significantly decreased following exposure to counterstereotypical exemplars; see Figure 2. We also tested adults' mean levels of bias against chance (μ = 0) for results at Time 2. Adults who were exposed to positive White (D = .25, SD = .56), t(46) = 3.09, p = .003, Cohen's d = 0.45, and positive Black (D = .28, SD = .54), t(48) = 3.66, p = .001, Cohen's d = 0.52, exemplars had significant levels of implicit pro-White/anti-Black racial bias, further suggesting that this intervention was not effective for adults.

Discussion

Study 1 provides further evidence that exposure to counterstereotypical exemplars reduces implicit bias in children (Gonzalez, Steele, et al., 2017). However, unlike previous research, we found some initial evidence that the success of this intervention could extend to children below the age of 9, suggesting its immediate effectiveness across the age range of 5–12. These results add to a recent body of work suggesting that implicit racial bias is malleable in childhood (e.g., Vezzali et al., 2011; Xiao et al., 2015), and this pattern is now observed across diverse intervention strategies.

Results 1 hr after exposure to the stories point to a possible developmental difference in the efficacy of bias interventions. Bias levels remained reduced after 1 hr for older children, underscoring the effectiveness of this intervention for producing longer-lasting change at this age group. However, for younger children, low levels of bias were found regardless of condition. As such, this intervention continued to be effective at reducing implicit pro-White/anti-Black racial bias 1 hr later among children aged 9–12 years who were exposed to counterstereotypical exemplars.

It is important to note, however, that this intervention was not effective for adults, who showed significant levels of implicit pro-White/anti-Black racial bias across conditions and time. This finding is consistent with previous work indicating that in the absence of intervention, adults reliably show racial bias on Child IATs (e.g., Baron & Banaji, 2006; Dunham et al., 2007). Although a main effect of condition emerged at Time 1 and was not qualified by an interaction with age, post hoc analyses provided evidence that this main effect was due to children's decreased bias following the intervention and not from a change in the biases of adults.

Study 2

Results of Study 1 suggest that exposure to our child-friendly counterstereotypical exemplars does not reduce bias in adults. As other studies have successfully reduced adults' implicit racial bias using more adult-oriented stimuli, it is important to consider reasons why we may not have observed change with our manipulation. While it is possible that the child-friendly nature of our stories or our measures may have limited their success, this seems unlikely given that a number of studies have used child-friendly stories as a manipulation with adults and have found the anticipated effects (e.g., Hussak & Cimpian, 2015; McCrink et al., 2010). Furthermore, a number of studies have used Child IATs with adult populations and have reliably found implicit racial bias at comparable levels to adult IATs (e.g., Baron & Banaji, 2006; Dunham et al., 2006, 2007). This was also the case in the current study, suggesting that this was not an artifact of the methods used. As such, an alternative explanation for the observed pattern of data is that the instructions that we provided to adults in the experimental condition were not sufficiently similar to instructions used in previous studies with adults (see Lai et al., 2014, 2016; Marini et al., 2012).

Specifically, in several of the previous bias change studies with adults, evaluative instructions were used to aid adults' internalization of the presented association. For example, in research by Lai et al. (2016), following exposure to exemplars, participants were told to "think 'good' when you see the faces of your Black teammates and 'bad' when you see the White faces from the cheating team." Therefore, it seems possible that additional instructions like these are needed in order for unknown positive exemplars to impact adults' implicit bias. In Study 2, we directly tested this possibility by examining whether the addition of explicit evaluative instructions would lead to the successful reduction of implicit pro-White/anti-Black racial bias in adults.

As the purpose of this study was to examine the effectiveness of including evaluative instructions when exposed to counterstereotypical exemplars, all participants in Study 2 were exposed to the counterstereotypical exemplar story from Study 1 where the prosocial children were Black and the antisocial children were White. In one condition, participants read the story on its own, in the same manner as the experimental condition in Study 1, serving as a replication of this study with the adult sample. In the other condition, after participants read the story, they received additional instructions to internalize the presented association (Black = good, White = bad). This condition served as a conceptual replication of previous work that has supplemented counterstereotypical exemplar exposure with evaluative instructions (Lai et al., 2016). Once again, to examine bias after a delay, we tested participant levels of bias immediately after the intervention (Time 1) and 1 hr later (Time 2). Thus, our study had a 2 (Time: Time 1 or Time 2) × 2 (Condition: Evaluative Instructions or No Instructions) design.

