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Intergroup Contact Reduces Dehumanization and Meta-Dehumanization: Cross-Sectional, Longitudinal, and Quasi-Experimental Evidence From 16 Samples in Five Countries

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Abstract

In 16 independent samples from five countries involving ~7,700 participants, we employ a mixture of cross-sectional, longitudinal, and quasi-experimental methods to examine the effect of intergroup contact on (a) the blatant dehumanization of outgroups, and (b) the perception that outgroup members dehumanize the ingroup (meta-dehumanization). First, we conduct a meta-analysis across 12 survey samples collected from five countries regarding eight different target groups (total $N = 5{,}388$) and find a consistent effect of contact quality on dehumanization and meta-dehumanization. Second, we use a large longitudinal sample of American participants ($N = 1{,}103$) to show that quality of contact with Muslims at Time 1 predicts dehumanization of Muslims and meta-dehumanization 6 months later. Finally, we show that sustained semester-long "virtual contact" between American and Muslim college students is associated with reduced American students' ($N = 487$) dehumanization of, and perceived dehumanization by, Muslims.

Keywords

intergroup contact, dehumanization, meta-dehumanization, Islamophobia, prejudice

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Intergroup contact has the potential to improve intergroup relations, especially when it is marked by positive encounters (e.g., Barlow et al., 2012; Pettigrew & Tropp, 2011). But how? The possibility most commonly explored is that positive contact with individual members of an outgroup reduces prejudice toward those individuals, which then extends and generalizes to reduce affective prejudice toward the outgroup as a whole (Tropp & Pettigrew, 2005). For example, White college students who are randomly paired with Black or Hispanic roommates display less discomfort with and more warmth toward a Black confederate than do White college students who are paired with White roommates (Gaither & Sommers, 2013). Meta-analytic support for this hypothesis shows that intergroup contact is associated with moderately reduced prejudice (Pettigrew & Tropp, 2006), with the beneficial effects varying depending on the type of outgroup in question (e.g., weaker effects for contact targeting ethnic or racial others vs. groups defined by physical ability or sexual orientation; Paluck et al., 2019).

But beyond reducing prejudice, positive intergroup contact might improve intergroup relations through other pathways. Here, we examine an alternative psychological process that may be affected by intergroup contact: dehumanization. Although there is some previous work examining the relationship between intergroup contact and dehumanization (for a review, see Capozza et al., 2014), this literature is almost exclusively cross-sectional, and examines the effect of contact on subtle forms of dehumanization (i.e., an indirect and/or unconscious tendency to overlook others' humanity or

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ascribe targets fewer emotions or traits associated with full humanity) rather than blatant dehumanization (i.e., direct and overt denial of another's status as fully human; for a notable exception, see Capozza et al., 2017). To our knowledge, no studies have examined the effect of an actual intergroup contact intervention on blatant dehumanization, despite research emphasizing that blatant dehumanization might be more strongly associated with conflict-related attitudes and behaviors than subtle dehumanization (Kteily et al., 2015). Moreover, little is known about the extent to which intergroup contact might change individuals' beliefs about the extent to which they think *they* are dehumanized by others (i.e., meta-dehumanization)—a belief known to promote cycles of intergroup conflict (Kteily & Bruneau, 2017a; Kteily et al., 2016). This research aims to bridge these gaps and illuminate an additional route through which intergroup contact might lead to better intergroup relations.

Dehumanization

Research on dehumanization differentiates between its animalistic and mechanistic forms. Whereas mechanistic dehumanization involves denying targets traits central to human nature (e.g., warmth, emotionality) or comparing them with inanimate objects, animalistic dehumanization involves denying targets traits thought to be unique to humans (e.g., civility, intelligence, self-control) or likening them to animals. We focus here specifically on animalistic forms of blatant dehumanization. Whereas both animalistic and mechanistic dehumanization are associated with negative interpersonal and intergroup outcomes (for a review, see Haslam & Loughnan, 2014), a range of recent studies suggests that animalistic dehumanization—especially in its blatant forms—is particularly associated with intergroup hostility and conflict-related attitudes and behavior (for a review, see Kteily & Bruneau, 2017b). For example, participants from the United States, England, Hungary, the Czech Republic, Spain, Greece, Denmark, Israel, and Palestine have been shown to rate at least one other group lower than their own when provided with an evolutionary scale of "evolvedness" that ranges from quadrupedal human ancestors to "modern" humans (Bruneau, Kteily, & Laustsen, 2018; Bruneau & Kteily, 2017; Kteily et al., 2015). Across individuals, the degree to which people blatantly dehumanize outgroups is a consistent predictor of negative outcomes, including attitudes (e.g., hostility), policy support (e.g., support for anti-outgroup policies, endorsement of violent vs. nonviolent resolutions to intergroup conflict; Jardina & Piston, 2016; Kteily & Bruneau, 2017a; Viki et al., 2013), and behavior (e.g., withholding donations to needy members of the target group, willingness to sign petitions against the target group; Kteily et al., 2015, 2016; Martherus et al., 2019).

