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RESEARCH ARTICLE

Believing that prejudice can change increases children's interest in interracial interactions

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Abstract

Children begin interacting less across racial lines around middle childhood, but it remains unclear why. We examine the novel possibility that, at that time, children's prejudice theories—their understanding of prejudice as a fixed or malleable attribute—begin to influence their desire for interracial affiliation. We devise immersive behavioral experiences to evaluate when and how prejudice theories affect interracial affiliation. Study 1 measured prejudice theories among 8–13-year-olds ($N = 152$; 76 White, 76 racial minority) and observed children in a newly-developed social interaction task. In line with our hypothesis, children older than 10 years with stronger malleable-prejudice theories exhibited more interest and affiliation in a simulated cross- (vs. same-race) interaction, regardless of their preexisting prejudice level. Study 2 randomly assigned children to listen to a fixed- or malleable-prejudice theory story before engaging in a real, first-time interaction with a same- or cross-race partner at a different school via live video-stream ($N = 150$; 96 White, 54 racial minority). The malleable theory increased children's interest in further interaction with their cross-race partner. These findings highlight the promise of malleable-prejudice theories for sustaining positive interracial relationships during a critical developmental window—when the frequency of cross-race friendships typically declines.

KEYWORDS
interracial interaction, prejudice theories, social cognitive development

1 | INTRODUCTION

Racial tensions in U.S. society and internationally raise fundamental questions about their underpinnings in development. Here, we home in on a critical developmental window in middle childhood—when the frequency of cross-race friendships begin to decline, for reasons that are not well understood. Bridging multiple literatures, we evaluate a new theoretical perspective that may inform this decline and provide insight into interventions that could foster increased interracial affiliation. We do so by devising simulated and real interracial interactions among elementary school children, which is a methodological novelty in the literature on children's interracial relationships. Past research has predominantly relied on retrospective surveys for assessing the quality and quantity of children's interracial relationships, and has focused on overcoming negative racial attitudes and prejudice in order to increase positive interracial interactions (Aboud et al., 2012). Here, we focus on the importance of children's *prejudice theories*: their conception of prejudice itself as a quality of individuals that is fixed versus malleable (Carr et al., 2012). We propose that, at around 10 years of age, fixed versus malleable beliefs regarding prejudice become an important factor shaping children's desire to engage in interracial interactions, for White and racial minority children alike. In two highly immersive behavioral studies with elementary school children, we evaluate whether increased belief in the malleability of prejudice predicts and fosters the desire for sustained interracial interaction.

1.1 | When and why do interracial interactions decline?

Though some children exhibit racially biased attitudes as early as 3 or 4 years, affiliation in interracial interactions only begins to decline around 8–10 years (Pauker et al., 2017). In the transition from middle childhood to pre-adolescence, cross-race friendships become increasingly rare, less stable, and children begin to self-segregate based on race (Aboud et al., 2003; Jugert et al., 2013; Shrum et al., 1988). These changes continue into adolescence, as cross-race friendships further dwindle (Lessard et al., 2019; Wölfer et al., 2016) and segregation persists, even in diverse, integrated schools (McCauley et al., 2001). Pinpointing the reasons for this developmental trend has proven challenging, as these behaviors do not appear to stem from an increase in racial bias. Indeed, children begin to show declines in cross-race friendships and greater self-segregation at a time when explicit bias actually *decreases* (Raabe & Beelmann, 2011). It is possible these developmental trends are linked to changes in children's implicit (vs. explicit) bias, but the literature bearing on this possibility is mixed. Initial research found that implicit bias emerges early and is stable across development (Dunham et al., 2008); however, more recent work suggests that implicit bias may increase (Degner & Wentura, 2010; Golarai et al., 2021) or decrease (Qian, Heyman et al., 2019; Steele et al., 2018) with age. Thus, the potential role of implicit bias in these developmental trends remains unclear.

What is clear, however, is that decreased cross-race friendships and increased self-segregation do correspond with multiple development changes that occur around this age, including increased cognizance of anti-prejudice norms and concern about acting on, or being the target of, prejudice (McKown, 2004; Pauker et al., 2015). By 10 years of age, children increasingly understand discrimination in the context of interpersonal interactions (Brown & Bigler, 2005; McKown, 2004; Quintana, 2008) and start to develop both an understanding of social norms proscribing prejudice and the prerequisite cognitive skills to adhere to these norms (Apfelbaum et al., 2008; Fitzroy & Rutland, 2010; Rutland et al., 2005). For example, recent work shows that 9–12-year-olds are reluctant to mention race and display more anxious nonverbal behavior during such efforts to regulate their behavior—moreover, this is true for both majority and minority children (Pauker et al., 2015). As children become cognizant of anti-prejudice norms, they may also come to view interracial interactions as more interpersonally challenging. One possibility, therefore, is that the documented decline in interracial relationships corresponds with a deeper understanding among majority and minority children of the "stakes" of interracial interactions—a social setting laden with the risks of expressing or experiencing prejudice. Effectively intervening may thus involve altering children's perception of those risks (e.g., via their construal of prejudice itself; Carr et al., 2012; Neel & Shapiro, 2012). Specifically, this suggests that portraying prejudice as a malleable attribute that can be overcome (vs. a fixed one that cannot) may increase children's desire to engage in interracial interaction.

RESEARCH HIGHLIGHT

- a malleable-prejudice theory may constructively reframe both racial majority and racial minority group members' approach to interracial interaction
- increased engagement (or disengagement) in interracial interaction can arise developmentally from pathways *independent* of prejudiced attitudes

Previous research has shown that individuals with relatively fixed beliefs are more likely to disengage from challenging situations in which they have the potential to fail, such as interracial interactions, because they risk being labeled by themselves or others (e.g., as prejudiced; Blackwell et al., 2007; Carr et al., 2012). Conversely, individuals with relatively more malleable beliefs are more likely to engage with challenging situations because they focus on learning and improving knowledge and skills (Blackwell et al., 2007; Carr et al., 2012; Neel & Shapiro, 2012). Our theory and predictions build on recent evidence that prejudice theories can affect White adults' interracial expectations and behavior (Carr et al., 2012; Neel & Shapiro, 2012). White adults who view prejudice as more fixed were less interested in and more uncomfortable in interracial compared to same-race interactions, even controlling for explicit and implicit prejudice (Carr et al., 2012). Fixed-prejudice beliefs led White adults to focus on concerns about being labeled racist whereas malleable-prejudice beliefs led them to focus on learning strategies (Carr et al., 2012; Neel & Shapiro, 2012).

We expect that prejudice theories become an important factor influencing children's interracial affiliation because they shape how children construe interracial interactions. Specifically, children with fixed-prejudice theories may display less interest in interracial interaction due to emergent concerns about being labeled as, or targeted by someone, prejudiced. By contrast, children with malleable-prejudice theories may exhibit greater interest in interracial interaction due to their focus on learning about and from people who are different (Migacheva & Tropp, 2013). Moreover, we expect the impact of prejudice theories to emerge at around 10 years as children develop a deeper understanding of the meaning and interpersonal dynamics of prejudice.