Method

Participants

A total of 130 White and Asian adult participants who met our preregistered eligibility criteria were recruited from the University of British Columbia human subject pool from March 2018 to September 2018 and received either course credit or $10 as compensation for study participation. Our study protocol received ethics approval from the University of British Columbia, H10-0047, "The Development of Social Cognition." In accordance with our preregistration and previous research, prior to any analyses, we excluded participants for whom there were errors in technology/study protocol ($n = 5$), who had more than 25% of their response latencies under 300 ms or errors on 25% or more of trials ($n = 6$), who failed a basic attention check asking participants to intentionally select a multiple-choice answer ($n = 12$), and who answered fewer than four of our six story comprehension questions correctly ($n = 6$).

After these exclusions, we had a final sample of 96 usable participants (23 male, 72 female, 1 nonbinary). A post hoc power analysis using G*Power indicated that this sample size would give us over 95% power to detect a medium-sized interaction (with a correlation of .16 between repeated measures). Of these 96 participants, 79% identified as East Asian ($n = 76$) and 21% identified as White ($n = 20$). The mean age of participants was 21.8 years old ($SD = 3.15$), and all participants were in the process of completing or had a university degree.

Procedure

The order of tasks for adult participants was identical to Study 1, with the addition of instructions for participants in the evaluative instructions condition. In both conditions, participants were exposed to counterstereotypical exemplars and read about Black prosocial and White antisocial characters. Participants were randomly assigned to either our evaluative instructions condition, where they were given additional instructions to internalize the presented association (Black = good, White = bad), or our no instructions condition, which was identical to our experimental condition from Study 1, where they were given no additional instructions.

For participants in the evaluative instructions condition, instructions were provided after comprehension questions but before the Child IAT. Participants in this condition were told,

> In a moment, you are going to complete a task designed to firmly establish in people's minds, even in difficult and misleading situations, that White = bad, Black = good. To make this new task easier, remember the story you just read and how the White characters participated in negative and antisocial actions, as well as how the Black characters participated in positive and prosocial actions. On the remainder of tasks, think "good" when you see an image of a Black individual and think "bad" when you see an image of a White individual.

Participants in the no instructions condition did not receive these instructions and instead proceeded directly to the IAT after reading the vignettes and completing the comprehension questions. At Time 2, regardless of condition, no additional instructions were given; participants proceeded directly to the Child IAT.

Results

Data Preparation

As in Study 1, we calculated an IAT *D* score for each participant such that higher scores indicate greater preference for White versus Black racial groups. Analyses were preregistered on the Open Science Framework (https://osf.io/rjpmz). See the online supplemental materials for preregistration details.

Manipulation Check (Explicit Questions)

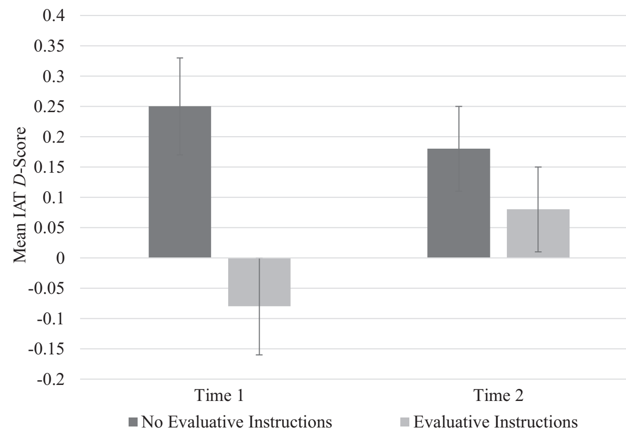
We conducted a series of binomial tests for each of our manipulation check questions to examine whether participants preferred the prosocial character and rated themselves as being more similar to the prosocial character. At Time 1, we found that 99% of participants preferred the prosocial boy character ($p < .001$) and 100% of participants preferred the prosocial girl character ($p < .001$), rated themselves as more similar to the prosocial boy character ($p < .001$), and rated themselves as more similar to the prosocial girl character ($p < .001$). At Time 2, we found that 100% of participants preferred the prosocial boy character ($p < .001$) and the prosocial girl character ($p < .001$). Additionally, 98% of participants rated themselves as more similar to the prosocial boy character ($p < .001$), and 99% of participants rated themselves as more similar to the prosocial girl character ($p < .001$). These results did not differ by condition (see online supplemental materials for these analyses).

