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# Categorizing a Face and Facing a Category: The Constructive Impacts of Ambiguity and Uncertainty in Racial Categorization

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## Abstract

The past generation has seen a dramatic rise in multiracial populations and a consequent increase in exposure to individuals who challenge monolithic racial categories. We examine and compare two potential outcomes of the multiracial population growth that may impact people's racial categorization experience: (a) exposure to racially ambiguous faces that visually challenge the existing categories, and (b) a category that conceptually challenges existing categories (including "biracial" as an option in addition to the monolithic "Black" and "White" categories). Across four studies ($N$ = 1,810), we found that multiple exposures to faces that are racially ambiguous directly lower essentialist views of race. Moreover, we found that when people consider a category that blurs the line between racial categories (i.e., "biracial"), they become less certain in their racial categorization, which is associated with less race essentialism, as well. Importantly, we found that these two effects happen independently from one another and represent two distinct cognitive processes.

## Keywords

biracial, multiracial, racial ambiguity, race essentialism, social categorization

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As a result of federal regulation change, starting in the year 2000, the U.S. Census enabled multiple responses to the racial categorization question, thus allowing participants to select more than one of the available monoracial categories of race (e.g., "White," "Black or African American," "Asian") to identify themselves. Since then, the multiracial population has been growing three times faster than the growth rate of the population as a whole (U.S. Bureau of the Census, 2015). There are more than 20 million multiracial individuals in the United States today, and the current estimate is that by 2050, one out of five Americans will be of mixed-race (Davenport, 2016).

This growing population of multiracial individuals represents a shift in the dynamics between racial groups and a dramatic increase in exposure to biracial and multiracial individuals. This is significant given that exposure to people from different racial groups can reduce individuals' racial biases, ranging from how a face is processed to prejudice and discrimination (Dovidio et al., 2003; Meissner & Brigham, 2001; Pettigrew et al., 2011). The long history of research on contact theory and exposure has concerned majority individuals' contact with those in the minority (e.g., relations between White and Black individuals). Inherent to an intergroup focus, however, is that a line is drawn between one group and another, thus conceiving of the groups as discrete entities. Historically, the line has been quite sharp; for centuries, even one drop of Black blood was seen to identify an individual as Black (Davis, 1991). Research on hypodescent has accordingly explored the factors that contribute to judging racially ambiguous faces as belonging to their lower status racial group (Ho et al., 2011; Peery & Bodenhausen, 2008).

The notion that individuals cannot sit between racial categories (which would blur a line between them) is a reflection of race essentialism, which is the belief that racial categories have discrete essential bases (e.g., biologically based, immutable, distinct and informative; Haslam et al., 2000). With the growing recognition of multiracial individuals—people who

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either conceptually or visibly blur the line between racial categories—researchers have begun to ask a new question: How does this new kind of exposure influence conceptions of racial groups? Specifically, exposure to individuals who blur the line between racial categories represents a promising avenue to reduce race essentialism. In addition, considering how someone might belong to multiple racial groups may reduce one's certainty that one can classify people into discrete racial groups in the first place. That is, the confidence that people hold in their racial categorizations might, in part, support essentialist views of race. If one can classify targets into racial groups with ease and certainty, it may seem intuitive to think that those racial groups have discrete essences. Yet if the certainty of one's categorizations were reduced, so too might one's broader essentialist views of race.

Given the negative intergroup harms associated with race essentialism, including stereotyping and prejudice (Chao et al., 2013; Haslam et al., 2006; Ho et al., 2015), a better understanding of the mechanisms by which race essentialism can be reduced will bring practical insights with regard to the development of interventions designed to reduce racial essentialism. In addition, a nuanced understanding of how race essentialism can be reduced would offer new insight into processes that are fundamental to social cognition, in particular, how the consideration of different social categories influences the process of social categorization and also how multiple exposures to racially ambiguous exemplars influence beliefs about social categories in general.

## Reducing Race Essentialism

A recent body of work has documented that exposure to diversity—particularly with regard to individuals who challenge discrete categorical Black and White thinking—can reduce race essentialism (Pauker et al., 2016, 2018; Young et al., 2013). The mechanisms by which this exposure reduces race essentialism, however, have yet to be disentangled. Specifically, prior work has examined two different processes in isolation: (a) the social-cognitive experience of categorizing a target who does not fit neatly into a monoracial category, and (b) broader beliefs about racial categories that accrue over time across multiple exposures to such targets. In contrast to prior work, the current work examines these processes simultaneously and independently to shed new light on the social-cognitive processes involved in reductions to race essentialism.

First with respect to the social-cognitive experience of categorizing a target, we propose that the consideration of racial identities that blur the line between racial groups (e.g., biracial or multiracial) will impact the manner in which people categorize the people they encounter. That is, considering the possibility that a target might identify in a way that challenges discrete conceptions of race may reduce one's certainty in race category judgments of that target. To the extent that people feel less able to readily categorize people into racial groups, we thus expect a reduction in race essentialism.

Second, with respect to broader beliefs, aside from any specific category judgment, visual exposure to people who do not appear to fit a specific monoracial category (e.g., Black/White biracial) may, in aggregate, impact the way people think about racial categories in general. That is, exposure to a set of exemplars that visually blur the line between Black and White race categories may conceptually blur the line as well.

The current work uniquely uses a design that allows us to separate these two processes, allowing us to examine for the first time the unique and independent effects of each, as well as whether they have an interactive effect on race essentialism.

## Categories Considered During Social Categorization

When categorizing a series of faces as either "Black" or "White," individuals do so quickly and with apparent ease (Amodio & Ratner, 2013). Even if the stimulus set includes racially ambiguous targets, participants find it relatively easy to categorize targets into discrete binary categories, often categorizing biracial individuals into their lower status racial group (i.e., hypodescent; Chen et al., 2014; Ho et al., 2011).

While considering people as either Black or White is quick and efficient, it is also prone to error in a world where people do identify as biracial. Peery and Bodenhausen (2008) found that even when a target was known to have mixed-race ancestry (i.e., were multiracial), in a speeded categorization task, participants were still likely to categorize such targets as Black. Only under conditions of more thoughtful reflection did participants become more likely to acknowledge that such targets would identify as biracial.

Chen and Hamilton (2012) found that people took longer to categorize Black/White biracial faces as biracial, compared with categorizing monoracial Black faces as Black and monoracial White faces as White. Furthermore, a cognitive load heightened this difference, suggesting that it requires more cognitive resources to consider the possibility that someone identifies in a way that challenges discrete binary conceptions of race. In another study, Chen and Hamilton found that increasing essentialist views of race made it less likely that Black/White biracial faces were categorized as biracial, suggesting an important link between the categorization process and conceptions of race (see Gaither et al., 2019).

Taken together, this prior work suggests that the categorization process should become less fluent when, in addition to "Black" and "White," people consider a category option that blurs the line between the two (i.e., "biracial"). Specifically, we predicted that when a categorization task includes these three options, participants would be less certain in their categorizations, relative to when the options are more simply "Black" and "White." In addition, we predicted that as a function of decreasing participants' certainty in their race categorizations, participants would hold less essentialist views of race.

## Multiple Exposures to Racially Ambiguous Exemplars

Those who endorse race essentialism tend to see race as immutable and racial categories as distinct (Haslam et al., 2000; Plaks et al., 2012). Yet, exposure—and especially repeated exposure—to targets who visibly blur the line between ostensibly discrete racial categories may reduce race essentialism (Levy et al., 2019).