1.2 | Overview

In two immersive behavioral studies with elementary school children, we evaluate when and how malleable-prejudice theories affect interest in interracial interaction. We focus on children's desire to interact more with partners following simulated (Study 1) and real (Study 2) interracial interaction. We also examine behavioral markers of affiliation during these interactions, such as approach-oriented nonverbal behaviors in Study 1 (e.g., smiling, and other behaviors that signal closeness) and nonverbal synchrony in Study 2 (the extent to which interaction

partners behaviorally mimic each other; Pearson et al., 2008; Trawalter et al., 2009). These two measures of affiliation (desire to interact and nonverbal behavior) represent important indicators of the formation and continuation of cross-group friendships (Murphy et al., 2011).

2 | STUDY 1

In Study 1, we measure 8–13-year-old White and racial minority children's preexisting prejudice theories and ask them to video-record a message to a same- or cross-race partner about a race-related topic—a situation likely to activate concerns over prejudice (Goff et al., 2008). We expect that children with relatively malleable-prejudice theories will express greater interest in future interaction and display more behavioral affiliation with cross-race, but not same-race partners. However, we only expect this pattern to emerge at around 10 years because this age coincides with the point at which (a) the incidence of interracial interactions generally decline and (b) children understand prejudice enough for prejudice theories to impact their construal of these interactions (McKown, 2004; Pauker et al., 2015). We also isolate the effect of prejudice theories on children's interracial affiliation from concomitant effects of prejudice. Specifically, we control for levels of implicit prejudice, since research with adults has found implicit bias is more strongly linked to nonverbal behavior in interracial interactions than explicit bias (Dovidio et al., 2002; Greenwald et al., 2009). Based on work in adult samples (Carr et al., 2012), we did not expect children's implicit prejudice to be related to their prejudice theories, or that their implicit prejudice would moderate the effects of prejudice theories on interracial affiliation. Finally, as an exploratory measure, we also examine *why* prejudice theories shape children's interest in interracial interactions, including the possibility that malleable-prejudice theories increase interest in interracial interaction through reframing the interaction as an opportunity to learn.

3 | METHOD

3.1 | Participants

We recruited 161 8–13-year-old children from elementary schools (three public, two private) that serve a range of low- to upper-middle-income families near San Francisco, California. The schools' student populations varied in their racial composition, and racial composition was confounded with SES. Given these school-level differences, we include schools as a factor in all analyses. Characteristics of each of the schools appear in Table S1 in Supplementary Information (SI). We report all measures, manipulations, and exclusions in the SI. These data were collected in 2010 and no power analyses were completed prior to data collection. The target sample size (based on sample sizes from the adult interracial interaction literature; e.g., Goff et al., 2008) was $n = 80$ per condition (same- or cross-race partner), and $n = 40$ per racial group (i.e., White majority member or racial minority member) within condition, and age and prejudice beliefs were treated as continuous. Data collection was stopped when we reached the target sample size and no data analysis was conducted before data collection was complete. Nine children were excluded from analyses either because they misidentified their partner's race in the manipulation check ($n = 7$) or because of experimenter error in the protocol ($n = 2$). The final sample ($n = 152$; 61 males, 91 females; $M_{age} = 9.86$ years, $SD_{age} = 1.17$) was racially diverse: 76 White, 42 Latinx, 22 Asian, nine Multiracial, and three Black children. Analyses compared White children ($n = 76$) to racial minority children ($n = 76$). Although Latinx, Asian, Multiracial and Black children differ in status and in the cultural stereotypes associated with their groups, in terms of interracial interactions, all of these groups have been found to experience peer discrimination (Fisher et al., 2000). Thus, we combined Latinx, Asian, multiracial, and Black children into a single group for analyses because of their shared experiences as targets of peer discrimination. A sensitivity power analysis conducted with our sample size found that with 80% power, $\alpha = 0.05$, we would be able to detect an effect of $f^2 = 0.05$ for the main multiple regression analyses.

3.2 | Procedure

The study was comprised of two phases, separated by one week, which we describe in detail in the SI. In both phases, individual children participated in a quiet location, separate from other children. In Phase 1, children were told that they would be asked to create a video message to be sent to a partner—ostensibly another child at a different school who would create a similar message for them. Children saw a photo of their partner prior to creating their video message, and similarly, learned their partner would be able to see a picture of them before creating his or her message. We manipulated the race of the partner photo (same- vs. cross-race partner) between participants, but matched photos to the gender of the child. For cross-race partners, children were paired with a partner who was likely to elicit prejudice concerns: White children were assigned a Black partner; Asian, Latinx, and Black children were assigned a White partner. There were two partner photos for each racial group and gender (e.g., two Black females, two Black males). Pretesting confirmed that partner photos were reliably identified as members of the intended racial group. Across racial groups, they portrayed children of a similar age background ($M = 9.4$ years), and were standardized for attractiveness, expressed emotion (i.e., all were smiling), and photo quality.

After children saw their partner's photo, they answered questions regarding their expectations about making their video message. Next, the experimenter asked the child to draw one of several folded pieces of paper from a cup to determine the topic of their video message—which, unbeknownst to them, included the same three race-related questions designed to activate prejudice concerns. After the experimenter read the questions aloud to children and confirmed their understanding, children video-recorded their message.

After the video, children completed a series of items that assessed their concerns with conveying the message to their partner and their interest in engaging in future interactions with their partner. Next, they completed the other-group orientation scale, a measure of friendship diversity, and reported their own and their partner's racial/ethnic background. Approximately one week after completing Phase 1 of the study, a new experimenter returned and administered a series of individual difference measures: a prejudice theories scale, a child version of the race Implicit Association Test (Child-IAT), a global measure of interracial anxiety, and items measuring loneliness and self-esteem. Experimenters in both phases were blind to hypotheses, and importantly the experimenter who collected the main predictor (prejudice theories) was not the same as the one who collected the child's video message. We prioritized our main dependent measures (interest in future interaction and behavioral affiliation) in Phase 1 when the child created their video-message. We included explicitly race-related measures for assessing construct validity of the prejudice theories scale (i.e., interracial anxiety) or for use as controls (i.e., the IAT) in Phase 2 of the study (several weeks later).

3.3 | Measures

The primary goal of our analysis was to test our main predictions regarding when and how prejudice theories predict children's desire to engage in interracial interaction.[1] The secondary goals of our analysis were to (a) assess the convergent and discriminant validity of the prejudice theories construct and (b) to explore process-related measures that may be relevant to understanding why prejudice theories relate to the desire to engage in interracial interaction. We include the descriptions of these secondary measures and corresponding analyses, including exploratory mediation analyses in the SI. All full measures (listed in the order they were administered) and sample materials (e.g., partner photos) are available at https://osf.io/ngr5m/?view_only. Photo stimuli came from sets developed in our lab. All self-report questions and scales used the same Likert response scale (1 = *very strongly disagree*, 6 = *very strongly agree*).

3.3.1 | Prejudice theories

First, the experimenter defined prejudice: "Prejudice is when we don't like people who are different than us. For example, some people may not like other people based on their skin-color." We then measured children's prejudice theories using four items, adapted from the adult version of the Theories of Prejudice scale (Carr et al., 2012; e.g., "People have a certain amount of prejudice and they can't change that"). We averaged the items ($\alpha = 0.75$; $\alpha_{\text{younger (8–9-year-olds)}} = 0.75$; $\alpha_{\text{older (10–13-year-olds)}} = 0.75$) with higher scores indicating more fixed beliefs. Both older and younger children exhibited high reliability on this scale, indicating that the younger students could answer and respond to the questions in a consistent manner.