One potential concern about examining blatant dehumanization as an outcome of positive contact is that blatant dehumanization may be redundant with prejudice. Below, we first discuss theoretical and empirical evidence that blatant dehumanization is distinct from prejudice, and then return to consider why positive contact may be associated with lower levels of blatant dehumanization specifically. Although blatant dehumanization and prejudice often co-occur—we often dehumanize those we dislike, and vice versa—this is not always the case. People may view others who they depict with warmth as less "evolved" than oneself or one's own group (e.g., colonialist ideas about aboriginals as "noble savages"; see Jahoda, 1999; Saminaden et al., 2010), and people may very much dislike those who they nevertheless believe to embody the essence of civilized humanity (consider Greeks' perceptions of Germans, marked by high humanity attribution but relatively low warmth; Bruneau, Kteily, & Laustsen, 2018). Indeed, humanity attributions may be more rooted in assessments of a group's advancement, sophistication, and status than is true for judgments of likability.

Supporting this theoretical distinction between blatant dehumanization and prejudice is work showing that blatant dehumanization uniquely predicts outcomes when controlling for prejudice, including support for aggressive policies, and behavioral outcomes, such as signing petitions (Jardina & Piston, 2016; Kteily et al., 2015). Moreover, while groups consistently report greater mean levels of warmth toward the ingroup than all other outgroups, they routinely rate other groups above their own in "evolvedness" (Bruneau, Kteily, & Laustsen, 2018). Finally, a recent neuroimaging study found that the brain regions active when making judgments associated with affective prejudice and blatant dehumanization are different and nonoverlapping (Bruneau, Jacoby, et al., 2018), suggesting that the judgments are cognitively distinct. Together, this evidence suggests that dehumanization is a psychological process complementary to prejudice that is highly consequential for intergroup conflict (see Kteily & Bruneau, 2017b, for a review).

Contact and Dehumanization

Contact with outgroup members is generally conceptualized as the frequency with which one interacts with outgroup members ("contact quantity") or how positive or negative that contact tends to be ("contact quality"). Previous work has examined the potential for dehumanization to be reduced through positive intergroup contact (for a review, see Capozza et al., 2014). This previous research has focused on contact quality and subtle forms of animalistic dehumanization that are assessed by determining the degree to which people preferentially assign human-specific traits ("unique humanity"; Haslam, 2006) and uniquely human emotions ("infrahumanization"; Leyens et al., 2000) to the ingroup versus the outgroup. This research has found that positive contact (direct, extended, and virtual) is associated with reductions in subtle dehumanization of a range of target groups. For example, a set of cross-sectional studies in Italy

found an association between contact quality and lower infrahumanization toward immigrants, and similarly linked contact quality to less subtle dehumanization by Northern toward Southern Italians (Capozza et al., 2013). A link between contact and less subtle dehumanization has also been established in a context defined by more direct and protracted conflict in Northern Ireland. In this study, contact between Irish Catholics and Protestants (here a combination of quality and quantity) was associated with lower infrahumanization of the other group (Tam et al., 2008). Finally, only a handful of studies have examined the relationship between contact and more blatant forms of dehumanization: The extent to which words overtly linked to the distinction between animals and people (e.g., "human" and "beast") were preferentially applied to a target group. For example, in one study, Viki et al. (2012) found that quality (but not quantity) of contact with sex offenders predicted dehumanization of sex offenders, and in a second study, Stathi et al. (2017) found that positive contact was associated with decreased dehumanization of Greek Cypriots among Turkish Cypriots (see also Capozza et al., 2017).

Supplementing the cross-sectional evidence for the relationship between contact and subtle dehumanization is one longitudinal study, which examined (across two time points) the degree to which British secondary school students infrahumanized students from another local school, and quality and quantity of contact with students from the other school. The authors found that quantity of contact at Time 1 predicted reduced infrahumanization at Time 2 (controlling for infrahumanization at Time 1), whereas the reverse path from infrahumanization at Time 1 to contact at Time 2 (controlling for contact at Time 1) was not significant (Brown et al., 2007). We are not aware of any longitudinal research examining the role of intergroup contact on blatant dehumanization.

Why might positive contact be associated with lower levels of blatant dehumanization? Positive contact may reduce blatant dehumanization directly, by challenging beliefs that the other side is beneath one's own in status, complexity, intellectual ability, or worth. To the extent that individuals have positive interactions with outgroup members they may not have engaged with previously, they could come to see a side of the outgroup that is inconsistent with more dehumanizing stereotypes they encounter in media depictions (Esses et al., 2013). Importantly, because contact has the potential of revealing that an outgroup is more *capable* (e.g., cognitively complex, sophisticated) than might have been assumed, it has the potential to specifically affect attributions of humanity (i.e., beyond merely making the outgroup seem more likable). Positive contact could also affect blatant dehumanization indirectly, by affecting perceptions that themselves serve as inputs into dehumanization. For example, the literature on dehumanization suggests that one reason why people dehumanize others is that they feel threatened (Haslam & Loughnan, 2014; Kteily et al., 2015). Promisingly, positive intergroup contact is quite effective at mitigating intergroup threat (even controlling for prejudice; Schmid et al., 2014), hinting at one mechanism by which contact could reduce dehumanization. Previous research also suggests another potential intermediary by which contact could indirectly reduce dehumanization: changing the perception that the outgroup dehumanizes the ingroup (meta-dehumanization).

