



Caught on camera: Cross-race interactions captured in daily life

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ABSTRACT

The present study examined the prevalence of cross-race interactions occurring in daily life using wearable camera technology that captures photographs of a participants' immediate environment and social interactions. Coders used appearance-based cues to identify the number of interaction partners captured in the photos who appeared to be White or a racial minority. We found that 29.6% of Whites' social interactions were with racial minorities and 23.9% of racial minorities' social interactions were with Whites. Furthermore, we examined whether personality and other individual differences correlated with being captured in more cross-race interactions. We found that Whites who used more emotion-focused coping and less emotional suppression were more likely to be captured engaging in cross-race interactions.

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1. Introduction

Social scientists—from psychologists, to sociologists, to demographers—have been particularly interested in the degree to which individuals from different racial and ethnic groups interact with each other, especially within the context of friendships (Bowman & Park, 2014, 2015; Galupo & Gonzalez, 2013; Hallinan & Teixeira, 1987a, 1987b; Hallinan & Williams, 1987, 1989; Joyner & Kao, 2000; Kao & Joyner, 2004; Quillian & Campbell, 2003). Considerable research, using self-reported methods and coding photographs of friend groups, has demonstrated that individuals overwhelmingly report or are captured engaging in more same-race interactions or friendships. Although people have a tendency to interact more with same-race individuals, some people do engage in cross-race interactions or maintain cross-race friendships. What factors relate to greater engagement with cross-race interaction partners?

The goals of the current research are twofold. The first goal is to replicate past research examining the prevalence of engaging in cross-race interactions using new wearable camera technology to capture one's naturally occurring social interactions. The second goal is to explore which personality traits or individual difference measures correlate with being more likely to engage in cross-race interactions. In the current study, participants wear a small camera on their shirt collar or on a necklace. The wearable camera captures photographs of a participant's immediate environment and social interactions (Brown et al., 2017). Using the thousands

of photos captured over the course of a participant's weekend, raters (who were blind to the race of the participant) coded the number of significant interactions with individuals who appeared to be White or a racial minority. We then correlated those coded social interactions with self-reported and informant-reported personality measures to test which factors correlated with greater engagement in cross-race interactions.

1.1. Prevalence of same-race versus cross-race interactions

Social scientists from a variety of disciplines have studied the prevalence of associating with others who are from one's same racial group—also known as *racial homophily* (McPherson et al., 2001). The general pattern of findings suggests that racial homophily in relationships and social interactions is the rule, not the exception. Preference for interacting with those of the same race has been replicated in probability and non-probability samples using children (Aboud et al., 2003; Hallinan & Teixeira, 1987a, 1987b; Hallinan & Williams, 1987, 1989), adolescents (Joyner & Kao, 2000; Kao & Joyner, 2004; Mazur & Richards, 2011; Quillian & Campbell, 2003; Rude & Herda, 2010), college students (Bowman & Park, 2014, 2015; Bowman, 2012; Chang et al., 2004; Fischer, 2008; Saenz et al., 2007), and adults (Galupo & Gonzalez, 2013; Smith, 2002).

A handful of studies have also used photos posted to social media accounts to examine the prevalence of cross-race friendships in naturalistic settings (Berry, 2006; Mayer & Puller, 2008; Mazur & Richards, 2011; Wimmer & Lewis, 2010). Using photos posted to Facebook, Myspace, and wedding announcement websites, researchers replicated findings supporting greater racial

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homophily among friends and acquaintances. For example, Mazur and Richards (2011) examined MySpace profiles and coded the demographic characteristics of those peers posting to the participant's "wall" during a 30-day period. They found that the average same-race homophily across all racial groups was 56%; however, White participants had highest proportion of racial homophily (68%) and Asian participants had lowest racial homophily (22%). In a study of wedding party photos, Berry (2006) found that having racially homogenous wedding parties was the norm. For example, 87.4% of White couples had exclusively White wedding parties but only 3.7% of White couples had a close-enough Black friend to be in their wedding party. In contrast, 22.2% Black couples included White wedding party members.

Across a variety of samples diverse in age and methodology, individuals from all racial backgrounds were more likely to have same-race interactions or friendships, but this was especially true among Whites. The majority of studies show that Whites are the most likely to engage in racial homophily compared to other racial groups while racial minorities generally show more diverse friend networks or cross-race interactions.

1.2. Predictors of cross-race interactions

Within the field of psychology, there are no studies to our knowledge which have examined which personality or individual difference characteristics correlate with greater engagement with cross-race interaction partners. However, social psychological research may provide some insights to possible dispositional factors. For example, social psychologists often use lab-based, experimentally-manipulated cross-race interactions to study interpersonal dynamics and intergroup attitudes (e.g., Blascovich et al., 2001; Richeson & Shelton, 2007; Shelton & Richeson, 2006a, 2006b).

In studies examining interactions between naïve cross-race partners or confederates, there is considerable evidence showing that Whites who engage in intergroup contact often experience negative feelings such as stress or anxiety (Blascovich et al., 2001; Plant & Devine, 2003; Toosi et al., 2012) and exert a lot of cognitive effort during their interactions (Richeson & Shelton, 2007; Richeson & Trawalter, 2005; Shelton, Richeson, Salvatore, & Trawalter, 2005). For example, in a meta-analysis of cross-race interactions, White participants engaging in cross-race interactions generally experienced more negative affect, had less friendly non-verbal behavior, and liked their cross-race partner less (Toosi et al., 2012). In contrast, racial minorities, who often had greater experience with intergroup contact, typically experienced less negative affect in cross-race interactions with Whites (Plant & Devine, 2003; Toosi et al., 2012). Richeson and colleagues (Richeson & Shelton, 2007; Trawalter & Richeson, 2006) suggest that Whites may engage in compensation strategies or self-presentation techniques such as emotional suppression to modulate their behavior in the service of having a positive cross-race interaction.