3.3.2 | Assessing prejudice theories construct validity

To assess the construct validity of the prejudice theories scale among children, we collected measures predicted to relate to prejudice theories (other-group orientation, interracial anxiety, friendship diversity). We also measured a different lay theory (personality theories scale) shown to be related to, but conceptually distinct from, prejudice theories in adult samples (Carr et al., 2012). Finally, we administered measures predicted *not* to relate to prejudice theories (loneliness, self-esteem). All of these measures are described in the SI.

3.3.3 | Implicit racial prejudice

We administered the Child-IAT (Dunham et al., 2008) as a measure of children's implicit racial prejudice. The IAT produces a single score that may reflect a combination of ingroup positivity and outgroup negativity. Children completed one of two types of IATs: a Latinx-White version (if they were Latinx) or a Black-White version (all other children in our study). Photos used in the IATs depicted children the same age as participants, and were matched for attractiveness and the emotion displayed. Following Greenwald et al. (2003), we computed an IAT effect size (*D*) such that positive scores indicated more pro-White/anti-Black or anti-Latinx bias and negative scores indicated more pro-Black or pro-Latinx/anti-White bias.

3.3.4 | Expectations

Before filming their video-message, children rated their expectations regarding making their video-message for a same- or cross-race partner on four dimensions. They indicated their agreement with one item that measured their *learning* expectation (Migacheva & Tropp, 2013; "I think I can learn a lot from the other student"), one item that measured their expectation of *similarity* to their partner (Levy & Dweck, 1999; Mallett et al., 2008; "I think the other student shares my same interests, worries, and hopes"), one item that measured their expectation of *being not liked* by their partner (Shelton et al., 2009;"I am concerned that the other student will not like me"), and four items that measured their *self-efficacy* expectations regarding making the video message (Plant & Devine, 2003; e.g., "I am worried about making my video message"). These expectations items (learning, similarity, liking, and self-efficacy) were used in exploratory mediation analyses described in the results and presented more fully in the SI.

3.3.5 | Interest in future interaction

After recording their message, children rated their interest in future interactions with their partner using three items (adapted from Pearson et al., 2008; e.g., "I would be excited to continue sharing what I think

with the same student."). The items were averaged together ($\alpha = 0.76$) with higher scores indicating more interest in future interactions with their partner.

3.3.6 | Verbal approach behavior

We coded the verbal content of children's messages as a measure of approach-oriented behavior (see SI for coding details). Two judges, blind to condition and hypotheses, independently read transcripts of the children's messages and made an overall rating of the extent to which the child's message was approach-oriented, defined as suggestions mentioned by the child that focused on decreasing interpersonal distance between the child and the other person (e.g., made suggestions to invite the child to play) on a scale of 1 (*not at all*) to 9 (*extremely*). Raters achieved high reliability in their overall ratings (inter-rater reliability: $\alpha = 0.80$); thus, we averaged their ratings. Higher scores indicate greater verbal approach behavior.

3.3.7 | Nonverbal approach behavior

Judges, blind to condition and hypotheses, independently viewed silent videos of children's behavior during the video-message (see SI for coding details). Eight judges were trained on coding two aspects of nonverbal approach-oriented behavior—(1) overall rating of friendliness and (2) overall rating of approachable/openness (Trawalter et al., 2009). They achieved acceptable reliability (inter-rater reliability: αs = 0.64–0.89), consistent with meta-analytic work examining nonverbal behavior in interracial interactions with adults (Toosi et al., 2012). Subsequently, at least two judges independently coded each video on a scale of 1 (*not at all*) to 9 (*extremely*) for friendliness and approachability/openness. We averaged ratings of friendliness and approachability/openness to form an index of nonverbal approach behavior ($\alpha = 0.95$). Higher scores indicate greater nonverbal approach behavior.

4 | RESULTS

4.1 | Analytic approach

To account for the nested nature of our data (i.e., participants nested within schools), we utilized multilevel linear models using MIXED with school as a random intercept in SPSS 22 (Heck et al., 2012) to test our main predictions regarding when and how prejudice theories shape children's interest in interracial interaction. We regressed each dependent variable onto age, prejudice theories, condition (−1 = same-race, 1 = cross-race), participant race (−1 = White, 1 = racial minority), and their interactions. We expected an Age × Prejudice Theories × Condition interaction and used simple slopes to probe this predicted interaction. Specifically, we expected the slope of prejudice theories to only be significant in the cross-race condition among older children. We also explored the four-way interaction with participant race, and other three-way interactions with participant race in the model. However, when these interactions do not contribute significantly to the model, we report the results from models that do not include them. All continuous predictors were centered (Aiken & West, 1991) and we report unstandardized coefficient values. We present descriptive statistics for all measures and zero-order correlations in Table S2 (see SI). Twenty-two students' responses were missing values on one or more of the measures. The variables with the most missing values were implicit prejudice (9%), loneliness (6.5%), and self-esteem (6.5%). We used multiple imputation to create 20 imputed data sets (see Enders, 2010). All analyses drew on the 20 imputed data sets and used pooled parameter estimates and standard errors across them.

4.2 | Assessing convergent and discriminant validity of prejudice theories

Supporting the convergent validity of the prejudice theories construct, the measure was predictably associated with several measures relevant to interracial interactions. Participants with a more malleable (versus fixed) view of prejudice reported more interest in engaging in interracial interactions, $r(150) = -0.37$, 95% CI [-0.50, -0.22], $p < 0.001$, more friendship diversity, $r(150) = -0.19$, 95% CI [-0.34, -0.03], $p = 0.019$, and less interracial anxiety, $r(150) = 0.33$, 95% CI [0.18, 0.46], $p < 0.001$. Notably, these relationships held after controlling for implicit prejudice (see SI). As expected, we observed a moderate positive relationship between prejudice theories and personality theories, $r(150) = 0.41$, 95% CI [0.27, 0.53], $p < 0.001$. Importantly, all relationships reported above also held controlling for personality theories, except for friendship diversity (see SI). Supporting discriminant validity, the prejudice theories construct was not related to implicit prejudice, $r(150) = 0.06$, 95% CI [-0.10, 0.22], $p = 0.471$, loneliness, $r(150) = 0.10$, 95% CI [-0.06, 0.26], $p = 0.250$, or self-esteem, $r(150) = -0.11$, 95% CI [-0.26, 0.05], $p = 0.180$. Together, these results support the convergent and discriminant validity of the prejudice theories scale for children.