Contact and Meta-Perceptions

Previous research has drawn a strong link between intergroup contact and *meta*-perceptions: how we believe an outgroup perceives the ingroup (Vorauer et al., 1998). For example, in a cross-cultural study, Techakesari et al. (2015) found that for White Americans, Hong Kong Chinese, and Buddhist Thais, positive contact with a relevant target group was associated with positive meta-perceptions, and negative contact was associated with negative meta-perceptions. There is also evidence that negative meta-perceptions can themselves disrupt intergroup contact experiences, heighten anxiety about intergroup contact, and reduce individuals' willingness to partake in it (Frey & Tropp, 2006; Shelton & Richeson, 2006). For example, White Canadians who believed that Native Canadians view White Canadians negatively expressed more negative views of Native Canadians and less willingness to meet with a Native Canadian (Vorauer & Sasaki, 2009). This cross-sectional work suggests both that contact may affect meta-perceptions and that meta-perceptions may affect the quality of contact. However, the evidence remains rather sparse, and lacks longitudinal or experimental data.

One specific meta-perception that has been shown to drive dehumanization and intergroup animosity is meta-dehumanization—the perception that one's group is dehumanized by the outgroup (Kteily et al., 2016). Specifically, Kteily et al. (2016) showed both cross-sectionally and experimentally that the degree to which groups dehumanize others is at least partly dependent upon how much the ingroup thinks they are dehumanized by the outgroup, above and beyond the effects of meta-prejudice (i.e., the extent to which the outgroup is perceived to dislike the ingroup). The effect of meta-dehumanization on outcomes was found across various national contexts, including Americans' meta-perceptions of Muslims, Hungarians meta-perceptions of the Roma minority, and Israelis' meta-perceptions of Palestinians. Similarly, Kteily & Bruneau (2017a), found among members of Latinx and Muslim minorities in the United States that feelings of being dehumanized by Americans predicted reciprocal feelings of dehumanization, which mediated increased support for violent, versus nonviolent, collective action. Most recently, meta-dehumanization expressed by American Democrats and Republicans has been shown to predict support for intergroup hostility, again mediated through higher levels of outgroup dehumanization (Moore-Berg et al., 2020).

However, given that the negativity of meta-perceptions tends to be exaggerated (Frey & Tropp, 2006; Moore-Berg et al., 2020), providing individuals with the opportunity to engage directly with the outgroup and hear their perspectives may effectively diminish intergroup hostility by correcting overly pessimistic meta-perceptions. For example, Kteily et al. (2016) demonstrated that Americans harbor strong negative meta-perceptions with respect to Muslims—believing that Muslims both dislike and dehumanize Americans—which is at odds with Pew surveys collected over the last decade indicating that Muslims across the world have positive views of Americans (Diamant, 2017). And when Americans are provided with true information about how Muslims actually view Americans, Americans dehumanize Muslims less. It therefore seems likely that when people believe that another group dehumanizes one's own group more than they do in reality, the "reality-check" of an encounter with an outgroup member may resolve the mismatch between meta-perceptions and reality by reducing meta-dehumanization. Thus, there is theoretical support that contact could reduce dehumanization and meta-dehumanization.

Current Research

The goal of the present research was to empirically assess the relationship between contact and blatant animalistic dehumanization and between contact and meta-dehumanization using cross-sectional, longitudinal, and quasi-experimental evidence. Given past research showing that contact outcomes are more strongly associated with contact quality than with contact quantity (e.g., Barlow et al., 2012; Brown & Hewstone, 2005), we focused here on contact quality, and when both contact quality and quantity were measured, we hypothesized that dehumanization and meta-dehumanization would be more strongly associated with contact quality than contact quantity.[1] To provide evidence for effects specific to dehumanization, we control wherever possible for outgroup prejudice (or meta-prejudice). In Study 1, we report correlations between self-reported quality and quantity of contact and dehumanization and meta-dehumanization in 12 data sets spanning five countries. In Study 2, we examine longitudinal data from a large sample of Americans assessed over a 6-month period to determine if quality and quantity of contact predict dehumanization and meta-dehumanization over time. Finally, in Studies 3a and 3b, we took a quasi-experimental approach by examining changes in dehumanization and meta-dehumanization of Muslims among multiple cohorts of non-Muslim Americans who participated in a "virtual contact" program with Muslim students. Since all participants took part in virtual intergroup contact, which included a defined number of encounters designed to encourage positive experiences, we did not differentiate between quality and quantity of contact in this study, and hypothesized that virtual contact, in general, would be associated with lower levels of dehumanization and meta-dehumanization.