After participants were asked to form an impression of someone who had a racially ambiguous appearance and who identified as biracial, a reduction in their race essentialism was found (Young et al., 2013). Similarly, after White individuals transitioned from the continental United States to Hawaii (which has a relatively large population of multiracial individuals), they exhibited decreased race essentialism (6–9 months after arrival; Pauker et al., 2018), suggesting that exposure to multiracial individuals may have been responsible for the reduction in race essentialism.

Pauker et al. (2016) found that children in Hawaii, compared with those in Massachusetts, exhibited less essentialist thinking about race. Importantly, these effects were only seen among older children. This suggests the possibility that the effect of exposure to multiracial individuals for children is contingent on more advanced mental development. Yet another potential explanation of this effect is that older children in Hawaii, relative to those in Massachusetts, have had more total exposure to multiracial individuals than younger children.

This prior work suggests that exposure to racially ambiguous exemplars, especially repeatedly over time, has the potential to reduce race essentialism. This prior work, however, has considered only one exposure accompanied by a biracial or monoracial label (Young et al., 2013) or a comparison that serves only as a proxy for exposure (i.e., geographical location; Pauker et al., 2016, 2018). It is possible that a single exposure might have an inflated effect if the exposure is taken to represent the whole social category. In contrast, the present work considers exposure to multiple, unlabeled, racially ambiguous exemplars, building on work that has examined the consequences of perceiving crowds of people (e.g., Lamer et al., 2018). We predicted that aside from the category options considered during categorization, multiple exposures to racial ambiguity (i.e., biracial faces), will impact how participants think about race categories in general, specifically reducing race essentialism.

## The Current Work

In the current work, we independently manipulated the categories considered during race categorization (i.e., Black or White vs. Black, White, or biracial) and exposure to racial ambiguity (i.e., displaying only monoracial Black faces and monoracial White faces, or Black faces, White faces, and biracial faces). We take measures of the social-cognitive experience of the categorization process (i.e., asking how certain participants are in each of their categorizations) as well as broader measures of beliefs about racial groups (i.e., taking a measure of race essentialism). This design allows us to examine participants' experience at the level of each categorization as well as their broader experience with the overall exposure.

Based on the reviewed studies of the categorization process, we predict that when participants consider, in addition to "Black" and "White," a third category that conceptually blurs the line between the two (i.e., "biracial"), they will be less certain in their categorizations. We further predict that as a function of reducing certainty in race category judgments, participants will demonstrate less race essentialism.

In contrast, based on the reviewed studies of accumulative exposure to racial ambiguity, we expect exposure to racial ambiguity to have a different effect. Exposure to racial ambiguity may not impact one's certainty in a specific category judgment. Indeed, prior work finds that participants have no trouble quickly categorizing racially ambiguous faces as belonging to a monoracial category (e.g., the work on hypodescent). Yet, in aggregate, multiple exposures to targets who visibly blur the line between racial categories should, in theory, impact race essentialism as this is the postulated mechanism of effects that compare living in Hawaii with mainland United States (Pauker et al., 2016, 2018).

In sum, we predicted that (a) when people consider a category that blurs the line between discrete racial groups, they would be less certain in race category judgments, and (b) overall when people are exposed to faces that visibly blur the line between racial groups, they would exhibit less race essentialism. In other words, we predict that the categories that come to mind during a social categorical judgment will determine the participant's social-cognitive experience with that target, whereas we predict that exposure to visual racial ambiguity will impact how people think about the racial groups overall. In addition, we predicted that these two routes to lower race essentialism would be independent of one another.

Study 1 first examines the impact of certainty during racial categorization on race essentialism. We predicted that when participants' certainty in race categorization was lowered, they would demonstrate less essentialist conceptions of race. Establishing a causal link between certainty of race category judgments and race essentialism allows us in later studies to examine whether a manipulation that influences certainty can, as a function of that reduction, predict lower race essentialism. Study 2 independently manipulates (a) the categories considered during racial categorization and (b) exposure to racial ambiguity, and measures certainty in categorizations and overall race essentialism. Study 3 replicates the findings from Study 2 and rules out the concern that by measuring certainty in categorization we amplified an effect on race essentialism. Finally, Study 4 replicates the prior results again, and examines the specificity of the effects by

comparing the consideration of a third race category (in addition to Black and White) that blurs the line between monoracial groups (biracial) to the consideration of an alternate third monoracial category that does not blur such a line (Latinx).

## Study 1

In Study 1, we asked participants to categorize biracial faces by race (Black or White), and provided (bogus) feedback midway through the task (vs. did not). In the experimental condition, this feedback was designed to undermine participants' certainty in their categorizations, which we predicted would lead to lower race essentialism.

### Method

*Participants and design.* We recruited 200 participants living in the United States (201 completed the study; 110 men, 90 women, one other; $M_{age}$ = 36.8 years, $SD$ = 11.5; in terms of racial identification, 72.2% White, 10.7% African American, 2.8% Native American, 6.1% Hispanic, 6.4% Asian, 0.3% Native Hawaiian, and 1.5% other; 22 of the participants selected more than one racial category) on Mechanical Turk (MTurk). For a simple test of mean differences, this sample size can detect Rosenthal's effect size $r$ = .20 with power = 80% and $\alpha$ = .05. Moreover (relevant for later studies), this sample size exceeds $N$ = 148 needed to find significant indirect effects with small-to-medium $a$ and $b$ paths (power =.80, $\alpha$ = .05; Fritz & MacKinnon, 2007).

Participants were randomly assigned to one of two conditions. Participants completed a face categorization task, an attention check (asking them to report on the feedback they received during the study), and demographics on the Qualtrics platform. Seven participants were removed due to failing the attention check (not knowing what feedback they got out of four options in a multiple-choice question), leaving a sample size of 194 participants. The materials, stimuli, and data for all studies can be found at: https://osf.io/74nzt/?view_only=61ef488e515344cabf3263c84c826646.

*Stimuli.* We used a set of real photographs of biracial-identifying individuals from Pauker et al. (2013). The photographs displayed their faces, and the individuals all identified as Black/White biracial. Our stimulus set, in total, consisted of 16 biracial faces. Not all biracial individuals are necessarily visually racially ambiguous (Chen et al., 2021). However, in these studies, because we did not explicitly label biracial faces as such, we used faces of biracial individuals that were rated as visually racially ambiguous in prior studies (Pauker et al., 2013).

*Procedure.* Participants were randomly assigned to one of two conditions. In both conditions, participants were exposed to the biracial faces in randomized order, and they were asked to categorize them as either Black or White. After categorizing half of the faces, participants received a message telling them that they had completed half of the categorizations.

In the experimental condition, participants were told that they categorized 50% of the faces correctly. This served as our manipulation designed to decrease certainty in one's judgments. In the control condition, participants were told that they completed half the task, but did not get any feedback as to how successful they were. With the assumption that *participants* would consider a "correct" categorization as classifying a face by the race the person identifies as, in both conditions, as a manipulation check, participants were asked how many faces they anticipated they would correctly categorize of the remaining eight faces, on a scale from 0 = *correct (none)* to 8 = *correct (all of them)*.

After completing the categorization task, participants filled out an eight-item race essentialism scale, adapted from No et al. (2008), on a scale from 1 = *strongly disagree* to 6 = *strongly agree*; for example, items include "It is hard if not impossible to change the innate dispositions of a person's race," "If social situations change the characteristics we attribute to race categories will change as well" (R), and "To a large extent, a person's race biologically determines his or her abilities and traits;" $\alpha$ = .72 (see also Coleman & Hong, 2008). Finally, participants answered an attention check and provided their demographic information.