4.3 | Interest in future interactions

We observed an effect of prejudice theories, $B = -0.16$, 95% CI [-0.30, -0.03], $SE = 0.07$, $p = 0.019$, such that malleable views of prejudice predicted more interest in interacting with their partner in the future. We also observed the predicted Age × Prejudice Theories × Condition interaction, $B = -0.14$, 95% CI [-0.25, -0.02], $SE = 0.06$, $p = 0.020$ (see Figure 1). Among younger children (−1 SD, ~8.69 years), prejudice theories were not significantly related to their interest in future interactions with same-race partners, $B = -0.23$, 95% CI [-0.51, 0.04], $SE = 0.14$ $p = 0.099$, or cross-race partners, $B = 0.01$, 95% CI [-0.22, 0.24], $SE = 0.12$, $p = 0.904$. However, among older children (+1 SD, ~11.03 years), malleable beliefs about prejudice predicted greater interest in future interaction with cross-race partners, $B = -0.42$, 95% CI [-0.16, -0.68], $SE = 0.13$, $p = 0.002$, but were not related to their interest in

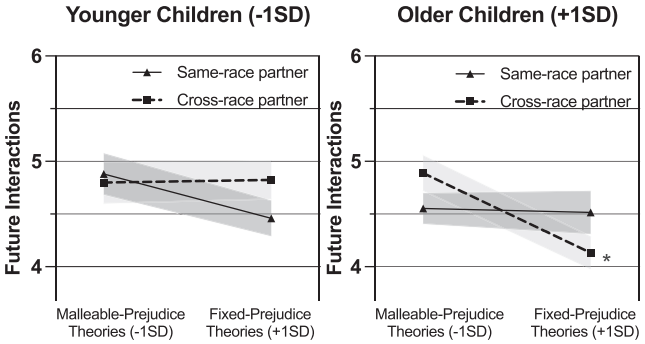

FIGURE 1 Study 1: Desire for future interactions among younger (−1 SD) and older (+1 SD) children, as a function of their theory about prejudice and whether they created a message for a same- or cross-race partner. Error bands represent standard error. * Indicates a significant slope

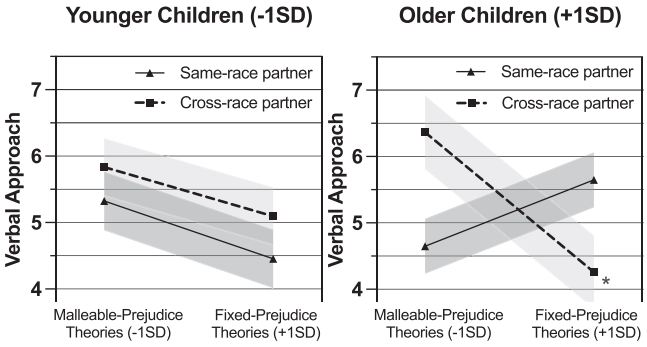

FIGURE 2 Study 1: Verbal approach behavior in messages among younger (−1 SD) and older (+1 SD) children, as a function of their theory about prejudice and whether they created a message for a same- or cross-race partner. Error bands represent standard error. * Indicates a significant slope

future interaction with same-race partners, B = -0.02, 95% CI [-0.28, 0.24], SE = 0.13, p = 0.875.

4.4 | Verbal approach behavior

We observed the predicted Age × Prejudice Theories × Condition interaction, B = -0.38, 95% CI [-0.75, -0.02], SE = 0.19, p = 0.040 (see Figure 2). Among younger children (−1 SD, ~8.69 years), prejudice theories were not related to verbal approach behavior in the message conveyed to either same-race partners, B = -0.48, 95% CI [−1.38, 0.40], SE = 0.45, p = 0.289, or cross-race partners, B = -0.41, 95% CI [−1.21, 0.39], SE = 0.41, p = 0.311. However, among older children (+1 SD, ~11.03 years), malleable views of prejudice were associated with more approach messages in the cross-race partner condition, B = −1.17, 95% CI [−2.01, -0.33], SE = 0.43, p = 0.006, but were not related to approach messages in the same-race partner condition, B = 0.55, 95% CI [-0.34, 1.45], SE = 0.46, p = 0.223.

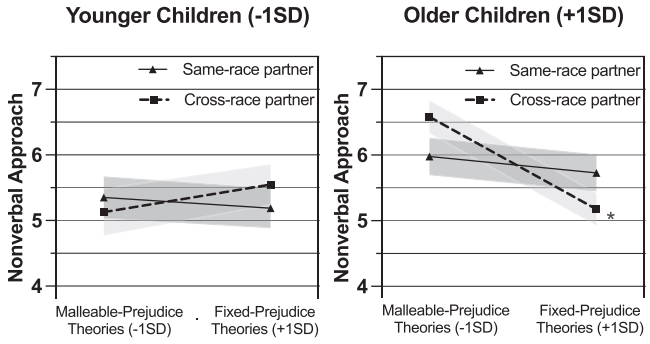

FIGURE 3 Study 1: Nonverbal approach behavior among younger (−1 SD) and older (+1 SD) children, as a function of their theory about prejudice and whether they created a message for a same- or cross-race partner. Error bands represent standard error. * Indicates a significant slope

4.5 | Nonverbal approach behavior

There was an effect of age on nonverbal approach behavior, B = 0.24, 95% CI [0.05, 0.43], SE = 0.10, p = 0.015, such that older children displayed more nonverbal approach overall than younger children. The predicted Age × Prejudice Theories × Condition interaction was not significant, B = -0.21, 95% CI [-0.43, 0.02], SE = 0.11, p = 0.070. Given our planned analyses, however, we probed the interaction using simple slopes analysis (see Figure 3). Among younger children (−1 SD, ~8.69 years), prejudice theories were not related to nonverbal approach behavior with either same- or cross-race partners, Bs = -0.09, 0.23, 95% CIs [-0.64, 0.46], [-0.23, 0.69], SEs = 0.28, 0.23, ps = 0.744, 0.320. However, among older children (+1 SD, ~11.03 years), malleable beliefs about prejudice were associated with more nonverbal approach in the cross-race partner condition, B = -0.78, 95% CI [−1.35, -0.21], SE = 0.29, p = 0.007, but were not related to nonverbal approach in the same-race partner condition, B = -0.14, 95% CI [-0.65, 0.37], SE = 0.26, p = 0.597.

4.6 | Analyses controlling for prejudice (IAT)

First, we examined general levels of implicit prejudice in our sample. Children in the sample exhibited a slight pro-White/anti-Black or pro-White/anti-Latinx bias (M = 0.06, SD = 0.38) that was not correlated with age, r(150) = -0.09, p = 0.383, or prejudice theories, r(150) = 0.06, p = 0.471. Similar to past work (e.g., Qian, Heyman et al., 2019), IAT scores were uncorrelated with other explicit measures (see Table S2 in SI). We ran one-sample t-tests to compare the level of implicit prejudice to 0 (no bias). The sample as a whole did not show a reliable pro-White/anti-Black or pro-White/anti-Latinx implicit prejudice, but consistent with past work, this differed by participant racial group membership. White children displayed a reliable pro-White/anti-Black bias, D = 0.12, SE = 0.04, t(85) = 2.95, p = 0.004, whereas children of color did not exhibit reliable pro-White/anti-Black (Asian and Black children)

or pro-White/anti-Latinx (Latinx children) bias, D = -0.02, SE = 0.05, $t(65)$ = -0.02, p = 0.985.

Second, we re-ran the previously reported analyses on all three outcomes, including IAT scores with all two- and three-way interactions with IAT in the model. Results demonstrate that the central Age × Prejudice Theories × Condition interaction remains reliable for all three outcomes *after* controlling for implicit prejudice. This suggests that prejudice theories predict interest and affiliation in interracial interaction in older children above and beyond any concomitant effects of racial prejudice (see SI for all analyses).