This research extends our current understanding of the relationship between contact and dehumanization by (a) cross-sectionally examining the relationship between contact and blatant animalistic dehumanization in several large cross-national samples, (b) providing the first quasi-experimental test of the effect of intergroup contact on dehumanization, and (c) providing the first examination of the association between contact and meta-dehumanization.[2]

Study 1

In Study 1, we examined data we previously obtained from 12 independent samples (total $N = 5{,}388$) collected from five countries (the United States, Hungary, Greece, Spain, and Israel) regarding eight different marginalized target groups (people on welfare, Native Americans, Mexicans, Iranians, Palestinians, Muslims, Muslim refugees, and Roma people). Each survey included measures capturing intergroup contact quality and quantity as well as blatant animalistic dehumanization; six of the samples also included a measure of meta-dehumanization. We tested whether the quality and/or quantity of past contact with outgroup members was associated with dehumanization and (when measured) meta-dehumanization.

Method

Participants. Participants in the United States were recruited through Amazon's Mechanical Turk. Samples from other countries were recruited through in-country survey sampling companies. For demographic details of each sample, see Table S1.

Survey measures. *Contact quality* with target group members was assessed either by asking, "When you have contact with [target group], how pleasant do you find the contact?" anchored at 1 ("very unpleasant") and 7 ("very pleasant") (in Samples F–K), or by providing two separate ratings, one for positive contact ("When I interact with people of [target group] background, I find it a pleasant experience") and one for negative contact ("When I interact with people of [target group] background, I find it an unpleasant experience") (in Samples A–E). Contact quality was determined for Samples A to E by averaging positive contact and (reverse-scored) negative contact (rs = .56 to −.74, ps < .001).

Contact quantity with target group members was assessed by asking participants to "Please indicate how [regularly (in Samples A–E)/frequently (in Samples F and G)/much (in Samples H-J)/often (in Sample K)] you come into contact with [target group]," anchored at 1 ("very infrequently") and 7 ("very frequently").

Blatant animalistic dehumanization was assessed in one of the three ways: (a) *Ascent dehumanization* alone, assessed by providing participants with the "Ascent of (Hu)man" scale (Kteily et al., 2015) and having them report their perception of

Table 1. Correlations Between Blatant Animalistic Dehumanization and Contact Quantity and Quality Across Five Countries.

Sample	Subject group	Target group	Sample size	Dehumanization measure	Contact quantity	Contact quality
A	United States	Welfare	325	Composite	−.09	−.49***
B	United States	Welfare	104	Ascent	−.12	−.48***
C	United States	Iranians	311	Composite	−.11	−.49***
B	United States	Iranians	115	Ascent	.03	−.29***
D	United States	Native Americans	292	Composite	−.08	−.36***
E	United States	Mexican immigrants	341	Composite	−.11*	−.54***
F	Greece	Roma	471	Composite	−.10*	−.47***
G	Spain	Roma	1,048	Composite	−.07*	−.42***
H	Hungary[a]	Roma	906	Ascent	−.06	−.48***
I	Hungary	Roma	458	Composite	−.10*	−.57***
J	Hungary[a]	Muslim refugees	502	Composite	−.01	−.56***
K	Israel[a]	Palestinians	515	Ascent	−.11*	−.36***

Note. In Sample B, participants were randomly assigned to respond to questions assessing contact quality and quantity, and dehumanization with regard to either welfare recipients or Iranians.
[a]Samples H and K were previously published in Kteily et al. (2016), and Sample J was previously published in Bruneau, Kteily & Laustsen, (2018).
*$p < .05$. **$p < .01$. ***$p < .001$.

the "evolvedness" of the (target group), which we then reverse-scored, such that the higher the score the *more* participants dehumanized the outgroup; (b) a multi-item measure asking how well dehumanizing traits (e.g., "backwards and primitive") characterize the (target group) (*Trait dehumanization*; αs = .82–.92); or (c) when both measures were available (in all Samples but B, H, and K, in which we assessed ascent dehumanization alone), by generating a composite from ascent dehumanization and trait dehumanization (by first *Z*-scoring each, and then averaging them together; as in Bruneau & Kteily, 2017; Kteily & Bruneau, 2017a; Kteily et al., 2015; *r*s = .45−.62, *p*s < .001). The ascent dehumanization measure was answered with unmarked sliders anchored at 0 (the "least evolved" image) and 100 (the "most evolved" image); the trait dehumanization measure was anchored at 0 ("strongly disagree") and 100 ("strongly agree").

Meta-dehumanization was assessed in Samples C and G to K by providing participants with five items capturing the degree to which people felt that the target group thinks of the ingroup in dehumanizing ways (e.g., "The [outgroup] think of [the ingroup] as animals"), on scales anchored at 0 ("completely disagree") and 100 ("completely agree"). Responses across all items were averaged to create a meta-dehumanization score (Kteily et al., 2016; αs = .92–.95).

Prejudice was assessed (in all Samples but D and K) with feeling thermometers, which asked participants to report how "warm/favorable" or "cold/unfavorable" they felt toward a number of groups. Scales were anchored at 0 ("very cold/unfavorable") and 100 ("very warm/favorable"). The item was reversed-scored, such that the higher the score the *less* favorable, or more prejudiced, participants were toward the outgroup.

Analysis. Meta-analyses were performed with MedCalc® (Schoonjans et al., 1995). MedCalc uses the Hedges & Olkin (1985) method for calculating the weighted summary correlation coefficient under the fixed effects model, transforms the correlation coefficients using a Fisher *Z*-transformation, and then uses the heterogeneity statistic to calculate the summary correlation coefficient under the random-effects model (DerSimonian & Laird, 1986).