Implicit Racial Bias

A 2 (Time 1 or Time 2) × 2 (Condition: Evaluative Instructions or No Instructions) ANOVA revealed no significant main effect of time, $F(1, 94) = .40$, $p = .53$, $\eta_p^2 = .004$, or Time × Condition interaction, $F(1, 94) = 2.30$, $p = .13$, $\eta_p^2 = .02$. There was, however, a significant effect of condition, $F(1, 94) = 6.70$, $p = .01$, $\eta_p^2 = .07$, such that participants who were exposed to exemplars without additional instructions ($D = .25$, $SD = .54$) had significantly greater implicit pro-White/anti-Black racial bias than participants who were exposed to exemplars *and* received evaluative instructions ($D = .07$, $SD = .52$); see Figure 3. These results suggest that compared to the counterstereotypical exemplar intervention alone, the addition of evaluative instructions significantly reduced adult levels of implicit pro-White/anti-Black racial bias.

Testing mean levels of bias against chance ($\mu = 0$) indicated that immediately after the intervention (Time 1), participants who received additional evaluative instructions ($D = .07$, $SD = .52$) showed no implicit preference for either racial group, $t(48) = 1.02$, $p = .31$, Cohen's $d = 0.13$, while participants who did not receive additional instructions ($D = .25$, $SD = .54$) showed a significant pro-White/anti-Black implicit racial bias, $t(46) = 3.15$, $p = .003$, Cohen's $d = 0.46$, further supporting the conclusion that this intervention was effective with the use of evaluative instructions but not without. Levels of bias showed a similar pattern 1 hr after the intervention (Time 2), with participants who received additional evaluative instructions ($D = .08$, $SD = .51$), $t(48) = 1.07$, $p = .29$, Cohen's $d = 0.15$, showing no bias and those who did not receive additional instructions showing significant bias ($D = .18$, $SD = .58$), $t(46) = 2.18$, $p = .03$, Cohen's $d = 0.31$.

Figure 3
Implicit Association Test (IAT) D Scores for Adults (Study 2)



Note. Higher scores represent greater pro-White/anti-Black racial bias. All participants read the counterstereotypical exemplar stories from Study 1.

Discussion

We found that as compared to counterstereotypical exemplar exposure without instructions, the addition of evaluative instructions successfully decreased adults' implicit pro-White/anti-Black racial bias. Accordingly, participants who were exposed to the stories paired with evaluative instructions did not show an implicit preference for either racial group, while those who were exposed to the stories alone had significant pro-White/anti-Black implicit bias. Bias did not change significantly over the course of 1 hr.

General Discussion

Across two studies, children and adults were exposed to positive child exemplars in an attempt to change implicit pro-White/anti-Black racial bias. In our first study, both younger (5–8 years) and older (9–12 years) children who were exposed to positive Black exemplars and negative White exemplars showed a lack of significant implicit bias immediately after reading the stories, in contrast to the significant levels of bias found among younger and older children who were exposed to positive and negative White exemplars. This difference between conditions was statistically significant for older children and marginal for younger children. As the current body of literature on the malleability of implicit racial bias is still relatively small, this is an important finding that extends previous work; these results use a different manipulation to demonstrate that counterstereotypical exemplar exposure can potentially reduce bias in younger children (Gonzalez, Steele, et al., 2017). The findings are also consistent with other recent work that has found teaching children to perceptually individuate other-race faces can decrease implicit racial bias (aged 4–6 years; Qian et al., 2017; Xiao et al., 2015) but includes a wider age range of children 5–12 years.