In a study of newly developing cross-race friendships in a Black-White sample, Shelton et al. (2010) found significant positive relations between self-disclosure, perceived responsiveness, and closeness for both Blacks and Whites in both same-race and cross-race relationships. Although Black participants reported greater disclosure, responsiveness, and closeness with their same-race peers, they still experienced positive relationships when White interaction partners engaged in more self-disclosure and responsive behavior. These findings suggest that emotional openness and vulnerability may be key markers to building successful interpersonal relationships, especially cross-race ones.

Taken together, a variety of studies show that one's emotional experience and amount of disclosure play an important role in the success of a cross-race interaction (Plant & Devine, 2003;

Shelton et al., 2010; Toosi et al., 2012). Therefore, individuals who dispositionally have more positive emotional experiences and better emotional coping may be more likely to engage in cross-race interactions. Therefore, we chose personality traits and individual difference measures that assessed one's ability to express and regulate emotions. Specifically, we collected self-reported and informant-reported measures of the Five Factor Model (FFM) of personality (Costa & McCrae, 1989; John et al., 2008), coping styles (Carver et al., 1989), and emotion regulation techniques (Gross & John, 2003).

From the FFM dimensions, extraversion is correlated with the experience of positive emotions and neuroticism is correlated with the experience of negative emotions (Clark & Watson, 1999; John et al., 2008; Tellegen, 1982). To the extent that the presence of positive emotions and absence of negative emotions support successful interpersonal interactions, we hypothesize that individuals higher in extraversion and higher in emotional stability (the positive pole of neuroticism) will be captured engaging in more cross-race interactions. Agreeableness is another personality factor relevant for interpersonal interactions (Trapnell & Wiggins, 1990). Those higher in agreeableness, who typically exhibit greater warmth and trust in interpersonal interactions, may be more likely to engage in more cross-race interactions. Finally, the dimension of openness to experience also includes several facets—openness to feelings, ideas, or values—that may be relevant to freely expressing emotions and being accepting of others who are different from oneself (Costa & McCrae, 1989, 1992). We hypothesize that individuals higher in openness will be captured engaging in more cross-race interactions.

Other individual difference measures that relate to one's emotional experience and likelihood to disclose about one's self include certain coping styles and emotion regulation techniques. Specifically, emotion-focused coping techniques include seeking emotional support from close others, expressing and processing one's emotions, or reinterpreting a negative situation in a more positive light (Carver et al., 1989). Individuals who are more likely to use emotion-focused strategies are engaging in the same important disclosure processes that strengthen closeness and intimacy in relationships (Reis & Shaver, 1988). In contrast, the emotion regulation technique of suppression involves clamping down or hiding one's emotions from others. Furthermore, suppression is correlated with experiencing more negative emotion and less positive emotion (Gross & John, 2003). Thus, to the degree the individuals feel comfortable expressing (versus suppressing) their emotional experience, we hypothesize that individuals higher in emotion-focused coping and lower in suppression will be captured engaging in more cross-race interactions.

1.3. The present study

Notably, we are the first study to examine whether various personality traits and individual difference variables correlate with engaging in more cross-race interactions. We are also the first study to use new wearable camera technology to capture naturally-occurring social interactions. A strength of using this methodology is that it minimizes socially desirable responding about the self-reported number of cross-race friends or interaction partners one has (see Davies et al., 2011; Smith, 2002 as examples).

Coders (who were blind to the race of the participant) used physical appearance to categorize the assumed race of participants' interaction partners from photographs. The choice to assign racial categorizations based on physical appearance is not new and has validity. For example, Saperstein (2006) found a strong correspondence between experimenter-observed race and self-reported race among Blacks (97%) and Whites (99%); however, there was significantly lower agreement (50%) for judgments for other racial

groups. In past studies, researchers have often excluded the categorization of Latinos because of the greater variability in skin tone and phenotype (Berry, 2006; Mayer & Puller, 2008). In the current study, we asked coders to select from two categories—'White' or 'non-White/ethnic minorities'—instead of trying to individually categorize interaction partners as Asian, Black, Latinx, or White. We hoped that collapsing all racial minority groups into one category would improve coders' categorization; however, we will discuss the limitations of this choice in the Discussion.

Finally, we acknowledge that the term 'cross-race' could imply interactions between members who belong to different racial minority groups (e.g., an interaction between a Black participant and Asian interaction partner). As described above, our current coding procedure does not allow us to test for interactions between different racial minority groups because we did not code interaction partners into specific racial categories (e.g., Asian, Black, Latinx). Therefore, when we use the term *cross-race interaction* throughout the paper, we are referring to interactions between Whites and racial minorities—that is, White participants captured interacting with those who appear to be racial minorities and racial minority participants captured interacting with those who appear to be White.

2. Method

2.1. Participants

A total of 135 participants (78% female; $M_{age} = 24.16$, $SD_{age} = 7.87$) were recruited using convenience sampling methods from a four-year public college with open-access admissions. A total of 20 participants were excluded from analyses; five participants' photographic data were lost due to technical difficulties and 15 participants had photos that did not include any interactions with other humans. This resulted in a total of 115 participants who were 80% female, 15% Asian/Asian American; 7% Black American, 41% Latinx/Hispanic American, 29% White/European American, and 9% bi-/multi-racial. For our cultural group comparisons, we compared White participants ($n = 33$) to all other racial minority participants ($n = 82$).

In terms of power, we did not conduct a priori power analyses and sought to recruit as many participants possible during our data collection period which spanned three semesters. Our final sample size was restricted due to resource limitations including lack of funding for participant incentives, requirement of multiple lab visits, and the time intensive nature for coding photographs.