Results and Discussion

For mean responses and variable correlations for each of the samples, see Tables S3 to S13. We found that the quality of contact with members of the target group was significantly correlated with lower blatant animalistic dehumanization in all of the samples examined (see Table 1). A random-effects meta-analysis showed a medium effect of contact quality on dehumanization (Mean $r = -.48$, $z = -36.31$, $p < .001$, 95% CI = [−0.50, −0.46]) (Figure 1). Second, with one exception (i.e., Americans' dehumanization of Iranians in Sample B), all correlations remained significant even after controlling for prejudice toward the target group (see Table S2), and we found a moderate and significant effect size in a random-effects meta-analysis (Mean $r = -.24$, $z = -14.28$, $p < .001$, 95% CI = [−0.27, −0.21]). Evidence for a correlation between the quantity of contact with target group members and lower dehumanization was weaker, with less than half of the samples (5/12) showing a significant (but weak) correlation, and the correlations between contact quantity and dehumanization were not significant for the other seven samples (see Table 1), yielding a significant, but small effect size in a random-effects meta-analysis (Mean $r = -.08$, $z = -5.66$, $p < .001$, 95% CI = [−0.10, −0.05]).

Results were similar for meta-dehumanization. Meta-dehumanization was significantly correlated with contact quality for all target groups examined, while it was not significantly correlated with contact quantity in any of the cases

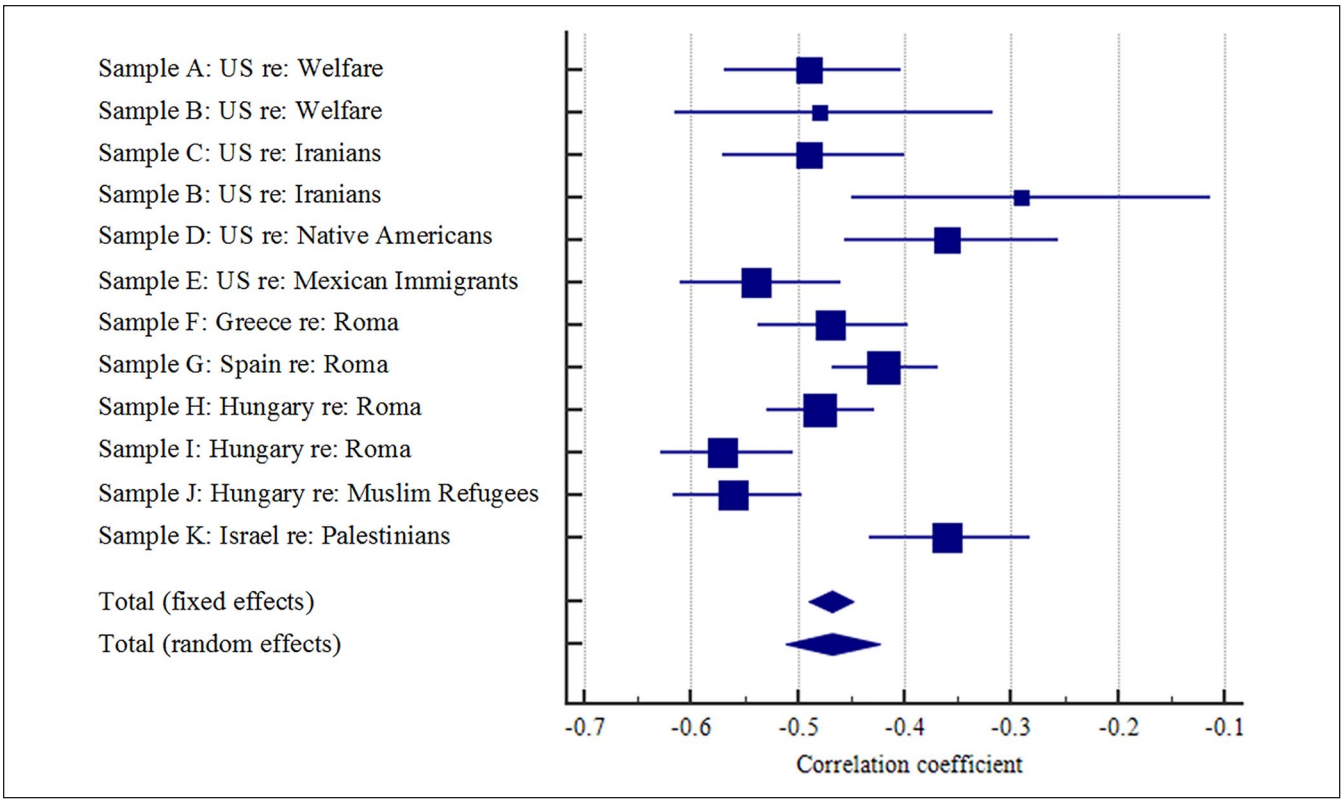

Figure 1. Meta-analysis of correlations between contact quality and blatant animalistic dehumanization in Study 1.
Note. Size of box represents sample size; lines indicate 95% confidence intervals.