4.7 | Mediation

We also ran an exploratory mediation analysis (see model descriptions and results presented in SI). We tested plausible alternative processes by which prejudice theories may improve interracial interactions: increasing learning expectations (our theorized process; Migacheva & Tropp, 2013), making outgroup members seem more similar to the self (Mallett et al., 2008), bolstering individuals' self-efficacy about navigating the interaction (Plant & Devine, 2003), and leading individuals to expect their partner will like (versus reject) them (Shelton et al., 2009). We only observed supporting evidence for learning expectations. Learning expectations mediated the effect of prejudice theories on interracial affiliation among older children for two out of the three affiliation outcomes (e.g., interest in future interaction and nonverbal approach behavior, but not for verbal approach behavior).

The results of Study 1 provide evidence that prejudice theories predict children's interest in interracial interaction, and highlight when this occurs in development. Specifically, older children (>10 years) with relatively malleable-prejudice theories exhibited more interest in interracial interaction and expressed more verbal and nonverbal approach behavior during their video message to a cross-race partner. Additionally, exploratory mediation analyses suggest that malleable-prejudice theories may operate by increasing children's expectations about the opportunity to learn in interracial interaction.

5 | STUDY 2

We sought to build on the results of Study 1 in two key ways. First, by isolating the causal impact of prejudice theories, and second, by examining its impact on real, first-time interracial interactions between children. We temporarily manipulated 10–12-year-old children's prejudice theories via a storybook that advocates a malleable- or fixed-prejudice theory. We then examined the causal effects of prejudice theories on live video-streamed interactions between children in one school (who received the manipulation) and a novel same- or cross-race partner in another school (who did not). Following the interaction, we again assessed interest in further interaction with partners. We also utilized a holistic measure of dyadic affiliation—nonverbal synchrony, reflecting the extent to which interaction partners' behavior is coordinated (e.g., if one person smiles does the other person smile?). Nonverbal synchrony is an important indicator of affiliation and rapport in dyadic interaction (Tickle-Degnan & Rosenthal, 1990), including interracial interaction (Pearson et al., 2008), as it is considered a mechanism that can enhance social bonding across group divisions (Tuncgenc & Cohen, 2016). Since unstructured interactions are particularly likely to evoke concerns about prejudice (Babbitt & Sommers, 2011), we examine the effects of prejudice theories on nonverbal synchrony during unstructured moments at the beginning of a social interaction versus those structured around specific topics.

6 | METHOD

6.1 | Participants

We recruited 10–12-year-old children (M = 10.42 years, SD = 0.65) from five elementary schools (four public, one private) that serve lower- and middle-class families near San Francisco, California. In two of the schools, the majority of children were White, whereas the other three schools were relatively heterogeneous in terms of race. As in Study 1, the racial composition of schools was confounded with socioeconomic status. Characteristics of each school appear in Table S1. The target sample size (based on sample sizes from the adult interracial interaction literature) was n = 40 per type of dyad (cross-race vs. same-race) and n = 20 per prejudice theory (fixed vs. malleable) within each type of dyad. Data collection was stopped when we reached the target sample size and no data analysis was conducted before data collection was complete. Due to the practical constraints of coordinating relatively equal numbers of same-race and cross-race interactions across multiple school sites, only children at majority White schools received the manipulation and children in the more heterogeneous schools served as their interaction partners.

Thus, children from the majority White schools were randomly assigned (1) to receive a malleable or fixed story about prejudice; and (2) to interact with an unfamiliar same-race or cross-race child from one of the more diverse schools. Both factors were manipulated between participants. We examined the effect of changing the prejudice theories of one interaction partner on the dynamics of the interaction as a whole; we collected future interaction interest and affiliation measures from both children in each dyad. This yielded 82 interaction dyads. Seven dyads' data were unusable due to internet connectivity problems (n = 3), misidentification of partners' race (n = 2), or researcher error (n = 2). Of the remaining 75 dyads, 31 were same-race (87% White-White, 13% minority-same minority; 52% male, 48% female) and 44 were cross-race (95% White-minority, 5% minority-different minority; 55% male, 45% female). The final sample (N = 150 children, 74 females) was racially diverse (96 White, 16 Asian, 17 Latinx, and 21 Black). A sensitivity power analysis conducted with our sample size found that with 80% power, α = 0.05, we would be able to detect an effect of η^2 = 0.05 for the main analyses.

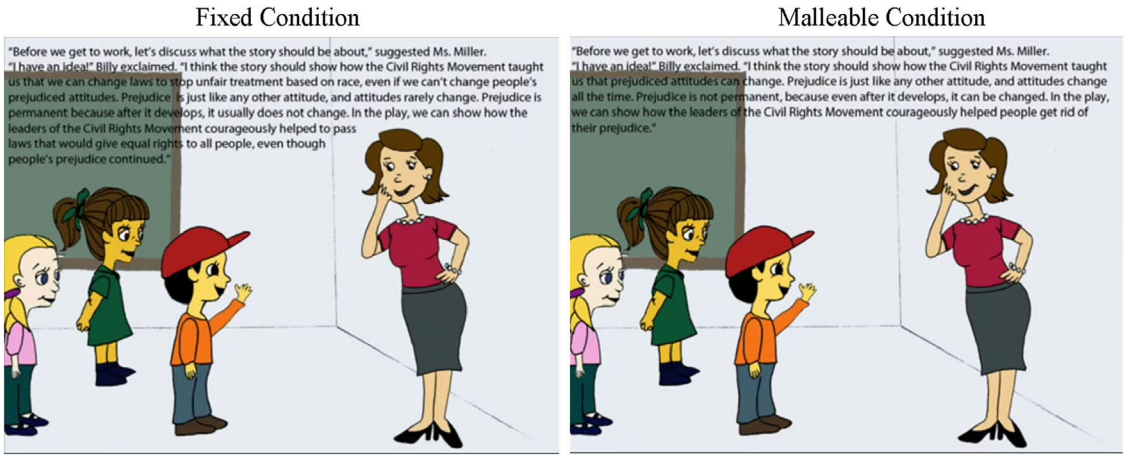

FIGURE 4 Example of storybook manipulation of prejudice theories used in Study 2

6.2 | Materials and procedure

Teams of experimenters present at both majority White and diverse schools were tasked with coordinating the timing of each experimental session to facilitate interactions between children who received the manipulation (referred to as "participants") and their partners who did not (referred to as "partners"; we describe the full procedure in detail in the SI). We employed several procedures to reduce the potential for demand effects. Experimenters told children that there would be two separate tasks, but did not describe the second task until the first task was complete. The purpose of the first task—the manipulation of prejudice theories—was ostensibly to help evaluate a story's suitability for younger children in their school. The second task involved a real interaction between two children via live video stream (using FaceTime® on Apple iPads). To further reduce the potential for demand effects, we employed a different experimenter for the first and second tasks.