We conducted a sensitivity power analysis based on our final total sample size and subgroup sample sizes using G*Power 3.1 (Faul et al., 2007). A sensitivity power analysis determines the minimal detectable effect (MDE), or what effect size can be detected based on the subjects collected. For our primary group comparison examining the number of same-race versus cross-race interactions, we examined power for a 2x2, mixed ANOVA with $n = 115$, $\alpha = 0.05$ (two tailed), power = 0.80, and correlation between dependent measures $r = -0.23$, the estimated MDE was $f = 0.20$. For our correlation analyses, we computed the MDE within the total sample, within the White subsample, and within the racial minority subsample. With a total sample size of $n = 115$, $\alpha = 0.05$ (two tailed), and power = 0.80, the estimated MDE was $r = 0.25$. Within our White subsample ($n = 33$), the estimated MDE was $r = 0.45$. Within our racial minority subsample ($n = 82$), the estimated MDE was $r = 0.30$.

Data collection was conducted in compliance with APA ethical guidelines and with Institutional Review Board (IRB) approval. Participation was voluntary and participants received small incentives

such as a flash drive with photos that they selected to keep from their participation in the study and other college-branded swag.

2.2. Procedure

Our study involved two lab visits and additional coding judgments made by trained research assistants.

2.2.1. Lab 1 visit

Participants were recruited to participate in a study examining "how personality is manifested in daily life". During the first lab visit, participants completed consent forms and reviewed guidelines on when to remove the camera. Participants were instructed to place the camera on the necklace behind their shirt collar or remove it entirely when they entered places where the public has a reasonable expectation of privacy (e.g., locker rooms and restrooms) or if an interaction partner asked to not be photographed. Participants learned how to operate the wearable camera, including storage and charging procedures, and then checked the camera out to wear over the weekend.

2.2.2. Lab 2 visit

During the second lab visit, participants returned the camera to the lab to download and review their photos in private. Because there were several gigabytes of photos, downloading could take up to 20 min to complete. During the photo downloading procedure, participants completed a battery of personality measures and reflections while wearing the camera, including measures of the FFM personality dimensions, coping styles, and emotion regulation reported here. Participants were not asked to identify demographic characteristics of the individuals they interacted with over the course of the weekend.

After completing the survey, participants reviewed their photos in private and were instructed that they could delete any photos they did not want to share with the research lab and could copy any photos that they wanted to keep to a flash drive we provided.

Participants completed their second lab visit by providing emails for three informants who knew them well. Participants were free to nominate whoever they liked, including friends, coworkers, family members, or relationship partners.

2.3. Materials

2.3.1. Wearable camera

The camera (branded as the "Narrative Clip version 1") is $36 \times 36 \times 9$ mm wide and can take five megapixel photos once every 30 s. Each camera was attached to a necklace to ensure that photos are taken from a first-person perspective (see Fig. 1). Participants wore the camera during waking hours over the weekend. The wearable camera captured anywhere from 500 to over 2,500 photos per participant depending on the length of time worn. To comply with IRB requirements, we labeled the camera with a sticker that read "This device takes photos."

2.3.2. Downloaded photographs

After participants completed the second lab visit, research assistants saved all approved photographs to a file folder on a password-protected external hard drive; the file folder was labeled using the participant's unique identifier. The average number of photos captured was 1937 ($SD = 6,427$), or approximately 969 min (16 h).¹

¹ We are happy to share de-identified quantitative data, but cannot make participants' photographic images publicly available because participants did not consent to have their images shared beyond the purposes of our research study.



Fig. 1. Wearable Camera and Sample Photo. *Note.* Miniature camera worn on necklace to capture photographs from a first-person perspective of the surrounding environment (left) and an example of a photograph captured by the camera worn on a necklace (right).

2.4. Self ratings

Participants completed a battery of personality measures, including measures of the FFM dimensions, coping styles, and emotion regulation.

2.4.1. Five factor model dimensions

The FFM dimensions were measured using an abbreviated version of the NEO-FFI scales (Costa & McCrae, 1989) with 9 items per factor and a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*). The alpha reliabilities for the nine-item factor scores were 0.71 for Extraversion, 0.65 for Agreeableness, 0.70 for Conscientiousness, 0.77 for Emotional Stability, and 0.57 for Openness. The average inter-subscale correlation for self-reported FFM was $r = 0.24$.

2.4.2. Coping styles

Three coping styles were measured using an abbreviated version of the COPE scale (Carver et al., 1989) and a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*). Problem-focused coping (“I put aside other activities in order to concentrate on the problem.”) was measured with 6 items ($\alpha = 0.68$), emotion-focused coping (“I talk to someone about how I feel.”) was measured with three items ($\alpha = 0.88$), and avoidant coping (“I admit to myself that I can’t deal with it and quit trying.”) was measured with 3 items ($\alpha = 0.41$).

2.4.3. Emotion regulation

Emotion regulation was measured using selected items from the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) and a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*). We selected two items from each ERQ subscale: suppression (“I control my emotions by not expressing them.”) and reappraisal (“I control my emotions by changing the way I think about the situation I’m in.”). The alpha reliabilities for the two-item composites were 0.84 for suppression and 0.73 for reappraisal.

2.5. Informant ratings

Each participant was asked to nominate and provide emails for three people who knew them well to provide ratings of their personality. Participants were told that the informants’ ratings would be kept completely confidential and that they themselves would never see their informants’ ratings. Following Vazire (2006) recommendations, we contacted informants by e-mail and asked them to complete an online questionnaire about how they see the target participant’s personality. Informants received a link and the target’s unique identifying number in the email. Informants who did not complete the ratings were sent reminder emails after two weeks. Informants were not compensated for their cooperation.