Table 2. Correlations Between Meta-Dehumanization and Contact Quantity and Quality Across Five Countries.

Sample	Subject group	Target group	Sample size	Contact quantity	Contact quality
C	United States	Iranians	311	−.06	−.42**
G	Spain	Roma	1,033	.02	−.26***
H	Hungary	Roma	906	−.01	−.31***
I	Hungary	Roma	458	.05	−.21***
J	Hungary	Muslim refugees	502	.05	−.21***
K	Israel	Palestinians	515	−.01	−.17***

**$p < .01$. ***$p < .001$.

(see Table 2). A random-effects meta-analysis found a modest but significant correlation between contact quality and meta-dehumanization (Mean $r = -.26$, $z = -7.94$, $p < .001$, 95% CI [−0.32, −0.20]) (see Figure 2). All but one of the correlations remained significant when controlling for prejudice (see Table S2).

Although our main analyses examined the associations between contact quality and quantity separately, we also examined the associations for contact quality when controlling for contact quantity and vice versa (see Tables S20–S21 and S30–S31). We found that the links between contact quality and lower dehumanization and meta-dehumanization were robust when controlling for contact quantity. On the contrary, the relationship between contact quantity and lower dehumanization and meta-dehumanization did not remain when controlling for contact quality.[3]

Study 1 illustrated that contact quality was associated with levels of dehumanization and meta-dehumanization in a range of contexts toward an array of target groups. However, correlational studies provide no insight into the direction of causality (Paluck et al., 2019): It could be that more positive contact with outgroup members makes one dehumanize the outgroup less and have more optimistic beliefs about how the outgroup perceives the ingroup. Alternatively, it could be that those who dehumanize the outgroup less and believe that the outgroup humanizes the ingroup more tend to have more positive contact with specific outgroup members. It is also possible that these relationships could be bidirectional. We

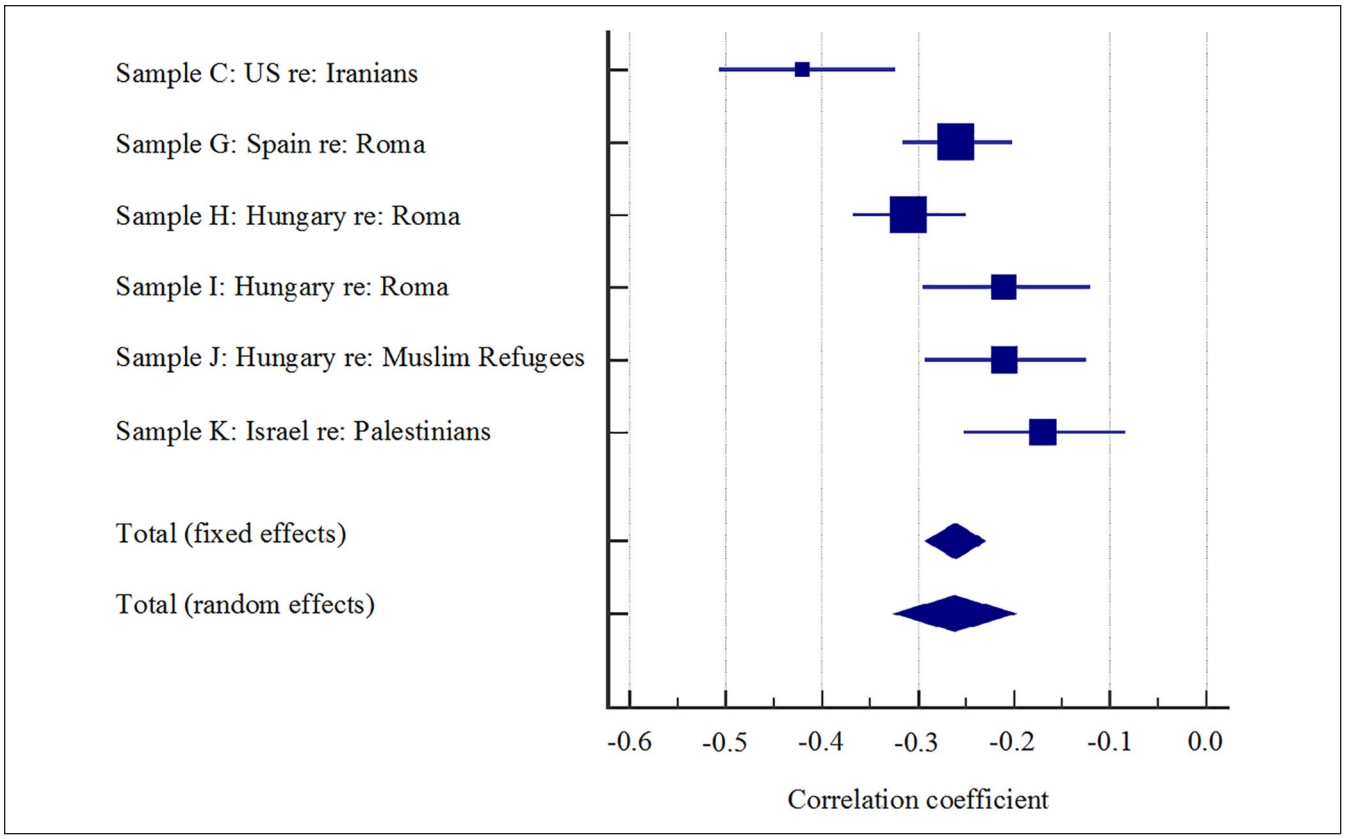

Figure 2. Meta-analysis of correlations between contact quality and meta-dehumanization in Study 1.
Note. Size of box represents sample size; lines indicate 95% confidence intervals.

considered the issue of directionality in the relationship between contact and (meta)dehumanization in Study 2.