### Results and Discussion

As expected, participants in the experimental condition were less certain in their racial categorizations ($M$ = 5.53, $SD$ = 1.09) than participants in the control condition ($M$ = 6.44, $SD$ = 1.36), $t(188) = 5.14$, $p < .001$, $d = -0.74$, 95% CI = [−1.04, −0.44], indicating a successful manipulation. Critically, participants in the experimental condition displayed lower levels of race essentialism ($M$ = 2.98, $SD$ = 0.84) than participants in the control condition ($M$ = 3.24, $SD$ = 0.81), $t(190) = 2.16$, $p = .032$, $d = -0.31$, 95% CI = [−0.60, −0.03].

Thus, a manipulation designed to lower feelings of certainty with regard to racial categorization resulted in lower race essentialism. Study 1 established a causal link between certainty of race categorization and lower race essentialism, which sets the ground for later studies to examine whether the manipulations (described next) would predict lower race essentialism through lower certainty.

## Study 2

In Study 2, we sought to again reduce certainty in racial categorization as an avenue to lower race essentialism. Rather than giving participants feedback on their categorizations, Study 2 situated the racially ambiguous faces in the context of monoracial faces. We independently manipulated whether participants were exposed to monoracial faces only, or

monoracial faces and biracial faces. In addition, we independently manipulated whether participants had two categories to choose from in their categorizations (Black and White, as in Study 1) or whether there was a third option (biracial).

We thus examined a 2 (stimulus set: monoracial Black and monoracial White faces vs. monoracial Black, monoracial White, and biracial faces) × 2 (categories considered: two categories available for categorization, *Black or White* vs. three, *Black*, *White*, *or biracial*) design.

## Method

*Participants and design.* To accommodate the extra two conditions (i.e., four study cells instead of the two in Study 1), we used the heuristic of doubling our sample size from the prior study, and recruited 400 American participants on MTurk (401 completed the study; 221 *men*, 179 women, and one other; $M_{age} = 37.1$ years, $SD = 11.70$; in terms of racial identification, 70.4% White, 12.2% African American, 1.2% Native American, 8.4% Hispanic, 6.9% Asian, 0.2% Native Hawaiian, and 0.7% other; 16 of the participants selected more than one racial category). For a linear mixed-effects model, this sample size afforded 80% power and $\alpha = .05$ to detect an effect of size $b = 0.17$ (Green & MacLeod, 2016). For a multiple regression, this sample size could detect an effect of size $b = 0.03$ with power = 80% and $\alpha = .05$. Participants were randomly assigned to one of four conditions from the 2 × 2 design. Participants completed the face categorization task, filled out a race essentialism questionnaire, and completed demographics on the Qualtrics platform.

*Stimuli.* Our stimulus set consisted of the same 16 biracial faces from Study 1 (the same photographs of the 16 Black/White biracial-identifying individuals from Study 1) as well as 48 more faces drawn from the same face database, photographed and standardized in exactly the same manner (Pauker et al., 2013). To accommodate the design described below, our stimulus set also consisted of 24 Black-identifying individuals and 24 White-identifying individuals.

*Procedure.* Participants were asked to categorize 48 faces by race as accurately and quickly as possible, and were assigned to one of four conditions in a 2 × 2 design: presence of racial ambiguity in the stimulus set (yes: *Black*, *White*, *and biracial faces* vs. no: *Black faces and White faces only*) × categories considered during categorization (three: *Black*, *White*, *and biracial category options*, vs. two: *only Black and White category options*).

In the first condition, participants were only exposed to 24 White faces and 24 Black faces (i.e., no racially ambiguous faces), and they were asked to categorize them as either Black or White (i.e., binary categorization). Participants in the second condition saw the same Black faces and White faces as in the first condition, but in this condition, they had a third category option of "biracial" (i.e., non-binary categorization). The third and fourth conditions were similar to the first two conditions, but in these conditions participants were shown 16 Black faces, 16 White faces, and 16 biracial faces (i.e., presence of racial ambiguity).

For each face, participants were asked to categorize the face in terms of race and to rate how certain they were in their categorization (on a scale of 1 = *not sure at all* to 7 = *very sure*). The order of faces was randomized.

After completing the categorization task, participants filled out the same essentialism scale as in Study 1. Finally, participants completed an attention check and provided demographics.

## Results and Discussion

Participants categorized 48 faces, and reported their certainty in each categorization. Rather than aggregating responses to each face, we implemented a linear mixed-effects model that examined each categorization outcome and level of certainty, treating both participant and target identity as random factors.

*Certainty.* To test our hypothesis that certainty in race category judgments would be uniquely influenced by the consideration of a biracial categorization option, we implemented multilevel models with R-package lme4 and lmerTest, which ran lmer models through Satterthwaite approximation tests to calculate *p* values (estimating degrees of freedom to non-whole numbers to best approximate the *F* distribution). The models include random intercepts for participant and target identity (random slopes were not included due to issues of non-convergence), the independent variables were dummy coded, and fit models used the restricted maximum likelihood (REML) criterion with an unconstrained covariance matrix. This approach is also used in the later studies.

We first entered our two independent variables (categorization options: Black or White vs. Black, White or biracial; and stimulus set: monoracial Black and monoracial White faces vs. monoracial Black, monoracial White, and biracial faces) as simultaneous predictors of certainty in one's categorization.

This analysis revealed that as hypothesized, independent of whether biracial faces were intermixed with monoracial Black and monoracial White faces, simply adding a biracial categorization option decreased the certainty of participants' categorizations, $b = -0.35$, $SE = 0.06$, 95% CI = [−0.47, −0.28], $t(398.00) = -5.69$, $p < .001$.

Independent of whether two or three options were provided, the presence of biracial faces did not significantly impact the certainty of the categorizations, $b = 0.05$, $SE = 0.06$, 95% CI = [−0.07, 0.17], $t(410) = 0.84$, $p = .403$.

We next also entered the interaction term, and found no significant interaction between categorization options and stimulus set, $b = 0.10$, $SE = 0.12$, 95% CI = [−0.14, 0.34], $t(397.00) = 0.81$, $p = .416$. In all analyses, we use the original scaling of the variables (i.e., we do not grand mean

center, which *only* affects the interpretation of simple slope analyses, and we do not conduct such analyses given that we do not find any significant interactions in the present work).

*Race essentialism.* Next, we examined effects on race essentialism. Unlike the certainty measure, which was taken per each face, race essentialism was only measured once at the end of the study. Hence, regression modeling was used for this outcome (equivalent to an analysis of variance [ANOVA] in this instance, but regression is used for consistency in coefficient estimates).

We first entered our two independent variables as simultaneous predictors of race essentialism. This analysis revealed that, independent of whether two or three options were provided for categorization (i.e., Black or White, vs. Black, White, or biracial), simply *including biracial faces in the stimulus set* led to lower race essentialism, $b = -0.38$, $SE = 0.08$, 95% CI = [−0.55, −0.21], $t(398) = -4.42$, $p < .001$.

Independent of whether biracial faces were intermixed with monoracial Black and White faces, *adding a biracial categorization option* did not result in less race essentialism, $b = -0.10$, $SE = 0.09$, 95% CI = [−0.27, 0.06], $t(398) = -1.21$, $p = .227$.

We next also entered the interaction term, and found no significant interaction between categorization options and stimulus set, $b = -0.20$, $SE = 0.17$, 95% CI = [−0.53, 0.14], $t(397) = -1.14$, $p = .254$.

*Indirect effect.* Whereas the *presence of biracial faces* in the categorization task led to lower race essentialism, it was the presence of a *third category option* (*i.e.*, *biracial*) that was associated with lower certainty in categorizations.

In Study 1, we found that reducing certainty in categorization resulted in lower race essentialism. Importantly, to test for mediation (i.e., of X on Y through M), it should already be established that M can casually affect Y (Fiedler et al., 2018). Study 1 provides this evidence: a certainty manipulation influenced race essentialism.