Of the 135 participants, 58.5% ($n = 79$) had at least one informant complete personality ratings and 41.5% ($n = 56$) did not have any informant reports. Given the significant number of non-responding peers, we tested whether there were participants who had informant reports were systematically different on the primary measures of interest from those participants with informants who did not respond. Participants did not differ on any of the primary outcomes related to cross-race interactions or personality measures with the exception of Agreeableness. Participants who had informants scored higher on Agreeableness ($M = 3.88$, $SD = 0.47$) compared to participants whose informants did not respond ($M = 3.69$, $SD = 0.54$), $t(133)$, $p = .035$.

The average number of informants per participant was 2 ($SD = 0.94$). There were a total of 191 informant ratings, of which 100 (52%) were from friends, 64 (34%) from family, and 27 (14%) from romantic partners. Informants had known the targets an average of 9.9 years ($SD = 6.3$), and over 91% of informants had known the target for at least one year.

Informants completed a battery of personality measures about the target using a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*) for all items discussed below. For participants who had more than one informant, all informant ratings were aggregated to form a single composite of informants’ perceptions for each measure below.

2.5.1. Five factor model dimensions

Informants rated 10 items (one positively-keyed and one negatively-keyed item per factor) drawn from the Big Five Inventory (John et al., 2008). For example, Extraversion was measured with the positively-keyed item “[This person. . .] is full of energy (generates a lot of enthusiasm)” and the negatively-keyed item “[This person. . .] tends to be quiet (shy, inhibited, reserved).” Computed across the sample of 191 informants, the alpha reliabilities for the two-item factor scores were 0.52 for Extraversion, 0.57 for Agreeableness, 0.58 for Conscientiousness, 0.60 for Emotional Stability, and 0.63 for Openness. The average inter-subscale correlation for informant-rated FFM was $r = 0.26$. There was good self-informant agreement for all FFM dimensions, average $r = 0.31$, except Openness ($r = 0.14$).

2.5.2. Coping styles

Informants rated one item for each coping style: problem-focused coping (“[This person. . .] seeks out solutions to stressful problems (doesn’t easily give up)”), emotion-focused coping (“[This person. . .] turns to friends when s/he needs emotional support (during times of stress/anxiety)”), and avoidant coping (“[This person. . .] spends a lot of time on social media (Facebook, Twitter, Instagram, etc.)”).

2.5.3. Emotion regulation

Informants rated two items for suppression (“[This person. . .] hides their emotions (controls their emotions by not expressing them)” and “easily expresses their emotions (you can interpret how they are feeling)” [reverse-coded]). Computed across the sample of 191 informants, the alpha reliability for the two-item suppression composite was 0.61. Informants rated one item for reappraisal (“[This person. . .] tries to see negative events in a different light (tries to find the positive or good in the experience)”).

2.5.4. Other outcomes

Informants also rated the participant’s expression of positive emotions (“[This person. . .] generally expresses positive emotions (e.g., happiness, amusement, interest)”) and negative emotions (“[This person. . .] generally expresses negative emotions (e.g., sadness, anxiety, anger)”). Informants also rated the participant’s likability using two items (“[This person. . .] is a very likable person (people generally like him/her upon first meeting)” and “gets along well with others (easygoing, not combative)”). Computed across the sample of 191 informants, the alpha reliability for the two-item likability composite was 0.64.

2.6. Coding

Six research assistants (4 women, 2 men) who were blind to the race of the participants served as coders. The coders were asked to focus on evaluating the social interactions that participants engaged in while wearing the camera. Coders reviewed a participant’s entire set of photos before making their ratings and were asked to “pay particular attention to the interactions the [participants] have with people they know. (Do not include “one-off” interactions with strangers or service employees, etc.)” By reviewing the entire collection of photos, coders could more easily evaluate which social interactions were with meaningful interaction partners versus inconsequential interactions.

2.6.1. Interaction partners

First, coders rated how many social interactions the participant engaged in while wearing the camera (1 = *no one* to 5 = *very many*). Participants who were not captured interacting with any other people ($n = 15$) were excluded from analyses.

For participants who interacted with one or more people ($n = 115$), coders selected a numeric value (0 = *none*, 1 = *one*, 2 = *two*, 3 = *three*, 4 = *four*, or 5 = *five or more*) to indicate the number of interaction partners identified in the entire set of photos for the following categories: adult males ($\alpha = 0.94, M = 1.46, SD = 1.18$), adult females ($\alpha = 0.96, M = 1.69, SD = 1.30$), children (from infant to teenagers) ($\alpha = 0.94, M = 0.62, SD = 0.80$), White/European Americans ($\alpha = 0.93, M = 1.34, SD = 1.41$), and non-White/ethnic minorities ($\alpha = 0.92, M = 2.00, SD = 1.43$).² The six coders showed excellent reliability with each other, α s range from 0.92 to 0.96.

To compute the total number of interaction partners, we added the values from White and racial minority interaction partners together. In the total sample, the average number of interaction partners observed was 3.33 ($SD = 1.76$). There were no cultural group differences in the total number of interaction partners observed in the photos; $t(113) = 0.37, p = .72$.

3. Results

3.1. Control variables

First, we correlated our primary outcome measures related to cross-race interactions with several control variables including cultural group, gender, age, and total number of photos captured (See Table 1). A full correlation matrix for all variables measured is reported in Supplemental Material (Table S1).