6.2.1 | Prejudice theories manipulation

Students at both schools viewed an illustrated digital storybook on a laptop computer (modeled after the materials used in Apfelbaum et al., 2010; see Figure 4). We created a series of illustrations and synchronized them with a prerecorded audio narrative. The storybook described a third-grade teacher's efforts to share what her class had learned about the Civil Rights Movement (or about protecting the environment in the control version) by organizing a class performance. Participants were randomly assigned to view a storybook that emphasized either a fixed or malleable view of prejudice, and their partners all saw the control version of the storybook, which instead focused on protecting the environment. The content of the narratives was virtually identical in the two versions that discussed fixed or malleable views of prejudice. At three critical points, however, the narratives diverged in how they described prejudice. The *fixed* version indicated that prejudice cannot change (e.g., "Prejudice is permanent because after it develops, it usually does not change" and "Changes in laws to give equal rights to all people are important, even if prejudice deep down cannot be erased"). The *malleable* version emphasized that prejudice can change (e.g., "Prejudice is not permanent, because even after it develops, it can be changed" and "Changing prejudice is important because with enough effort, even prejudice deep down can be erased"). Note, at the conclusion of the study, we presented all children with a malleable version of the story to mitigate any potential negative effects of the fixed condition. See https://osf.io/ngr5m/?view_only for the full text of all storybooks.

A number of procedures detailed in the SI were employed to ensure that experimenters remained blind to condition assignment. After viewing their assigned story (~10 min.), both the participants and their partners completed a series of items to assess their comprehension of the story and were given the opportunity to provide feedback. Once complete, a different experimenter introduced them to the second task. This maintained the cover story of two separate tasks, and further, ensured that the experimenter who facilitated the interaction was blind to the prejudice theories condition.

6.2.2 | Interracial interaction

Different sets of experimenters at both schools—blind to the prejudice theories condition—introduced the second task to each respective child. Experimenters in both locations communicated via a shared electronic document to confirm that they were in sync with one another and were ready to proceed. Once ready, the experimenters positioned their computer tablets in front of the children and activated the live video stream. Students completed secondary measures of their expectations regarding the interaction within moments of the live video stream starting. Once connected, the participant and partner each introduced themselves and shared a "fun fact." The partner then drew one of many folded pieces of paper from a large container to determine the first discussion question, which was always about healthy eating. The children proceeded to offer their responses (participant first

and partner second) and then were given a maximum of 5 min to converse naturally. They then repeated this procedure for a second question drawn by the partner from a different container, which was about race relations (see SI for the wording of both questions). Both questions were pretested to ensure children could understand the questions and answer them. We video-recorded the interactions with separate cameras in each location.

When the interaction ended, the experimenters closed the video stream and asked children to complete the central measure regarding interest in engaging in future interactions with their partner as well as secondary measures that assessed their impressions of the interaction (analyses for secondary measures are presented in the SI). Children then completed items that assessed the manipulation of prejudice theories, as well as demographics items. Finally, as part of debriefing, we presented all children who received either the fixed- or malleable-prejudice storybook with a shortened version of the malleable-prejudice theory storybook to mitigate any possible adverse effects of the fixed condition.

6.3 | Measures

6.3.1 | Manipulation check

To assess our manipulation, children completed the measure of prejudice theories used in Study 1.

6.3.2 | Interest in future interactions

Children rated their interest in future interactions with their partner using two items (e.g., "If the other student went to my school, I would talk to them in the class or on the playground"). The items were averaged together ($\alpha = 0.74$) with higher scores indicating more interest in future interactions with their partner.

6.3.3 | Nonverbal synchrony

Videos from the camera at each location were digitally merged (see SI) so that both children appeared on the same screen (see Figure 5 for a sample still image).

We were unable to create merged videos for 16 dyads because at least one child's video in the dyad was missing (e.g., because the child did not want to be videotaped). We then divided each digitally merged video into three segments based on discussion topic: introduction, race-neutral question, and race-related question, and sampled a thin-slice (a 5-s slice) from the beginning, middle, and end of each segment. The thin slice technique—coding short sections of a longer interaction—has been shown to yield valid judgments of a number of behavioral variables, including interactional synchrony, our variable of focus (see Ambady et al., 2000). Further, this technique has demonstrated reliability and validity when adults are judging thin sliced videos of children (Tackett et al., 2016). Four judges, blind to hypotheses, then independently viewed the three thin-slices (15 s total per segment) blocked by discussion topic (i.e., introduction, race-neutral question, race-related question) with the audio removed. Removal of the audio served two purposes: it allowed judges to focus on nonverbal behavior and it kept them blind to the content of the discussion. They evaluated each dyad's nonverbal synchrony using three items: the extent to which they appeared to have similar body posture/movement, appeared coordinated, and appeared to have similar tempo (Bernieri & Rosenthal, 1991). The judges achieved interrater reliability among a subset of 30 videos (αs = 0.65–0.80; see SI), and at least two judges coded each video. We averaged ratings across all three items to form an index of nonverbal synchrony ($\alpha = 0.86$).

6.3.4 | Secondary measures

We include descriptions of secondary measures (i.e., pre-interaction expectations and post-interaction impressions) and corresponding analyses in the SI.

7 | RESULTS AND DISCUSSION

7.1 | Analytic approach

We analyzed the manipulation check of prejudice theories and the measure of interest in future interactions at the level of the dyad using a 2 (Prejudice Theories: fixed, malleable) × 2 (Dyad Race: same-race, cross-race) × 2 (Participant Role: Participant, Partner) mixed model ANOVA with the first two factors between dyads and the last factor within dyads. We analyzed the measure of nonverbal synchrony at the level of the dyad using a 2 (Prejudice Theories: fixed, malleable) × 2 (Dyad Race: same-race, cross-race) × 3 (Topic: introduction, race-neutral, race-related) mixed model ANOVA with the first two factors between dyads and the last factor within dyads. Participant role was not included in this analysis because there is only one nonverbal synchrony score per dyad. In line with our theory and results from Study 1, we predicted a Prejudice Theories × Dyad Race interaction such that a malleable- (vs. fixed-) prejudice theory would yield more interest in future interactions and more nonverbal synchrony in cross-race but not same-race dyads. We tested these specific predictions with one-tailed contrasts when we expected a directional effect (e.g., in cross-race dyads) and two-tailed contrasts when we expected no effect (e.g., in same-race dyads). We expected these effects on nonverbal synchrony to be more pronounced for race-related discussion topics.