We thus examined whether lowered certainty in Study 2 explained lower essentialism. As required by a mediational model, we examined the relationship between certainty and essentialism, controlling for our two manipulated independent variables (thus isolating the *b* path in a mediational model).[1] Indeed, this analysis revealed a relationship between certainty in racial categorizations and race essentialism, $b = 0.09$, $SE = 0.04$, 95% CI = [0.02, 0.16], $t(396.98) = 2.62$, $p = .009$.

Accordingly, independent of whether biracial faces were intermixed with monoracial Black and White faces, simply *adding a biracial categorization option predicted lower race essentialism through decreasing participants' certainty in their categorizations*, $Z_{\text{mediation}} = -2.07$, 95% CI = [−4.03, −0.11], $p = .038$ (conditional on the assumption that the model posited applies; Fiedler et al., 2018).[2] Importantly, this effect should not be considered to demonstrate mediation causally as only the independent variable was manipulated (not the mediator). Rather, we have quantified the indirect effect and posit that a causal relationship makes theoretical sense given our mediator here (certainty) did causally influence our outcome (essentialism) in Study 1.

*Additive effect.* Finally, given that exposure to biracial stimuli and the presence of the biracial category option had independent effects, we thus subsequently hypothesized that the combination of these two factors would have a stronger impact on essentialism than each one of them separately. (Note that this is not equivalent to an interaction, which would mean that the strength of one effect would depend on the other, a multiplicative effect, of which there was none.) Accordingly, to test for an additive effect, we conducted an ANOVA that compared race essentialism across the conditions. As expected, the ANOVA revealed significant variation across the conditions, $F(3, 19{,}244) = 359.71$, $\eta^2 = 0.05$, $p < .001$. A Tukey post hoc analysis revealed that indeed the participants that were exposed to both biracial stimuli and a third category displayed the lowest levels of race essentialism ($M = 3.08$, $SD = 0.78$), lower than only being exposed to biracial faces ($M = 3.28$, $SD = 0.83$), $d = -0.26$, 95% CI = [−0.30, −0.21], $p < .001$, and lower than only being exposed to a third category ($M = 3.56$, $SD = 0.80$), $d = -0.61$, 95% CI = [−0.65, −0.56], $p < .001$ (see Figure 1).

In sum, Study 2 found that, independent of having two or three options for categorizing the faces, exposure to biracial faces lowered race essentialism. While being presented with three (vs. two) options for categorizing the faces did not directly affect race essentialism, it did reduce participants' certainty in their categorizations, an effect that explained lower race essentialism.[3]

## Study 3

In Study 3, we sought to replicate the findings from Study 2, and also test whether explicitly asking participants how certain they were in their judgment was responsible for the effects on race essentialism found in Study 2. That is, perhaps the direct effect of exposure to racial ambiguity on race essentialism is contingent on asking participants to consider their certainty in their race category judgments. To examine this possibility, Study 3 had the same design as Study 2 with the exception that we independently manipulated whether participants rated how certain they were in their categorization, or not.

We thus examined a 2 (stimulus set: Black faces and White faces vs. Black, White, and biracial faces) × 2 (categories available for categorization: two, *Black or White* vs. three, *Black*, *White*, *or biracial*) × 2 (certainty measured: with the explicit certainty question vs. without) design.

### Method

*Participants and design.* To accommodate the extra four conditions (in addition to the conditions from Study 2), we

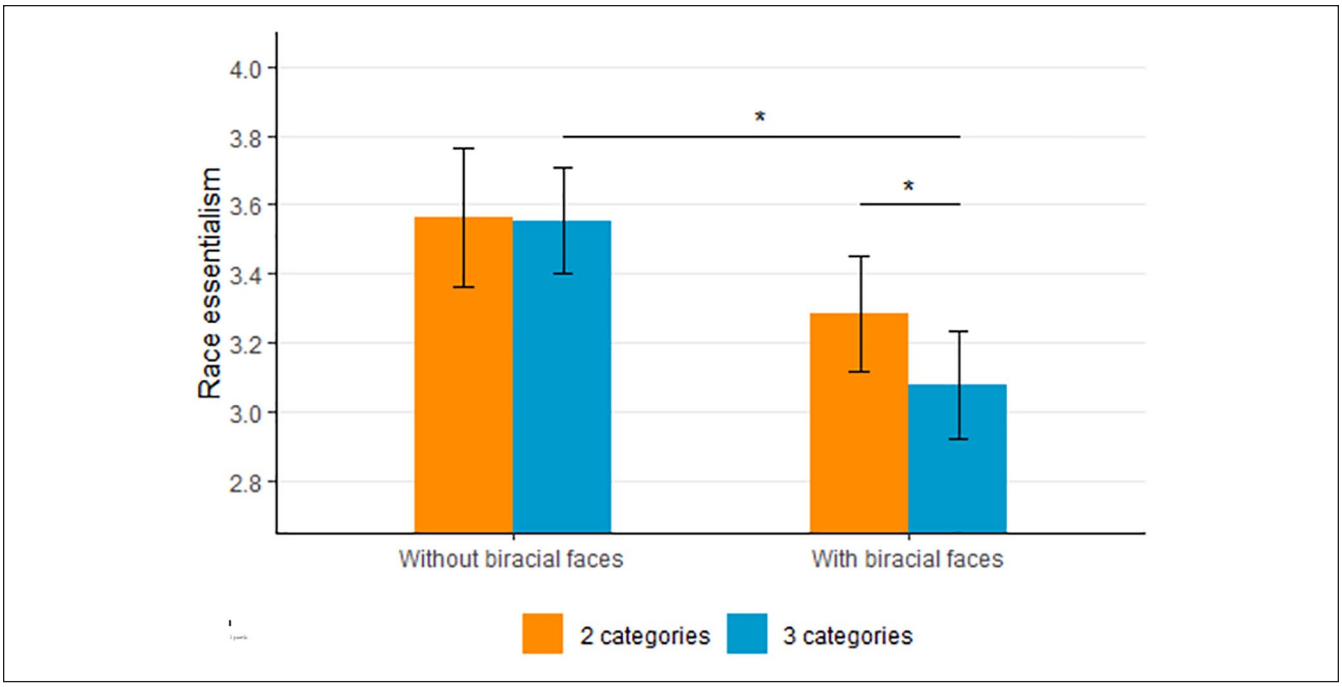


**Figure 1.** Comparing race essentialism across conditions, with/without exposure to biracial faces and with/without a third biracial category.
*Note.* Error bars represent 95% confidence intervals.

again used the heuristic of doubling our sample size from the prior study. We thus recruited 800 American participants (804 completed the study; 377 *men*, 417 women, 10 other; $M_{age}$ = 37.6 years, $SD$ = 12.80; in terms of racial identification, 71.6% White, 9.8% African American, 0.9% Native American, 7.3% Hispanic, 9.2% Asian, 0.4% Native Hawaiian, and 0.8% other; 39 of the participants selected more than one racial category) on MTurk. For a linear mixed-effects model, this sample size afforded 80% power and $\alpha = .05$ to detect an effect of size $b = 0.16$ (Green & MacLeod, 2016). For a multiple regression, this sample size could detect an effect of size $b = 0.01$ with power = 80% and $\alpha = .05$. Participants were randomly assigned to one of eight conditions from a 2 × 2 × 2 design. Participants completed the face categorization task, filled out a race essentialism questionnaire, and completed demographics on the Qualtrics platform.