Racial minority participants were more likely to be captured interacting with more non-White partners, $r(113) = 0.47, p < .001$, and less likely to be captured with White interaction partners, $r(113) = -0.44, p < .001$. The percent of cross-race interaction partners was not correlated with the participant’s cultural group, gender, age, or total number of photos captured over the weekend. However, percent of cross-race interaction partners positively correlated with one’s total number of interaction partners, $r(113) = 0.19, p = .04$.³

3.2. Cultural group differences

Replicating past research, we hypothesized that Whites would be captured engaging in more same-race interactions and fewer interactions with racial minorities; racial minorities would be captured interacting less with Whites and more with other racial minorities. We conducted a 2×2 , mixed-subjects ANOVA where participant’s cultural group (White, racial minority) was the between-subjects factor and interaction partners’ cultural group (White, racial minority) was the within-subjects factor. There was no significant main effect for participant’s cultural group, $F(1, 113) = 0.13, p = .72$, or interaction partners’ cultural group, $F(1, 113) = 0.10, p = .75$. However, there was a significant interaction between participant and interaction partners’ cultural groups, $F(1, 113) = 57.67, p < .001$. As shown in Fig. 2, there was a significant crossover interaction. White participants were observed interacting with more with same-race compared to cross-race individuals. Similarly, racial minority participants were observed interacting

² In addition to these ratings, coders also made subjective ratings for length of time interacting with these various interaction partners (1 = *never* to 5 = *most of the time*); though these are not the focus of this manuscript. Please refer to Supplemental Material Figure S1 for a list of all codes assessed.

³ We also tested whether one’s cultural group moderated the relation between total number of interactions captured and percent of cross-race interactions captured. The interaction between cultural group and total interactions approached significance ($B = 0.03, p = .10, \Delta R^2 = 0.023, F(1, 111) = 2.71, p = .10$). Interacting with more people did not change percent of cross-race interaction partners for White participants, but did increase the number of White interactions captured for racial minority participants. The analysis and graphed interaction appear in Supplemental Material under Figure S2.

Table 1
Correlations between Control Variables and Captured Interaction Partners.

Variables	1	2	3	4	5	6	7
1. Cultural Group ^a	–						
2. Gender ^b	–0.01	–					
3. Age	–0.35**	0.08	–				
4. Total number of photos captured	0.06	–0.04	–0.05	–			
5. Total number of interaction partners	0.03	0.03	–0.12	0.07	–		
6. Number of White partners	–0.44**	0.02	0.10	0.12	0.61**	–	
7. Number of racial minority partners	0.47**	0.01	–0.24**	–0.02	0.63**	–0.23*	–
8. Percent of cross-race partners	–0.10	0.03	0.06	0.17	0.19*	0.47**	–0.23*

^a 1 = Racial minority, –1 = White.

^b 1 = Male, –1 = Female.

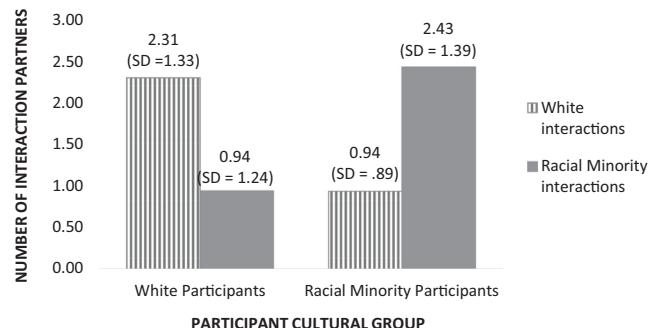


Fig. 2. Racial Categorization of Interaction Partners by Participant Cultural Group. Note. White participants = 33, Racial Minority participants = 82.

with other racial minority interaction partners compared to White interaction partners.

We also found a significant 5 × 2 interaction between participants' self-identified racial group and type of interactions captured in, $F(4, 110) = 16.15, p < .001$ (see Supplemental Material Figure S2). White participants were more likely to be observed interacting with White interaction partners while all other racial groups were more likely to be observed interacting with racial minority interaction partners.

3.3. Correlates of engaging in cross-race interactions

We predicted that individuals higher in extraversion, agreeableness, emotional stability, openness, and emotion-focused coping will be captured engaging in more cross-race interactions. Individuals higher in suppression, on the other hand, will be captured engaging in fewer cross-race interactions.

To examine correlates of engaging in cross-race interactions, we had to compute a new variable using our originally coded variables: (1) total number of White partners, (2) total number of racial minority partners, and (3) total number of interactions (i.e., sum of interactions with White and racial minority partners). Using these variables, we computed the percent of cross-race interaction partners observed for each cultural group. As a reminder, we have defined cross-race interactions as White participants captured interacting with those who appear to be racial minorities and racial minority participants captured interacting with those who appear to be White.

For example, if the participant was White, we divided the number of racial minority interaction partners observed by the total number of interaction partners observed. For racial minority participants, we divided the number of White interaction partners observed by the total number of interaction partners observed. These computed percentages became our single new variable—percent of cross-race interaction partners observed.

We conducted an independent-samples *t* test to examine if there were cultural group differences in percent of cross-race interactions observed. There were no significant cultural group differences, $t(113) = -1.03, p = .31$. White participants were observed with 29.6% cross-race (racial minority) interaction partners ($SD = 26.3\%$) and racial minority participants were observed with 23.9% cross-race (White) interaction partners ($SD = 26.9\%$). These percentages are similar to those found in past research (Mazur & Richards, 2011; Rude & Herda, 2010).

Next, we correlated our self- and informant-rated personality measures with the percent of cross-race interaction partners observed. The zero-order correlations for the total sample and within each cultural group are reported in Table 2.

3.3.1. Correlations in the total sample

In the total sample, only three measures significantly correlated with engaging in more cross-race interactions. In line with some of our predictions, self-reported emotional stability, $r(115) = 0.20, p = .03$, and informant-reported extraversion, $r(68) = 0.33, p < .01$, were positively correlated with percent of cross-race interactions captured. We also found that informant-rated expression of negative emotions, $r(68) = -0.25, p = .04$, was negatively correlated with percent of cross-race interactions captured. Contrary to our predictions, self-reported problem-focused coping, $r(113) = 0.19, p = .04$, not emotion-focused coping, was positively correlated with engaging in more cross-race interactions.

However, because processes may work differently for Whites and racial minorities, we first examined the zero-order correlations between personality and cross-race interactions within each cultural group and then examined the cultural group × personality interactions.