For younger children (aged 5–8 years), the results after 1 hr were somewhat unclear, where levels of bias appeared to be reduced in both conditions, with no significant difference between children who were exposed to positive White versus positive Black exemplars. For older children (aged 9–12 years), bias appeared to remain reduced after a 1-hr delay. This finding is especially important because it provides preliminary evidence that brief exposure to counterstereotypical exemplars may help to build longer-lasting association changes in older children. Indeed, if the change found immediately following exposure to our vignettes was just a brief effect, we might expect to see no difference in implicit association strengths between the control and experimental conditions a full hour later. This result sets a foundation for additional exploration of the temporal boundaries of this bias change.

In contrast to our findings with children, the results of our post hoc analyses suggest that exposure to counterstereotypical exemplars alone did not significantly reduce adults' implicit pro-White/anti-Black bias immediately after the intervention or 1 hr later. Adults who were exposed to positive and negative White exemplars and those who were exposed to positive Black and negative White exemplars both had a significant implicit pro-White/anti-Black preference. This bias was present in both conditions immediately after reading the stories, as well as after the 1-hr delay. This finding is inconsistent with some previous research suggesting that adults' implicit racial bias can be changed through counterstereotypical exemplar exposure (Columb & Plant, 2011; Dasgupta & Greenwald, 2001; Joy-Gaba & Nosek, 2010); however, none of these prior studies have exposed adults to unknown child exemplars. As such, the current research suggests that this type of exposure may not be sufficient to change adults' implicit racial bias without the addition of explicit instructions to internalize the presented association.

In our second study, we were able to successfully reduce adults' implicit racial bias by adding evaluative instructions to our counterstereotypical exemplar manipulation. Replicating Study 1, adults who were only exposed to positive Black and negative White exemplars, without any additional instructions, had significant levels of pro-White/anti-Black bias both immediately after story exposure and after an hour-long delay. In comparison, adults who read these stories and then received instructions to internalize a Black = good and White = bad association had reduced levels of implicit bias such that they showed no preference for either racial group. This reduction in bias also lasted after 1 hr.

The results of these studies suggest that children's implicit racial bias can be affected by exposure to child-friendly counterstereotypical exemplars. A developmental difference appeared to emerge between children and adults, with adults requiring a "booster" following exemplar exposure in order for implicit attitudes to change. Consistent with this finding, past studies that have successfully decreased adults' bias using counterstereotypical exemplar exposure have employed these evaluative instructions (Lai et al., 2014, 2016) or have used well-known exemplars, which may shift associations more easily (Dasgupta & Greenwald, 2001). Other past research that has successfully reduced implicit racial bias in adults has also been more explicit; for example, explicit instructions have been particularly effective in studies that seek to break the negative "habit" of prejudice (Devine, 1989; Devine et al., 2012; Monteith, 1993). Additional studies that make adults more explicitly aware of bias (Rudman et al., 2001), or train them to correct bias (Kawakami et al., 2007; Stewart et al., 2009), have also been successful in bias reduction with adults. As such, future work may seek to investigate which methods of bias change are most effective at different points in development.

It is important to note a number of limitations that constrain the interpretation of this work. First, it is unclear why this intervention showed some effectiveness among young children, when a previous intervention exposing children to adults contributing positivity to their community did not (Gonzalez, Steele, et al., 2017). We made several modifications to this intervention that could explain its increased effectiveness with younger children, most notably the use of child (as opposed to adult) exemplars and targeting multiple associations through the inclusion of positive Black and negative White exemplars. Any of these changes may have contributed to the difference in results between this study and that conducted by Gonzalez, Steele, et al. (2017). As such, future work should seek to identify the specific mechanisms that may have allowed younger children to encode the associations presented in exemplar stories, as well as ways to make this intervention more reliably effective with this age group. Specifically, future research may seek to investigate whether the inclusion of negative exemplars is essential for the efficacy of this manipulation or whether there are conditions under which positive exemplars alone can induce change.

Additionally, it remains unclear why younger children had reduced levels of bias after 1 hr in both the control and experimental conditions. One explanation for this finding is that this sample of children may have lower levels of bias overall as only a small proportion of the population in this community identifies as Black (Statistics Canada, 2016). As such, racial bias may be acquired over time (e.g., Dunham et al., 2006), resulting in a floor effect where younger children simply show lower levels of bias across conditions. Another possibility is that younger children could have potentially fatigued more easily in our study and paid less attention when taking the IAT at Time 2, therefore bringing the control condition scores closer to zero. Future studies should seek to conceptually replicate this intervention with young children who have higher levels of implicit racial bias and/or who live in more racially diverse environments. Additionally, researchers could consider incorporating a premeasure to control for levels of implicit bias before implementing the intervention. If studies with other populations can successfully reduce bias in younger children using this type of intervention, it would further suggest that this method could be employed to reduce implicit racial bias in children ages 5–8 years.