*Stimuli and procedure.* The stimuli and procedure of Study 3 were identical to those of Study 2 with the exception that for half of the conditions (i.e., the additional four new conditions), there was no certainty question after the categorization of each face.

## Results and Discussion

Participants categorized 48 faces, and a random half of the participants reported their certainty in each categorization. Rather than aggregating responses to each face, as before, we implemented a linear mixed-effects model that examined each categorization outcome and level of certainty, treating both participant and target identity as random factors, using the same modeling approach described in Study 2.

*Certainty.* For the four conditions *with the certainty measure*, we first entered our two independent variables (categorization considered: Black or White vs. Black, White, or biracial, and stimulus set: Black monoracial faces and White monoracial faces vs. the addition of biracial faces) as simultaneous predictors of *certainty in one's categorization*. This analysis revealed that as hypothesized, independent of whether biracial faces were intermixed with monoracial Black and monoracial White faces, simply adding a biracial categorization option decreased the certainty of participants' categorizations, $b = -0.32$, $SE = 0.06$, 95% CI = [−0.43, −0.20], $t(391.32) = -5.59$, $p < .001$ (as in Study 2).

Independent of whether two or three options for categorization were provided, the presence of biracial faces did not significantly influence the certainty of the categorizations, $b = 0.02$, $SE = 0.06$, 95% CI = [−0.09, 0.14], $t(406.19) = 0.42$, $p = .678$ (as in Study 2).

We next also entered the interaction term and found no significant interaction between categorization options and stimulus sets, $b = 0.21$, $SE = 0.11$, 95% CI = [−0.01, 0.43], $t(389.83) = 1.84$, $p = .067$.

*Race essentialism.* Unlike the certainty measure, which was taken per each face, race essentialism was only measured once at the end of the study. Hence, as before, regression modeling was used for this outcome.

We first entered our three independent variables (categorization options: two vs. three; biracial faces included in the stimulus set: yes vs. no; certainty measure: with the certainty question with vs. without) as simultaneous predictors of race essentialism. This analysis revealed that independent of whether two or three options were provided for categorization and independent of the presence of a certainty question, the presence of biracial faces in the stimulus set led to lower race essentialism, $b = -0.14$, $SE = 0.06$, 95% CI = [−0.25, −0.03], $t(801) = -2.44$, $p = .015$ (as in Study 2).

Independent of whether biracial faces were intermixed with monoracial Black and monoracial White faces, and independent of the presence of a certainty question, adding a biracial categorization option did not result in lower race essentialism, $b = -0.08$, $SE = 0.06$, 95% CI = [−0.19, 0.04], $t(801) = -1.34$, $p = .181$ (as in Study 2).

We next also entered the interaction term, and found no significant interaction between categorization options (two vs. three) and biracial presence (yes vs. no), $b = 0.11$, $SE = 0.11$, 95% CI = [−0.11, 0.33], $t(800) = 0.95$, $p = .343$ (as in Study 2).

Finally, we examined whether the presence of an explicit certainty question was responsible for the effect on race essentialism. First, the presence of a certainty question did not predict race essentialism, $b = -0.01$, $SE = 0.06$, 95% CI = [−0.11, 0.10], $t(800) = -0.14$, $p = .891$, and also did not interact with either of the other independent variables: biracial faces included in the stimulus set, $b = -0.04$, $SE = 0.11$, 95% CI = [−0.26, 0.18], $t(799) = -0.34$, $p = .732$, or biracial option included for categorization, $b = -0.04$, $SE = 0.11$, 95% CI = [−0.18, 0.26], $t(799) = 0.34$, $p = .733$. Finally, there was no three-way interaction, $b = 0.16$, $SE = 0.23$, 95% CI = [−0.29, 0.60], $t(796) = 0.69$, $p = .490$, demonstrating that the race essentialism effects were not significantly altered by explicitly asking participants how certain they were in their categorizations.

*Indirect effect.* In both Studies 2 and 3, whereas the presence of biracial faces in the categorization task led to lower race essentialism, it was the presence of a third category option (i.e., biracial) that was associated with lower certainty in categorizations.

As in Study 2, we examined whether the effect of reducing certainty in categorizations (from adding a third category option; i.e., biracial) might explain lower race essentialism (again conditional on the assumption that the model posited applies; Fiedler et al., 2018). As before, this process was plausible because in Study 1, a manipulation that reduced certainty in categorizations also resulted in lower race essentialism.

As required by a mediational model, we examined the relationship between certainty and essentialism, controlling for our two manipulated independent variables (thus isolating the *b* path in a mediational model).[4] Indeed, this analysis revealed a relationship between certainty in racial categorizations and race essentialism, $b = .09$, $SE = 0.04$, 95% CI = [0.02, 0.16], $t(394.00) = 2.39$, $p = .017$.

Again, consistent with our theoretical process model, independent of whether biracial faces were intermixed with monoracial Black and monoracial White faces, simply adding a biracial categorization option predicted lower race essentialism through decreasing certainty in participants' categorizations, $Z_{\text{mediation}} = -2.04$, 95% CI = [−4.00, −0.08], $p = .041$.

*Additive effect.* As in Study 2, we also conducted an ANOVA on race essentialism that revealed significant variation across conditions, $F(7, 38584) = 64.86$, $\eta^2$=0.01, $p < .001$. A Tukey post hoc analysis revealed that (as in Study 2) the participants that were exposed to both biracial stimuli and a third category displayed the lowest levels of race essentialism ($M = 3.19$, $SD = 0.79$), lower than only being exposed to biracial faces ($M = 3.22$, $SD = 0.75$), $d = -0.10$, 95% CI = [−0.14, −0.06], $p < .001$, and lower than only being exposed to a third category ($M = 3.28$, $SD = 0.79$), $d = -0.12$, 95% CI = [−0.16, −0.08], $p < .001$ (to facilitate comparison to Study 2, we collapsed across the manipulation of whether the certainty question was asked in Figure 2).

In sum, the results of Study 3 replicated the findings from Study 2. Through reducing certainty, adding a biracial categorization option predicted lower race essentialism. The presence of biracial faces in the categorization task resulted directly in lower race essentialism (an effect that is present whether or not an explicit certainty question was posed).

## Study 4

In a final study, we sought to examine whether the presence of *any* third category option (compared to only two category options) resulted in lower certainty in race category judgments or whether the effects observed in the earlier studies were contingent on the third category (biracial) conceptually blurring the line between the other two (Black or White).

Study 4 replicated the design of Study 2, but now we manipulated whether the third category option conceptually blurred the line between Black and White (i.e., "biracial" as in the previous studies), or presented a third monoracial group that the racially ambiguous faces could also conceivably be categorized as (i.e., "Latino/a"). We chose this label, in particular, based on prior work which finds that this is the most common monoracial label provided for Black/White racially ambiguous faces (see Chen et al., 2018).[5]

We thus had three conditions: two category options (*Black or White*), three category options (*Black*, *White*, *or biracial*), and three category options (*Black*, *White*, *or Latino/a*). All conditions had the same stimulus set (monoracial Black faces, monoracial White faces, and biracial faces).