3.3.2. Correlations within the White subsample

Similar to our overall predictions, White participants who scored higher in emotional stability, $r(31) = 0.35, p = .044$, higher in emotion-focused coping, $r(31) = 0.41, p = .019$, and lower in emotional suppression, $r(31) = -0.42, p = .015$, were observed engaging in more cross-race interactions. Among informant ratings, only informant-rated emotional suppression showed a similar association to self-reported suppression. Informants who rated White participants lower in emotional suppression were more likely to be observed engaging in cross-race interactions; this association approached significance, $r(20) = -0.39, p = .07$.⁴

⁴ We also conducted a multiple regression to test the unique contributions of the significant personality predictors (controlling for total number of interactions). Because the personality variables were significantly inter-correlated (see Table S1) and our subsample of White participants was small, none of the predictors remained statistically significant when all included in the model. The standardized coefficients were: self-reported emotional stability ($\beta = 0.20$), emotion-focused coping ($\beta = 0.12$), and suppression ($\beta = -0.24$). The overall model fit was $R^2 = 0.22$.

Table 2
Correlations between Self- and Informant-Rated Personality and Percent of Cross-Race Interactions.

	Total		Whites		Racial Minorities	
	Self ^a	Informant ^b	Self ^c	Informant ^d	Self ^e	Informant ^f
FFM Dimensions						
Extraversion	0.13	0.33**	0.01	0.50*	0.16	0.22
Agreeableness	-0.03	-0.03	-0.18	0.05	0.02	-0.06
Conscientiousness	0.10	-0.06	0.14	0.07	0.08	-0.11
Emotional stability	0.20*	0.17	0.35*	0.27	0.13	0.15
Openness	0.15	0.15	-0.02	0.05	0.22*	0.18
Coping Styles						
Problem-focused coping	0.19*	0.15	0.27	0.27	0.18	0.08
Emotion-focused coping	0.07	-0.04	0.41*	-0.14	-0.05	0.00
Avoidant coping	-0.18	0.03	-0.16	-0.03	-0.18	0.07
Emotion Regulation						
Suppression	-0.13	-0.12	-0.42*	-0.39 ^j	-0.01	0.07
Reappraisal	0.07	0.13	-0.03	-0.01	0.13	0.22
Informant-Rated Variables						
Positive emotions	-	0.19	-	0.38 ⁱ	-	0.12
Negative emotions	-	-0.25*	-	-0.60**	-	-0.11
Likeability	-	0.18	-	0.23	-	0.18

Note. ^j $p < .10$. * $p < .05$. ** $p < .01$. FFM = Five Factor Model.
^a $df = 113$. ^b $df = 68$. ^c $df = 31$. ^d $df = 20$. ^e $df = 80$. ^f $df = 46$.

Notably, informant-rated extraversion, $r(20) = 0.50$, $p = .018$, and informant-rated expression of negative emotions, $r(20) = -0.60$, $p = .003$, also significantly correlated with greater observance in cross-race interactions. Informants who rated White participants higher in extraversion and lower in expression of negative emotions were more likely to be observed engaging with more cross-race interaction partners.

3.3.3. Correlations within the racial minority subsample

Across all personality variables measured, only one variable significantly correlated with greater observance interacting with cross-race (White) interaction partners. Racial minority participants who scored higher in openness to experience were observed engaging in more cross-race interactions with White individuals, $r(80) = 0.22$, $p = .049$. None of the informant-rated personality variables significantly correlated with being observed in cross-race interactions with White individuals.

3.4. Cultural group \times personality interactions

Next, we conducted moderated multiple regressions to test whether one's cultural group moderated the relation between each personality measure (either self-reported or informant-reported) and being captured interacting in more cross-race interactions. Using PROCESS Model 1 for simple moderation (Hayes, 2013), we entered percent of cross-race interactions as the outcome, personality variable as the predictor, and cultural group as the moderator (controlling for total interactions captured).

There was a significant Cultural Group \times Emotion-Focused Coping (self-reported) interaction, $B = -0.05$, $p = .03$, that explained a significant increase in variance in percent of cross-race interactions captured, $\Delta R^2 = 0.042$, $F(1, 111) = 5.11$, $p = .03$. The unstandardized simple slope for White participants was statistically significant, $B = 0.08$, $p = .03$; however, the simple slope for racial minorities was not statistically significant, $B = -0.02$, $p = .48$.

Fig. 3 depicts the interaction using simple slopes plotted at 1 SD above and below the mean for use of emotion-focused coping. White participants who reported more emotion-focused coping styles ($\hat{y} = 0.38$) were more likely to be captured engaging in cross-race interactions than those using less emotion-focused coping ($\hat{y} = 0.21$).

The Cultural Group \times Suppression (self-reported) interaction approached significance, $B = 0.04$, $p = .058$, $\Delta R^2 = 0.03$, $F(1, 111) = 3.66$, $p = .058$. The unstandardized simple slope for White participants was statistically significant, $B = -0.08$, $p = .02$; however, the simple slope for racial minorities was not statistically significant, $B = -0.002$, $p = .94$.

Fig. 4 depicts the interaction using simple slopes plotted at 1 SD above and below the mean for use of suppression. White participants who reported lower suppression ($\hat{y} = 0.38$) were more likely to be captured engaging in cross-race interactions than those with higher suppression ($\hat{y} = 0.22$).

4. Discussion

To our knowledge, our study is the first to examine whether certain personality traits or individual differences correlate with engaging in more cross-race interactions. Our study replicates and extends past work on cross-race interactions using naturally-occurring social interactions captured unobtrusively using new wearable camera technology.