Furthermore, while our study demonstrates the capacity for implicit bias change in childhood using counterstereotypical exemplar exposure, it does not examine the structure of implicit bias across development or the cognitive mechanisms underlying bias change. Future work should seek to explore potential differences in the nature of implicit bias and mechanisms of bias change between children in early and middle childhood. It is also important to note that our study does not examine potential influences of experimenter or study location on children's performance on the IAT. We used a single experimenter and location for the duration of the study. As such, it is possible that experimenter bias and consistency of location could potentially influence children's performance on the IAT. Though to our knowledge, developmental studies have not yet explored this possibility in children, future research should seek to systematically examine these factors.

It also remains unclear whether or not adding evaluative instructions to this intervention might increase its efficacy with children and result in longer-lasting change comparable to that of adults. We also do not know whether the evaluative instructions enhanced the efficacy of the counterstereotypical exemplar exposure for adults or if the evaluative instructions may have changed bias on their own. Studies have shown that the use of evaluative statements can be effective in changing implicit bias, which would suggest that this addition could have impacted adults' bias without the use of counterstereotypical exemplars (Kurdi & Banaji, 2017). As such, while there is an apparent developmental difference in the efficacy of our child-friendly stories, it is unclear whether the inclusion of these stories directly contributed to the reduction in adult levels of implicit bias. Nonetheless, these results point to potential mechanistic differences in the necessary and sufficient conditions to produce bias change across development that should be explored in future research.

Taken together, our findings highlight the possibility that there are developmental differences in the malleability of implicit racial bias following exposure to counterstereotypical exemplars. We believe that this exemplar exposure serves to reduce implicit racial bias by counteracting existing cultural associations (e.g., pro-White/anti-Black) with an alternative association (e.g., pro-Black/anti-White), which then serves to reduce the magnitude of children's racial bias. Importantly, in accordance with other research, our view is that the malleability observed in this study may reflect process-related change in the activation of implicit racial attitudes, rather than change in the underlying attitude representation (Lai et al., 2014). We suspect that exposure to positive Black exemplars facilitates the activation of positive associations with people who are Black, leading to a decrease in culturally acquired pro-White and/or anti-Black associations. However, future research should examine the mechanisms behind the attitude change observed in the current study, as well as the potential of this method to result in longer-term activation of alternative associations.

We also suspect that children's implicit racial bias may be more malleable than that of adults due to the fact that they have relatively less exposure to cultural stereotypes (Baron, 2015). As a result, exposure to counterstereotypical exemplars in mainstream media, such as TV, movies, or books, may be particularly effective for children, who do not require any additional instruction to internalize counterstereotypical associations. In contrast, for adults, counterstereotypical exemplar exposure may be most effective when paired with diversity training or other forms of explicit instruction (see Bezrukova et al., 2016; Devine et al., 2012). In order to examine these potential differences, we recommend that future research incorporates both adults and children into their investigations of bias malleability as comparative work will help researchers identify optimal strategies to change implicit intergroup bias across development.

In conclusion, these results, combined with those from previous research (Gonzalez, Steele, et al., 2017), indicate that counterstereotypical exemplar exposure can successfully reduce implicit racial bias in children and suggest that counterstereotypical exemplar exposure may be easier to implement with children, particularly older children, as compared to adults. Future research should seek to further examine bias change beyond the course of 1 hr. Additionally, as the effect sizes for our manipulation were small, researchers should consider the potential of *repeated* brief interventions to induce larger effects with longer-lasting bias change. In order to counteract continuous cultural messages of bias and prejudice and to solidify counterstereotypical associations, it may be essential for bias reduction interventions to occur multiple times and to ideally take multiple forms. As such, we hope that future research will build upon the current findings to develop brief, economical, and scalable interventions that can be successfully used to reduce implicit racial bias across development.

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