7.2 | Manipulation check

We expected those who received the malleable-prejudice message compared to those who received the fixed-prejudice message to

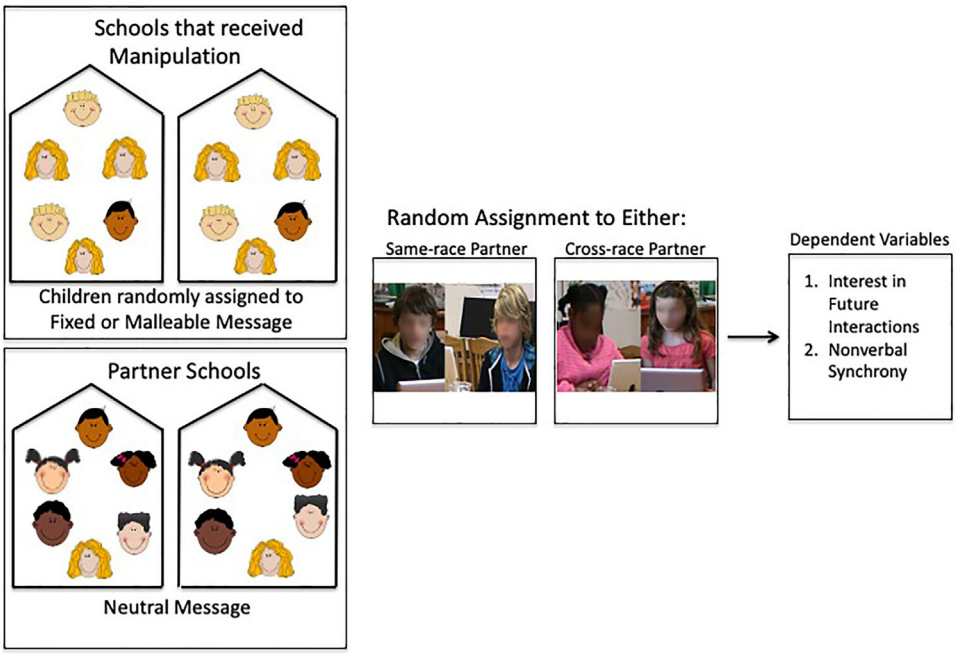

FIGURE 5 Study 2 design: participants at majority White schools who received the manipulation were randomly assigned to interact with same-race or cross-race partners from diverse schools

endorse more malleable theories about prejudice on the prejudice theories scale. We did not have a clear prediction about whether partners' prejudice theories would change based on being paired with children who received the malleable- or fixed-prejudice theories manipulation. We observed a Prejudice Theories x Participant Role interaction, $F(1, 71) = 10.44$, $p = 0.002$, $\eta_p^2 = 0.13$, 95% CI [0.02, 0.27]. Supporting the effectiveness of our manipulation, participants (those children exposed to the manipulation) expressed greater beliefs in the malleability of prejudice in the malleable condition ($M = 2.49$, $SD = 0.81$) than in the fixed condition ($M = 3.24$, $SD = 0.73$), $t(71) = 3.28$, $p < 0.001$, $r = 0.36$, 95% CI [0.18, 0.52]. Partners' (those children not exposed to the manipulation) endorsement of prejudice theories did not differ based on whether the participant in their dyad had been exposed to a malleable message ($M = 3.19$, $SD = 1.26$) or a fixed ($M = 2.89$, $SD = 1.04$) message; $t(71) = -1.38$, $p = 0.172$, $r = -0.16$, 95% CI [-0.37, 0.07].

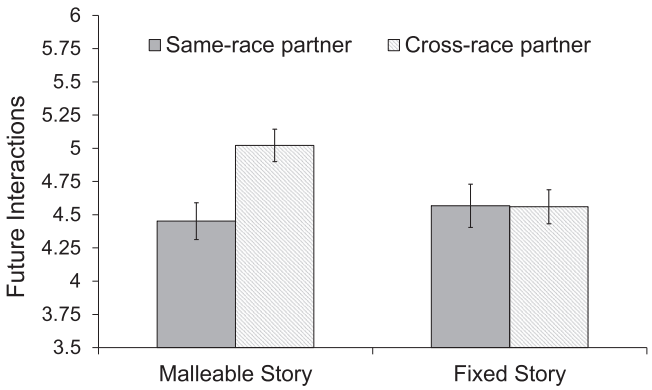

FIGURE 6 Study 2: Children's mean desire for future interactions with their partner according to what story manipulation they received and whether they were in a same-race or cross-race dyad. Error bars denote standard error

7.3 | Interest in future interactions

Children expressed more interest interacting with their cross-race versus same-race partner in the future, $F(1, 71) = 4.11$, $p = 0.046$, $\eta_p^2 = 0.06$, 95% CI [0, 0.18], but this was qualified by the predicted Prejudice Theories × Dyad Race interaction, $F(1, 71) = 4.34$, $p = 0.041$, $\eta_p^2 = 0.06$, 95% CI [0, 0.18]; see Figure 6. Planned contrasts indicated both participants and their partners in the cross-race dyads expressed more interest in future interaction in the malleable ($M = 5.02$, $SD = 0.80$) compared with the fixed condition ($M = 4.56$, $SD = 0.82$), $t(71) = 1.84$, $p = 0.035$, $r = 0.21$, 95% CI [0.02, 0.39]. However, children in same-race dyads showed no difference in future interaction interest between the malleable ($M = 4.45$, $SD = 0.80$) and fixed condition ($M = 4.57$, $SD = 0.77$,), $t(71) = 0.38$, $p = 0.705$, $r = 0.05$, 95% CI [-0.18, 0.27]. Among dyads who received the fixed manipulation, children did not differ in their interest in interacting with their same- or cross-race partner in the future, $t(71) = 0.03$, $p = 0.976$, $r = 0.003$, 95% CI [-0.22, 0.23], but children who received or were partnered with a child who received the malleable manipulation were more interested in engaging in future cross-race (vs. same-race) interactions following their interaction experience, $t(71) = 2.18$, $p = 0.016$, $r = 0.25$, 95% CI [0.06, 0.42].

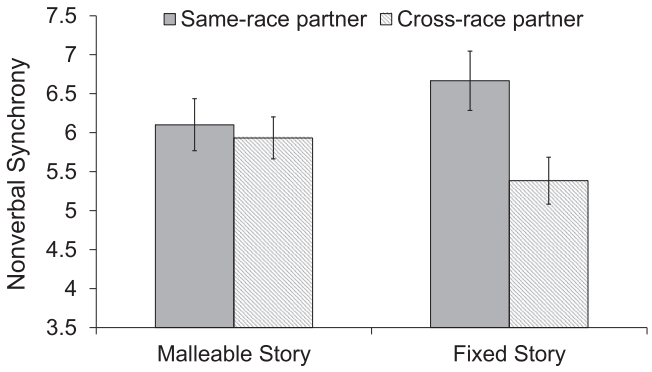

FIGURE 7 Study 2: Children's mean nonverbal synchrony during the initial introductions according to what story manipulation they received and whether they were in a same-race or cross-race dyad. Error bars denote standard error

7.4 | Nonverbal synchrony

Nonverbal synchrony within each dyad changed across the interaction depending on the topic the children were discussing, $F(2, 110) = 7.58$, $p = 0.001$, $\eta_p^2 = 0.12$, 95% CI [0.02, 0.23]. The nature of this change depended on whether children were in a same-race or cross-race dyad, $F(2, 110) = 3.84$, $p = 0.024$, $\eta_p^2 = 0.07$, 95% CI [0.0001, 0.16]. Most importantly, this effect also depended on the prejudice theories manipulation, as evidenced by a significant Prejudice Theories × Dyad Race × Topic interaction, $F(2, 110) = 4.56$, $p = 0.013$, $\eta_p^2 = 0.08$, 95% CI [0.004, 0.17]. Follow-up simple-effects tests revealed a non-significant Prejudice Theories × Dyad Race interaction, $F(1, 55) = 2.95$, $p = 0.092$, $\eta_p^2 = 0.05$, 95% CI [0, 0.19] that unexpectedly, emerged only during students' initial introductions, and not during the subsequent race-neutral and race-relevant discussion topics. Given this effect was directionally consistent with our theory, follow-up planned contrasts on nonverbal synchrony during the initial introductions showed that among those who received the fixed manipulation, same-race dyads were more synchronized than cross-race dyads, $t(55) = 2.64$, $p = 0.005$, $r = 0.34$, 95% CI [0.13, 0.51], but those who received the malleable message exhibited similar amounts of synchrony regardless of their partner's race, $t(55) = -0.39$, $p = 0.698$, $r = -0.05$, 95% CI [-0.31, 0.21]; see Figure 7.