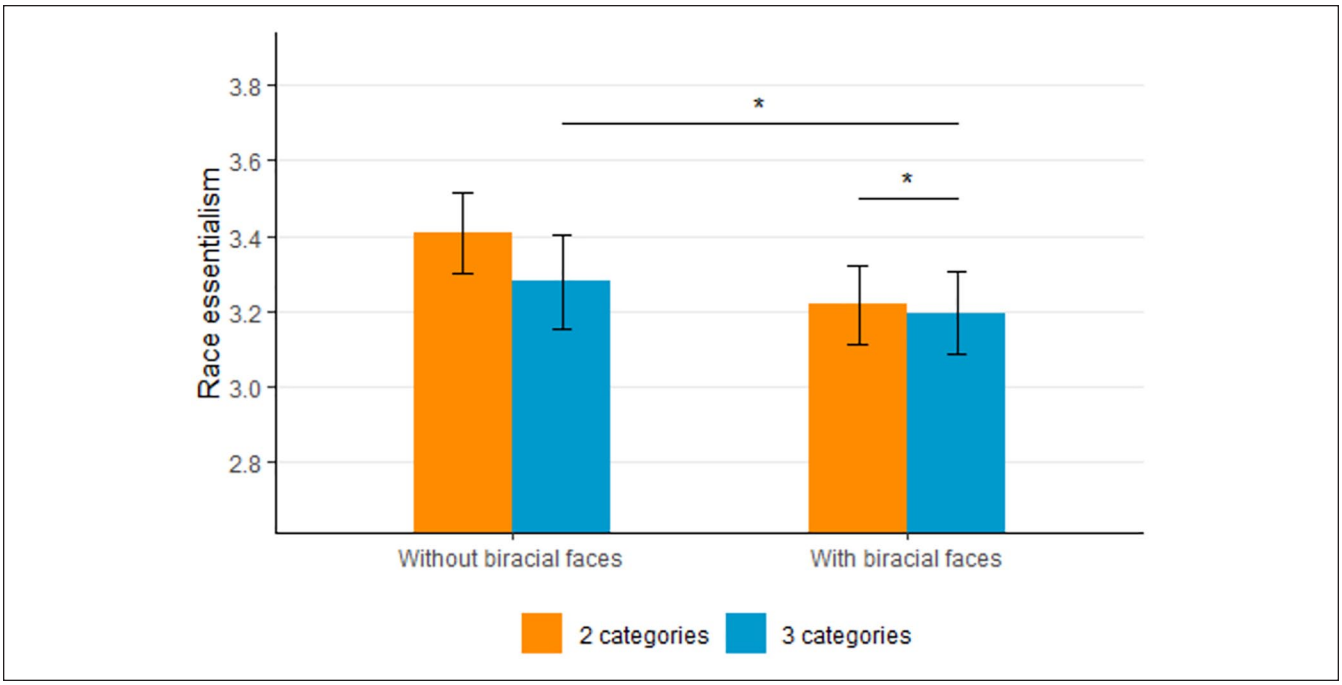


**Figure 2.** Comparing race essentialism across conditions, with/without exposure to biracial faces and with/without a third biracial category.
*Note.* Error bars represent 95% confidence intervals.

## Method

*Participants and design.* As in the prior studies, we sought 100 participants per condition. However, at the time the study was conducted, there was a recent influx in poor-quality MTurk responders (see Arechar & Rand, 2021). Consequently, based on in-lab estimates of the percentage of poor-quality responders, we added an extra screening measure and increased our sample size by 30% to make up for the anticipated poor-quality responders. Accordingly, we recruited 400 American participants on MTurk (404 completed the study and 356 remained after the "bot screening" which simply asked participants to describe the study they just completed [writing, for example, "good" would not suffice, and consisted of a failed attention check]; 195 men, 160 women, one other; $M_{age}$ = 39.6 years, $SD$ = 13.4; in terms of racial identification, 70.7% White, 11.1% African American, 1.9% Native American, 6.1% Hispanic, 9.2% Asian, 0% Native Hawaiian, and 0.9% other; 17 participants selected more than one racial category). For a linear mixed-effects model, this sample size afforded 80% power and $\alpha$ = .05 to detect an effect of size $b$ = 0.22 (Green & MacLeod, 2016). For a multiple regression, this sample size could detect an effect of size $b$ = 0.03 with power = 80% and $\alpha$ = .05. Participants were randomly assigned to one of three conditions. Participants completed the face categorization task, filled out a race essentialism questionnaire, and completed the attention check and demographics on the Qualtrics platform.

*Stimuli.* We drew from the same face database used and described in the prior studies. The stimulus set consisted of standardized photographs of faces of 16 Black-identifying individuals, 16 White-identifying faces, and 16 Black/White biracial-identifying individuals (using the same images from Studies 1 to 3).

*Procedure.* Participants were assigned to one of three conditions: two category options (*Black or White*), three category options (*Black*, *White*, or *biracial*), and three category options (*Black*, *White*, or *Latino/a*).

In the first condition, participants were asked to categorize the faces as either Black or White (i.e., binary categorization). Participants in the second condition saw the same faces, but had a third category option of "biracial." Finally, participants assigned to the third condition also saw the same faces as in the other conditions, but had a third category option of "Latino/a."

For each face, participants were asked to categorize the face in terms of race, and to rate how certain they were in their categorization (on a scale of 1 = *not sure at all* to 7 = *very sure*). The order of faces was randomized.

After completing the categorization task, participants filled out the same essentialism scale as in Studies 1 to 3. Finally, participants completed an attention check and demographics.

## Results and Discussion

Participants categorized 48 faces, and reported their certainty in each categorization. Rather than aggregating responses to

each face, as before we implemented the same linear mixed-effects model approach from the prior studies, examining each categorization outcome and level of certainty, and treating both participant and target identity as random factors.

*Certainty.* Implementing the same multilevel modeling strategy as in the earlier studies, we first created two dummy codes and entered the independent variables (biracial category option included = 1, other two conditions = 0, Latino/a category option included = 1, and other two conditions = 0) as simultaneous predictors of certainty in one's categorization. When coding the dummy codes in this manner, each condition that offered three category options is being compared with the condition that offered only two category options.

This analysis revealed that as hypothesized and replicating the previous studies, relative to only having two category options (Black or White), adding a biracial categorization option decreased the certainty of participants' categorizations, $b = -0.23$, $SE = 0.08$, 95% CI = [−0.38, −0.08], $t(353.00) = -2.97$, $p = .003$. In contrast, relative to only having two category options, adding the Latino/a third category option did not significantly decrease the certainty of participants' categorizations, $b = -0.10$, $SE = 0.08$, 95% CI = [−0.25, 0.05], $t(353.00) = -1.32$, $p = .186$.

*Race essentialism.* Unlike the certainty measure, which was taken per each face, race essentialism was only measured once at the end of the study. Hence, regression modeling was used for this outcome, as in the earlier studies.

We first entered the two dummy variables as independent variables (coded as above) as simultaneous predictors of race essentialism. This analysis revealed that, as predicted and replicating the previous studies, relative to only having two category options (Black or White), adding a third category option did not have a direct impact on race essentialism: when that third option was "biracial," $b = 0.04$, $SE = 0.11$, 95% CI = [−0.17, 0.25], $t(353) = 0.39$, $p = .698$, nor when that third option was "Latino/a," $b = -0.11$, $SE = 0.10$, 95% CI = [−0.31, 0.10], $t(353) = -1.03$, $p = .304$.

*Indirect effect.* Finally, we examined whether lower certainty in Study 4 explained lower essentialism as in the previous studies. As required by a mediational model, we examined the relationship between certainty and essentialism, controlling for our two dummy variables (thus isolating the *b* path in a mediational model), though alternative causal models, as with the prior studies, cannot be excluded by mediation analysis (Fiedler et al., 2018). Indeed, this analysis revealed a relationship between certainty in racial categorizations and race essentialism, $b = 0.11$, $SE = 0.04$, 95% CI = [0.04, 0.19], $t(352.00) = 2.89$, $p = .004$.