Study 2

To better understand the relationship between dehumanization, meta-dehumanization, and intergroup contact, we turned in Study 2 to a longitudinal analysis of data obtained at two time points. This allowed us to determine if quality and/or quantity of contact at Time 1 predicted dehumanization and meta-dehumanization at Time 2, controlling for dehumanization and meta-dehumanization at Time 1. This study also allowed us to examine the reverse path, to determine if people who thought that Muslims dehumanize Americans strongly, and who themselves dehumanized Muslims at Time 1, would report worse contact quality with Muslims at Time 2 controlling for original levels of contact quality. As in Study 1, we also controlled for prejudice toward Muslims to show (meta) dehumanization-specific effects. Finally, in this data set, we also assessed participants' meta-prejudice, which allowed us to examine whether contact still served as a significant predictor of (meta)dehumanization even after controlling for the extent to which participants felt *disliked* by the outgroup. Although this analysis does not provide definitive causal evidence for contact affecting (meta)dehumanization, predicting change over time in one construct as a function of levels of another construct goes further than cross-sectional data in suggesting a causal relationship.[4]

Method

Participants. We recruited 1,939 participants through Amazon's Mechanical Turk. Of the participants recruited, 14 were Muslim and removed from the data, and 66 failed the attention check questions, leaving 1,859 participants in Time 1 (M_{age} = 36.62, *SD* = 12.04; 50.9% female; 44.1% Republican/lean Republican, 55.9% Democrat/lean Democrat). Of these participants, 1,111 (59.8%) completed the study at Time 2, conducted 6 months later, and eight failed the Time 2 attention check, resulting in 1,103 participants (M_{age} = 38.68, *SD* = 12.28; 49.0% female; 46.9% Republican/lean Republican, 53.1% Democrat/lean Democrat).

Surveys. *Contact quality* was assessed with a single item: "When I interact with Muslims, I generally find the experience to be," assessed on a Likert-type scale anchored at 1 ("very negative") and 7 ("very positive").

Contact quantity was assessed by asking "How often do you come in contact with Muslims?"[5] on a Likert-type scale anchored at 1 ("not at all") and 7 ("very often").

Table 3. In Study 2, Contact Quality at Time 1 Predicts Blatant Animalistic Dehumanization and Meta-Dehumanization at Time 2, 6 Months Later, While Contact Quantity Does Not.

	Blatant animalistic dehumanization Time 2			Meta-dehumanization Time 2		
Time 1 measures	β	*B*	*B* 95% CI	β	*B*	*B* 95% CI
Blatant animalistic dehumanization	0.63***	0.62	[0.56, 0.67]	—	—	—
Meta-dehumanization	—	—	—	0.43***	0.44	[0.37, 0.50]
Contact quality	−0.10***	−0.06	[−0.09, −0.03]	−0.08**	−1.65	[−2.82, −0.49]
Contact quantity	0.02	0.01	[−0.01, 0.03]	0.001	0.02	[−0.86, 0.90]
Prejudice	0.06†	0.002	[−0.00, 0.003]	0.11***	0.11	[0.05, 0.18]
Meta-prejudice	0.10***	0.003	[0.001, 0.004]	0.15***	0.15	[0.22, 0.63]
Political affiliation	0.05*	0.02	[0.004, 0.04]	5.05***	2.16	[1.32, 3.00]

Note. Two separate regression analyses were performed, one predicting dehumanization at Time 2, controlling for dehumanization at Time 1, and one predicting meta-dehumanization at Time 2, controlling for meta-dehumanization at Time 1. CI = confidence interval.
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Blatant animalistic dehumanization was assessed by *Z*-scoring and averaging (Time 1: $r = .64$, $p < .001$; Time 2: $r = .67$, $p < .001$) responses to the (reverse-scored) ascent dehumanization measure, and a 9-item measure of trait dehumanization (Time 1: $\alpha = .95$; Time 2: $\alpha = .95$), as in Study 1.

Meta-dehumanization was measured as in Study 1 (Time 1: $\alpha = .98$; Time 2: $\alpha = .98$).

Prejudice was measured with a reversed-scored feeling thermometer, as in Study 1.

Meta-prejudice was assessed by providing participants with five items capturing the degree to which people felt that the target group thinks of the ingroup favorably (e.g., "The [outgroup] do not have positive attitudes towards [the ingroup]."), on scales anchored at 0 ("completely disagree") and 100 ("completely agree"). Responses across all items were averaged to create a meta-prejudice score (Kteily et al., 2016; Time 1: $\alpha = .99$; Time 2: $\alpha = .98$).