4.1. Percent of cross-race interactions

While Whites and racial minorities were captured engaging in the same average number of interactions while wearing the camera, Whites were captured with other Whites approximately 70.4% of the time and with racial minorities only 29.6% of the time. Similarly, racial minority participants were only observed interacting with Whites for 23.9% of interactions, while the remaining interactions were with other racial minorities. At least for our White participants, our results replicate a preference for racial homophily among same-race interaction partners (McPherson et al., 2001).

While we illustrate that racial minorities are more likely to engage in interactions with other racial minorities compared to Whites, we are cautious to make a direct claim of preference for racial homophily among our racial minority participants. Our method of racial categorization posed several limitations. The first limitation is that we asked coders to use their subjective judgment to categorize whether an interaction partner appeared White or appeared to be a racial/ethnic minority member. We chose this dichotomy because past work has shown that observers are less

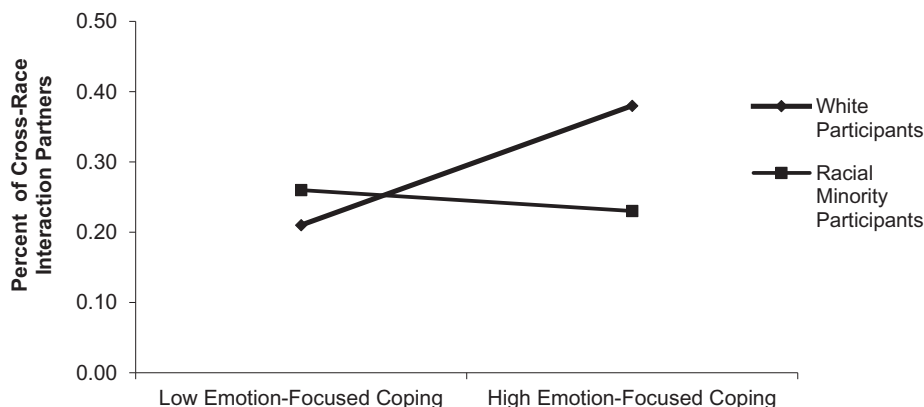


Fig. 3. Cultural Group Moderates Relation between Emotion-Focused Coping and Cross-Race Interactions. Note. White participants = 33, Racial Minority participants = 82.

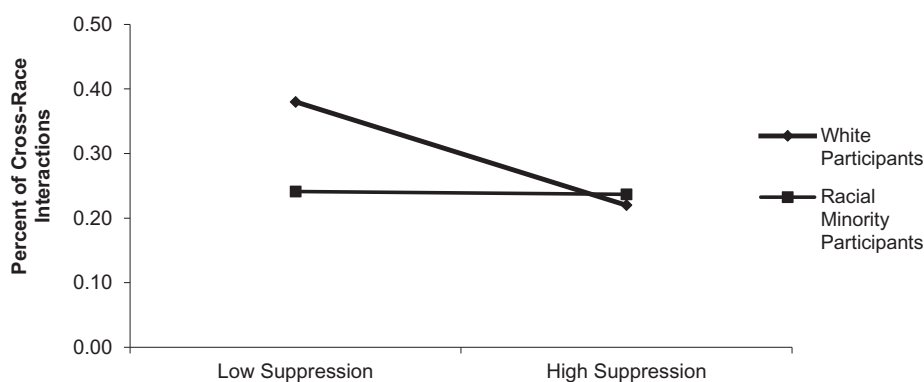


Fig. 4. Cultural Group Moderates Relation between Suppression and Cross-Race Interactions. Note. White participants = 33, Racial Minority participants = 82.

accurate when trying to categorize individuals of Latin decent, likely due to wide variance in skin tone (Saperstein, 2006). We hoped that using a more simplified dichotomous categorization (versus categorizing interaction partners as Asian, Black, or Latinx) would improve coders' ability to categorize interaction partners accurately. Importantly, coders showed strong agreement in their racial categorizations of interaction partners. Furthermore, all coders were blind to the race of the participant so they could not be influenced by that information while categorizing participants' interaction partners.

Another coding limitation was that we did not ask coders to evaluate the nature or strength of the relationship with observed interaction partners because it would have been difficult to discern whether the interaction partner was a friend, family member, or romantic partner. Therefore, we are unable to disentangle whether some of the interaction partners could be family members who are of the same racial or ethnic background as the participant.⁵ In spite of some of the limitations to our coding, we argue that our estimates of the number of cross-race interactions would be less affected by the type of relationship held with the interaction partner. Said differently, participants who were captured interacting with a person of a different race were more likely to be interacting with an acquaintance, friend, or romantic partner and not a family member. There-

⁵ However, upon further inspection of the self-reported data, participants said they spent 5.5 h, on average, with family and 3.6 h, on average, with friends. Even with this limitation, both cultural groups reported an equal number of hours spent with family members while wearing the camera ($M_W = 5.64, SD_W = 4.03; M_{RM} = 5.53, SD_{RM} = 3.62; t(104) = -0.14, p = .89$). This suggests that both groups' percentages for same-race or same-status interactions would be inflated to the same degree.

fore, we believe our general conclusions about the correlates of engaging in cross-race interactions still hold true.

In future research using the camera technology, participants could review their photos and group them into sets of distinct events. Participants could then provide information about the interaction partners captured in the photos including their race or ethnicity and the nature of the relationship. This would allow researchers to compare time spent with friends, family, or romantic partners as well as examining known friendships or romantic relationships with a cross-race partner.

A final limitation is that several of our self-reported and informant-reported personality and individual difference measures relied on fewer items and resulted in lower alpha reliabilities that may have attenuated the correlational results. To the extent possible, future research paradigms should incentivize participation for both participants and informants in order to require completion of longer surveys and improve informant response rates.

4.2. Correlates of cross-race interactions among Whites

Although we found a few significant correlations with personality measures in the total sample, the pattern of zero-order correlations within the White subsample and subsequent interaction effects tell an interesting story. Among self-reported variables, Whites who were higher in emotional stability, higher in emotion-focused coping, and lower in suppression were captured engaging in more cross-race interactions. Among informant-rated variables, Whites who were rated as more extraverted and expressing more negative emotions were captured engaging in more cross-race interactions.