Accordingly, and replicating Studies 2 and 3, relative to only having two category options (Black or White), simply adding a biracial categorization option predicted lower race essentialism through decreasing certainty in participants' categorizations, $Z_{mediation} = -2.01$, 95% CI = [−3.94, −0.05], $p = .044$. However, this effect only occurred when the added category was a *biracial* category. When the third category added was a *Latino/a* category, there was no significant indirect effect, $Z_{mediation} = -1.15$, 95% CI = [−3.11, 0.81], $p = .251$.

In sum, Study 4 replicated the effect from Studies 2 and 3 in which being presented with three (vs. two) options for categorizing the faces reduced participants' certainty in their categorizations, and as a function of this lower certainty, predicted lower race essentialism. Moreover, Study 4 found that this effect only takes place when the third category added is one that conceptually blurs the line between Black and White (i.e., the biracial category), rather than a third monoracial category (which the racially ambiguous faces could also be categorized as; see Chen et al., 2018).

Finally, it is worth noting that the indirect effect tests throughout the article are limited in their power and strength, and that modeling an indirect effect (through the certainty measure, when taken) with a larger data set would provide more power and greater precision. To this end, we created a pooled data set of the conditions present in each of Studies 2 to 4[6]: that is, whether the biracial category option was available during the categorization process (or not) when exposed to monoracial and biracial faces intermixed (as Study 4 did not have a monoracial faces only condition). Indeed, this pooled analysis demonstrated a more reliable indirect effect of the biracial category option (vs. only Black and White category options) predicting lower race essentialism, through reducing certainty of race categorizations, $Z_{mediation} = -3.13$, 95% CI = [−5.09, −1.17], $p = .002$.

## General Discussion

Social categorization—thinking about others in terms of their group membership—is fundamental to how people process information in their social environments. The belief that social categories are real and meaningful supports essentialist beliefs, which are associated with increased stereotyping, the acceptance of racial inequalities, and reduced interest in interacting with outgroup members (Haslam et al., 2002; Williams & Eberhardt, 2008; Yzerbyt et al., 1997).

However, such social categorical thinking varies across time and across contexts, and the growing salience of multiracial categories and presence of multiracial exemplars can potentially challenge such social categorical thinking. Even when basic cognitive and motivational processes contribute to biased social cognition, it may be possible to change social perceptions and intergroup attitudes for the better by understanding, managing, and redirecting these processes (Levy & Dovidio, 2021). In the current work, we examined and isolated two potential avenues to lower race essentialism: (a) increasing the consideration of a category that conceptually blurs the line between Black and White (i.e., "biracial"), and

(b) increasing visual exposure to exemplars that visually blur the line between Black and White. Recognizing that these two processes are different and thus may have different effects, we manipulated these two processes, independent of one another. We found that these two processes had unique and independent implications for race essentialism, and did not interact. Our results revealed distinct social-cognitive effects of considering a category label that conceptually blurs the line between two monoracial categories and being exposed to faces that visually blur the boundary. Each offered a unique route to lower race essentialism, a distinction that was not possible from the study designs of prior work.

### *Categories Considered During Social Categorization*

We found that when people considered a category (i.e., "biracial") that conceptually blurs the line between discrete racial groups (i.e., Black and White), it impacted the manner in which they interacted with a given face; they became less certain in their race category judgments. It was consideration of the *biracial category* itself that resulted in lower certainty in race judgments, not exposure to individuals who visually appear biracial. This pattern of findings is consistent with past work. Even when people are exposed to individuals who look biracial, majority group members will categorize such individuals as belonging to the minority outgroup with speed and efficiency (i.e., hypodescent; Chen et al., 2014; Ho et al., 2011). Indeed, independent of having two or three options for categorizing the faces, when biracial faces were included in the stimulus set (vs. not), participants were no less certain in their monoracial categorizations.[7]

In other words, exposure to someone who is multiracial (i.e., conveyed visually only) does not itself seem to result in less biased social categorical thinking toward that individual. Instead, an instance of considering the possibility that someone identifies in a way that blurs the line between racial groups (i.e., might identify as biracial) impacts the way in which one engages with the individual. Irrespective of the stimulus set (i.e., whether it included biracial faces or not), explicitly considering whether someone identifies as biracial reduced certainty in race categorizations. In addition—while participants were less certain when categorizing a face as biracial relative to categorizing a face as monoracial (Black or White)[8]—when participants were provided with Black, White, and biracial as their options for categorization (independent of stimulus set), they were even less certain of their monoracial categorizations, relative to participants who were only presented with Black and White as categorization options.[9]

Having established a causal link between reduced certainty in race categorizations and lower race essentialism (Study 1), we thus posited that as a function of reducing certainty in categorizations, we might see lower race essentialism—from introducing the biracial category option during the race categorization process. Indeed, when the third category option blurred the line between Black and White (as opposed to a third monoracial category option that the faces could also be perceived as; "Latino/a"), we observed lower race essentialism as a function of reducing certainty in race categorizations. Given that this effect on race essentialism was indirect (through reduced certainty) rather than direct, this means that when someone considers the possibility that a target is biracial, this does not itself change overall conceptions of race. Instead, considering the possibility that a target might identify as biracial changes how one engages with the target, reducing certainty in race categorization, which is in turn associated with less endorsement of race essentialism.

Prior work has sought to alter the categorization process by manipulating processing conditions (e.g., how much of the face is visible, is the face presented upright, are time constraints imposed, is the categorization task speeded, is there a cognitive load or a mood induction; Chen & Hamilton, 2012; Cloutier & Macrae, 2007; Cloutier et al., 2005; Peery & Bodenhausen, 2008; Thorstenson et al., 2019). Adding to this body of work, we demonstrate that simply changing which categories are considered during the categorization task can also change how people engage with the face. Lab-based processing manipulations cannot be realistically implemented outside the laboratory (e.g., changing what visual information is available), but an intervention could instead ask participants to keep in mind that people may identify with multiple racial groups, especially when interacting with novel target individuals. This represents a promising direction for an intervention aiming to reduce the social-categorical processes that contribute to race essentialism.

### *Multiple Exposures to Racially Ambiguous Exemplars*

Independent of the processes discussed in the preceding section, we found a second and more direct route to lower essentialism. After multiple exposures to faces that visibly blur the line between racial groups, participants endorsed less essentialist views of race. This effect was found for overall conceptions of the race groups themselves, rather than trial-level processes with respect to a specific target individual. That is, participants whose stimulus set included biracial faces intermixed with monoracial faces (compared with a stimulus set of only monoracial Black faces and monoracial White faces) were *not* less certain in their categorizations of each target individual. This suggests that the influence of this kind of exposure does not operate through how people engage with each target, but rather through how people think about the racial categories in general.

These findings suggest a mechanism for prior work demonstrating the benefits of living in more racially diverse environments and populations with higher rates of mixed-race individuals. Prior work finds that living in less racially diverse environments is associated with more discrete processing of racial categories (Freeman et al., 2016).

Conversely, living in or moving to Hawaii, relative to the continental United States, has been associated with lower race essentialism (Pauker et al., 2016, 2018).

The current work uniquely experimentally links exposure to targets who visually blur the line between racial categories to lower race essentialism, suggesting that real-life visual exposure likely explains a significant portion of the reduction in race essentialism seen in prior studies. That is, even aside from the additional route to lower race essentialism (i.e., one operating through how people engage with the individual), these findings suggest that multiple exposures to exemplars who blur the line between discrete racial categories could lower race essentialism.

### *Limitations and Future Directions*

In the current work, we independently manipulated the categories considered during race categorization (i.e., Black or White vs. Black, White, or biracial) and exposure to racial ambiguity (i.e., displaying only monoracial Black faces and monoracial White faces, or Black faces, White faces, and biracial faces). In addition, we took measures of the social-cognitive experience of the categorization process (asking how certain participants are in each of their categorizations) as well as broader measures of beliefs about racial groups (taking a measure of race essentialism). Thus, our designs enabled us to examine participants' experience at the level of each categorization as well as their broader views of the racial groups. We suggest that a design that has these features would help future work disentangle the multiple routes through which race essentialism may be reduced.