Study 2 provided clear evidence that a malleable- (vs. fixed-) prejudice theory increased majority children's interest in future cross-race interaction, and further, that interacting with a child with a malleable- (vs. fixed-) prejudice theory increased minority children's interest in future cross-race interaction. We also observed some evidence, though not specifically predicted, that a malleable- (vs. fixed-) prejudice theory increased children's nonverbal synchrony in the early, unstructured stages of actual interracial interaction.

8 | GENERAL DISCUSSION

What can be done to sustain children's desire to engage across racial lines at a time when the frequency of interracial relationships tends to decline? The present research suggests that children's prejudice theories—their understanding of prejudice as a malleable versus fixed attribute of individuals—may play a role. As compared to the oft-used methods of vignettes, hypotheticals, and surveys, the two studies reported herein are unusual in their use of highly immersive and realistic behavioral experiences to evaluate our hypotheses. Across two studies, we observed that older children (>10 years) with more malleable- (versus fixed-) prejudice theories, exhibited more interest in future interracial contact. This effect was evident for White and racial minority children alike (in Study 1) and for White children with more malleable-prejudice theories and racial minority children paired with a child with more malleable-prejudice theories (in Study 2). Additionally, results from Study 1 suggest that malleable-prejudice theories help promote interest in interracial interaction by reframing such encounters as an opportunity to learn. We observed a similar pattern of results for children's verbal and nonverbal approach behaviors in Study 1, but only partial support for nonverbal synchrony in Study 2.

The results advance theory in important ways. First, our results may help elucidate an important puzzle in the literature on cross-race friendship in children: namely, why declining interaction with cross-race peers, typically assumed to stem from bias, occurs at a time when explicit negative racial attitudes *decrease* (Raabe & Beelmann, 2011). Our findings suggest that among older children, those who hold a more fixed-prejudice theory have lower interest in interracial interaction than those who hold a malleable-prejudice theory. Given that intergroup friendships lead to long-term benefits, including more positive intergroup attitudes and reduced interracial anxiety (Davies et al., 2011), interventions during middle-childhood aimed at disrupting this trend can be important.

Second, our findings suggest that increased engagement (or disengagement) in interracial interaction can arise developmentally from pathways *independent* of prejudiced attitudes, despite the fact that most theories and interventions target such biases. Numerous interventions have been designed to reduce both explicit and implicit racial prejudice, with the assumption that a decrease in prejudicial attitudes will translate into improved intergroup behavior (Aboud et al., 2012). For instance, recent work has focused on improving implicit racial attitudes in children (given that it is particularly resistant to change in adults; Lai et al., 2016). These attitude-focused interventions have shown that, for example, exposure to counterstereotypes and perceptual individuation training can improve implicit racial attitudes (Gonzalez et al., 2017, 2021; Qian et al., 2017; Qian, Quinn et al., 2019). Nevertheless, the primary focus on children's prejudicial attitudes leaves open important questions about how to foster more affiliative intergroup *behaviors*. Our findings complement and extend this recent scholarship by highlighting a promising alternative pathway to cultivating more positive intergroup interactions. We find that fostering a malleable-prejudice theory or interacting with a partner exposed to a malleable-prejudice theory leads children to construe of the challenges of interracial interaction as a learning opportunity, and thereby increases their desire to engage in such interactions. Thus, an intervention targeting children's beliefs about the nature of prejudice itself could improve intergroup behavior without even targeting children's prejudicial attitudes.

Third, we substantively extend past research on prejudice theories among White adults (e.g., Carr et al., 2012) by incorporating the experiences of both majority and minority group individuals. Majority and minority group members' concerns and behaviors dually shape the tenor of interracial interactions, thus research aiming to improve interracial contact should (but often does not) consider them together (Shelton, 2000). Though the nature of concerns in interracial interactions may differ for majority and minority members (e.g., expressing versus being targeted by prejudice; Richeson & Shelton, 2007), a malleable-prejudice theory may constructively reframe each group members' approach to interracial interaction and address *both* majority and minority group members' divergent concerns about prejudice (e.g., as opposed to traditional interventions that focus exclusively on improving majority group members' racial attitudes).

We also acknowledge limitations and unanswered questions that present important avenues for future research. One question is why the effects of prejudice theories on nonverbal synchrony in Study 2 only emerged in the initial, unstructured phase of the interaction. Perhaps the effects of prejudice theories are most evident in these initial, unstructured phases because tensions and uncertainty are high (Babbitt & Sommers, 2011). Alternatively, the manipulation may have faded over the course of the interaction. Another question is whether observed effects on children's interest in interacting with a specific cross-race partner will generalize to interracial contact, more broadly. Though future work should examine this directly, we did find in Study 1 that children with more malleable-prejudice theories report more motivation to engage in interracial interactions in general and less interracial anxiety in general. Additionally, the motivation to interact with a different race child in the future (child-specific measure) was significantly correlated with these same two general measures: the motivation to engage in interracial interactions ($r(75) = 0.38$, $p = 0.001$; a general measure) and interracial anxiety ($r(75) = -0.45$, $p < 0.001$; a general measure).

Additionally, Study 2 limits our capacity to discern the impact of the prejudice theories manipulation on minority children. Though we observe effects for minority students in Study 1 using a correlational design, and changes in the dyadic interracial experience in Study 2, only students at the majority White schools received this manipulation in Study 2. Future research should assess the causal effects of prejudice theories on both majority and minority children (beyond the specific groups and dyads examined here), and examine how these effects may interact with the diversity of the school context (e.g., Lessard et al., 2019).

Finally, it is noteworthy that these data were collected over 10 years ago and recent events (e.g., the murder of George Floyd, the Black Lives Matter movement) have amplified the broader cultural dialogue surrounding race and prejudice (Rogers et al., 2021; Sullivan et al., 2021). To the extent that these events have elevated concerns about being victimized by, or perpetrating, prejudice, this research is perhaps more applicable and relevant today than when the data were originally collected. Given the lack of opportunities for interracial contact at mostly-majority or mostly-minority schools, live video-streams may translate into new opportunities to initiate positive interaction experiences between groups unlikely to be in contact. Thus, it may be important to understand how to facilitate positive interracial interactions through this medium. In the context of these novel exchanges, we demonstrate that believing that prejudice *can change* increases children's desire to interact across racial lines.

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CONFLICT OF INTEREST

None to declare.

ETHICS APPROVAL STATEMENT

The studies reported herein were approved by the Stanford IRB and conducted in accordance with recognized standards of human subjects research.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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ENDNOTE

[1] Our predictions and planned analyses were outlined in a funded NICHD grant proposal (K99HD065741) that preceded this research. However, the studies reported in this article were not formally preregistered. Requests for data or the grant proposal can be sent via email to the lead author.

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