Among these correlations, we found significant interaction effects between one's cultural group and two emotion-related individual difference measures. First, White participants who reported more emotion-focused coping styles were more likely to be captured engaging in cross-race interactions than Whites using less emotion-focused coping. There was no difference in the percent of cross-race interactions for racial minorities who differed in emotion-focused coping. Second, White participants who reported lower emotional suppression were more likely to be captured engaging in cross-race interactions than those with higher emotional suppression. There was no difference in the percent of cross-race interactions for racial minorities who differed in suppression. Collectively, these results highlight the role of emotion processing and regulation in interpersonal relationships, especially for Whites engaging with racial minorities. Specifically, Whites who are dispositionally more likely to evaluate and process their emotions with others and be less likely to suppress their emotions appear to be more likely to engage with racial minorities.

Past work has shown that in situations where a White participant engages with an unknown cross-race partner, Whites often have more negative emotional experiences and may be engaging in compensatory strategies that require a lot of cognitive effort (Plant & Devine, 2003; Richeson & Shelton, 2007; Toosi et al., 2012). Although we cannot be sure about the strength or closeness of the relationships captured in the photos, it is possible that Whites who use emotion-focused coping strategies such as seeking out emotional support are using the very tools, such as emotional self-disclosure, that are key in building intimacy in interracial friendships (Shelton et al., 2010). Furthermore, those individuals who are less likely to suppress their emotions would be more likely to be perceived as a responsive, genuine partner. Ultimately, being willing to disclose details about one's self or being able to be emotional vulnerability are important in building closeness in any relationship, but may be especially important for building trust with a member of a racial or ethnic minority group.

4.3. Correlates of cross-race interactions among racial minorities

Among our sample of racial minorities, we found few significant relationships with engaging in more cross-race interactions with White interaction partners. Primarily, we found a positive correlation between openness and percent of cross-race interactions with Whites within the racial minority subsample; however, there was not a significant Cultural Group \times Openness interaction. As discussed earlier, openness to experience includes being open-minded in a variety of situations and domains, such as openness to feelings, ideas, or values (Costa & McCrae, 1989, 1992). In some relationships, racial minorities may need to be open or accepting of a majority group member's differing attitudes or values as they relate to race or racism. Interestingly, Galupo and Gonzalez, 2013 found that peers in cross-race friendships rated similarities such as shared values and lived experiences as less important to their relationship. Said differently, similarity was not as important in cross-race friendships as it was in same-race friendships. Perhaps being more open and showing a tolerance for differences helps maintain friendships across racial differences.

Another consideration is that because racial minorities are often the numerical minority in many settings, they are required to engage with Whites more frequently as a matter of their daily lives. As a result, interacting with Whites could be considered a "strong situation" (Mischel, 1977) that acts to weaken the influence of any personality and individual differences that might otherwise predict greater cross-race interactions with Whites. Some past research has suggested that because racial minorities

are required to engage in more interactions with Whites, they may have developed coping techniques that help them navigate or minimize negative interactions (Plant & Devine, 2003; Shelton, Richeson, & Salvatore, 2005; Toosi et al., 2012). For example, they may engage in more friendly non-verbal behavior such as smiling or leaning in or being more responsive and asking more questions (Kaiser et al., 2011; Shelton, Richeson, & Salvatore, 2005). Racial minorities may become so accustomed to engaging in these interpersonal techniques that they become more adept at engaging in cross-race interactions with Whites.

Although we found little evidence for the role of personality or individual differences among racial minorities, there may be other individual differences that we did not examine, including variables specific to being a racial or ethnic minority. For example, racial minorities who score higher in race-based rejection sensitivity may approach cross-race interactions more cautiously because they fear rejection based on their race (Mendoza-Denton & Page-Gould, 2008; Mendoza-Denton et al., 2002) or possibly confirming negative stereotypes about their group (Richeson & Shelton, 2012; Steele & Aronson, 1995). Other factors such as one's racial centrality (Kaiser et al., 2011), how strongly identified one is with their race, or attitudes towards Whites (Shelton & Richeson, 2006b) could also play a role, especially in nonverbal behavior displayed during interactions.

Finally, it is important to consider that all relationships are dyadic and each person brings something to the interaction or relationship (Shelton & Richeson, 2006a). Furthermore, what factors are relevant for engaging in everyday, short-term cross-race interactions differ from the factors related to starting and maintaining a long-term cross-race friendship. Again, due to the limitations of our coding, we are unable to discern the nature of the relationships captured in the photos to determine whether interactions with Whites were required (e.g., for work or school) or were chosen (e.g., friendship or romantic partner). Future research should recruit individuals who identify themselves as having strong, close ties with a cross-race friend and examine the similarities and differences in personality, attitudes, and values.

4.4. Conclusion

A wide body of research has shown the benefits of engaging in cross-race or intergroup interactions, especially for reducing prejudice towards those groups (Davies et al., 2011; Pettigrew & Tropp, 2006, 2008; Pettigrew, 1998). Our work replicates past research using self-report and other observed data methods to show that cross-race interactions occur less frequently than same-race or same-status interactions. Our work also highlights that a White person's ability to express and regulate his or her emotions is an important component in fostering relationships with others from different races or ethnicities. Understanding these differences may help understand the divergent experiences Whites and racial minorities experience when interacting with novel partners or why some cross-race friendships or relationships develop and maintain themselves over many years.

CRedit authorship contribution statement

Laura Naumann: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Resources, Supervision, Writing - original draft, Writing - review & editing. **Paula Ramirez:** Data curation, Formal analysis, Project administration, Writing - review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jrp.2021.104101>.

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