Importantly, there are a few limitations to our studies that also should be addressed in future research. Specifically, while our study design allowed us to experimentally influence which categories were considered during the categorization process, the forced-choice nature of the methods may limit the interpretation and generalizability of the effects on certainty. Recent work that compares forced-choice tasks with free-response tasks finds that commonly used forced-choice tasks may overestimate the extent to which participants use biracial categorizations, and when allowed, participants used alternative monoracial categorizations (e.g., categorizing a Black–White biracial target as Hispanic or Middle Eastern; Nicolas et al., 2019). It is possible that being presented with the biracial option may have lowered participants' certainty because participants inferred that they were being asked to use a biracial categorization for a target that they would otherwise categorize as monoracial. Notably, this alternative explanation does not change the finding that this lower certainty was associated with lower race essentialism. Moreover, the effect seems specific to asking people to consider the biracial option (given the findings for offering instead the Latino/a option). Future work should examine whether the inclusion of the biracial option still leads to lower certainty when a free-response option is also available.

Furthermore, while we establish a causal relationship between the posited mediator and reports of race essentialism in Study 1, statistical mediation tests remain limited in their ability to exclusively identify the true causal model from alternative models that are also consistent with the data. For example, the manipulation designed to lower feelings of certainty may have also influenced other unobserved variables, which in turn may have lowered race essentialism. Our mediation results reflect a theorized pathway, but one that cannot be causally demonstrated from the current data. Future work should examine other plausible mechanisms.

Future work should also explore other racial groups, as well as examine the current processes among minority participants. Different minority racial groups are not all perceived and treated alike (Lu et al., 2020). Accordingly, future research could examine the framework introduced in this article in other racial contexts. For instance, while there are several studies that found similar effects for exposure to both Black–White and Asian–White racial ambiguity (e.g., Chen & Hamilton, 2012), it is possible that the present effects may operate differently in different contexts.

The majority of our participants belonged to the racial majority group. Thus, our conclusions should be considered within this context. A recent study has found that there are both similarities and differences in the manners by which majority and minority group members categorize multiracial individuals (Chen et al., 2018). Accordingly, future research should examine whether the current manipulations will influence certainty in race categorizations and endorsement of race essentialism among minority group members, and if so, whether these routes to lower race essentialism are driven by the same underlying psychological mechanism for majority and minority group members.

Future work might also examine other forms of dual identities. The increase of biracial and multiracial people's prevalence and prominence has given rise to abundant research on the impact of exposure to racial ambiguity, including the studies described in this report. However, the modern era of globalization has led to the increase of complex and multiple social identities on other dimensions than just race (Love & Levy, 2019). For instance, immigrants may hold a dual national identity, and children of parents from two different religions may hold a dual religious identity. Perhaps exposure to these other forms of blurring a line between discrete social categories will reduce the essentialism seen for other social categories (Bastian & Haslam, 2008; Bogart et al., 2019). Future research should examine the present processes with respect to other forms of dual identity and multiple identity exemplars, such as in the domains of ethnicity, nationality, and religion.

Furthermore, while we demonstrate that the effect of considering a biracial category on race essentialism through certainty is contingent on the category blurring the line between

monoracial groups, future work could examine other forms of uncertainty. For example, if someone were unsure about another's age or even where their accent was from, perhaps this would influence social-cognitive processes through a more general uncertainty.

## Conclusion

Recent years have seen a meteoric rise in the number of multiracial individuals as a result of both actual growth of the multiracial population and of people now using the option of categorizing as such (Lee & Bean, 2004). People who look multiracial are thus now more visible, and people are now using labels that span race categories more frequently. Accordingly, increasing people's recognition that others can be identified in a manner that challenges discrete boundaries between Black and White people, and increasing exposure to individuals who visually challenge Black and White categorical thinking represent two promising avenues to lower race essentialism. These are closely related processes, but can be distinguished based on the target of judgment: beliefs about an individual to which someone is exposed, and beliefs about social categories, respectively.

In sum, we found that when considering the possibility that an individual identifies in a way that conceptually blurs the boundaries between Black and White, participants were less certain in their race categorizations, which predicted lower race essentialism. In addition, multiple exposures to exemplars that visually blur the line between Black and White race categories had an independent and direct effect on lower race essentialism. Both the social-cognitive experience of categorizing a target who does not fit neatly into a monoracial category and the broader beliefs about racial categories that follow from multiple exposures to such individuals represent two avenues to lower race essentialism, and thus improving interracial relations.

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### Data Accessibility

Data, stimuli, and additional analyses are available on the Open Science framework at: https://osf.io/74nzt/?view_only=61ef488e515344cabf3263c84c826646

### Supplemental Material

Supplemental material is available online with this article.

### Notes

1. Given that race essentialism is constant per each participant, whereas uncertainty varies with each face, essentialism needs to be entered as a predictor of certainty (otherwise one cannot predict a value that is constant for a given participant within multilevel modeling).
2. Given that there exists no current standard practice on how to bootstrap multilevel models for indirect effect tests, we turn to a recently-introduced formula for calculating an indirect effect that circumvents this issue, the $Z_{\text{Mediation}}$ statistic (Iacobucci, 2012). The logic of the standard indirect effect test is maintained in this method. By taking the product of the *a* and *b* coefficients divided by their standard errors, and dividing by the pooled standard error, this approach produces a $Z_{\text{Mediation}}$ statistic, a standardized representation of the strength of the indirect effect, whereby its significance can be tested via a *z*-test.
3. In Studies 2 and 3, we also had an outcome measure of endorsement of racial stereotypes. We found a similar indirect effect with this measure as well, but for the sake of brevity we report these findings in the supplementary material.
4. As in Study 2, given that race essentialism is constant per each participant, whereas uncertainty varies with each face, essentialism needs to be entered as a predictor of certainty (otherwise one cannot predict a value that is constant for a given participant within multilevel modeling).
5. Although Latino/a is a commonly used racial category (both in discourse and psychology studies), it is defined in the U.S. Census as referencing Spanish culture or origin regardless of race. Thus, although in common usage Latino/a is often considered a distinct monoracial category, people who identify as Latino/a may identify as any race.
6. These are the only studies we have conducted investigating this specific research question (i.e., we do not have any "file-drawer" studies).
7. Study 2: $b = 0.03$, $SE = 0.06$, $t(405.1) = 0.43$, $p = .67$; Study 3: $b = -0.01$, $SE = 0.06$, $t(400.1) = -0.12$, $p = .906$.
8. Study 2: $M_{\text{Mono}} = 6.44(0.96)$, $M_{\text{Bi}} = 5.11(1.32)$, $t(396) = 49.60$, $p < .001$; Study 3: $M_{\text{Mono}} = 6.44(0.95)$, $M_{\text{Bi}} = 5.29(1.25)$, $t(392) = 54.47$, $p < .001$; Study 4: $M_{\text{Mono}} = 6.29(1.03)$, $M_{\text{Bi}} = 5.26(1.27)$, $t(353) = 44.53$, $p < .001$.
9. Study 2: $b = -0.27$, $SE = 0.09$, $t(397.8) = -4.53$, $p < .001$; Study 3: $b = -0.26$, $SE = 0.09$, $t(391.6) = -4.56$, $p < .001$; Study 4: $b = -0.14$, $SE = 0.06$, $t(351.0) = -2.17$, $p = .030$.

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