Results

For dropout bias analysis, and mean responses and variable inter-correlations at each time point, see the Supplemental Material (p. 3 and Table S34). For the longitudinal analysis, we first regressed the levels of blatant animalistic dehumanization measured at Time 2 on Time 1 contact quality and quantity, controlling for Time 1 measures of dehumanization, prejudice, meta-prejudice, and political affiliation. The analysis revealed that contact quality ($\beta = -0.10$, $p < .001$), but not contact quantity ($\beta = 0.02$, $p = .25$), predicted levels of dehumanization over time. When we examined whether these same variables at Time 1 predicted meta-dehumanization at Time 2, controlling for Time 1 measures of meta-dehumanization, prejudice, meta-prejudice, and political affiliation, we found that contact quality ($\beta = -0.08$, $p = .005$), but not contact quantity ($\beta = 0.001$, $p = .963$), significantly predicted levels of meta-dehumanization across time.[6] Thus, participants who reported more positive contact at Time 1 were more likely to experience a subsequent rank-order decrease in both blatant dehumanization and meta-dehumanization at Time 2 (see Table 3; for analyses for ascent of human measure and trait dehumanization separately, see Table S35).

We then examined the reverse models, that is, regressing contact quality or contact quantity at Time 2 on Time 1 blatant animalistic dehumanization, and meta-dehumanization, while controlling for Time 1 levels of contact (quality or quantity, respectively), prejudice, meta-prejudice, and political affiliation. We found that contact quantity at Time 2 was significantly predicted only by contact quantity at Time 1 ($\beta = 0.67$, $p < .001$; all other ps $> .138$). Contact quality at Time 2 was significantly predicted by Time 1 contact quality ($\beta = 0.47$, $p < .001$) and also by blatant dehumanization ($\beta = -0.12$, $p = .002$), prejudice ($\beta = -0.11$, $p = .003$), meta-prejudice ($\beta = -0.09$, $p = .009$), and marginally by political orientation ($\beta = -0.04$, $p = .056$), but not by meta-dehumanization ($\beta = -0.02$, $p = .499$) (see Table S36).

Discussion

Extending the correlational results from Study 1, we find in Study 2 that contact quality is associated with changes over time in blatant animalistic dehumanization and meta-dehumanization, even when controlling for prejudice, meta-prejudice, and political affiliation. Also consistent with the data from Study 1, contact quantity was not associated with changes in dehumanization or meta-dehumanization, when controlling for prejudice, meta-prejudice, and political affiliation. We also found evidence that initial levels of dehumanization predicted quality of contact 6 months later, controlling for initial levels of contact. This suggests that the degree to which Americans dehumanize Muslims colors their future interactions with Muslims. If Americans hold high levels of dehumanization, they may interpret ambiguous interactions with Muslims more negatively than Americans whose initial

levels of dehumanization are low. If ambiguous interactions are viewed as negative, this could then increase perceptions of (meta)dehumanization.

Despite this study's strengths, it should be noted that we detected attrition of participants due to, most notably, Time 1 levels of contact quantity, meta-prejudice, and age. Although we therefore cannot entirely rule out that selective attrition might have had some influence on our findings, it is worth noting that it was mostly driven by higher likelihood of young participants to drop out than older participants.

Although these data go a step further than purely cross-sectional results in suggesting that contact quality reduces dehumanization and meta-dehumanization, longitudinal data remain limited in their ability to draw causal inferences. In Studies 3a and 3b we therefore took a quasi-experimental approach to provide additional evidence that positive contact reduces (meta)dehumanization by assessing the effect of an intergroup contact program between American and Muslim students on (meta)dehumanization over time, and relative to a control group of students.

Study 3a

In Study 3a, we sought to examine the effect of actual intergroup contact on (meta)dehumanization with a pre–post design. To do this, we partnered with a nongovernmental organization (Soliya) that facilitates multi-person video conferencing in small groups (typically 8–10 people) between non-Muslim American college students and Muslim college students from the Middle East, North Africa, and Southeast Asia. Students interact exclusively online for one semester for 2 hr per week in structured sessions with trained mediators. Conversations about personal issues and social and political events were conducted in English, and therefore some level of English proficiency was a program requirement. Participants also engaged in individual and shared projects, including a project that allowed them to critically analyze media video-clips. Thus, Soliya is structured to establish optimal conditions for positive intergroup contact (Allport, 1954), whereby members of the different groups have normative support for contact, equal status within the interaction, and the opportunity to cooperate on projects with shared goals. More broadly, virtual contact programs (like Soliya's) have been argued to be a particularly fruitful approach to promote better intergroup relations in contexts in which direct, face-to-face contact is difficult to obtain. Much like direct contact, it has been found to have effects that extend beyond the immediate virtual group participants to the entire outgroup even as these effects tend to be smaller than for direct contact (Lemmer & Wagner, 2015).

In Study 3a, we assessed dehumanization and meta-dehumanization among two independent samples of non-Muslim American students who were engaged in "virtual contact" with Muslim students. Dehumanization and meta-dehumanization were assessed both before the start of the program, and after the program was completed, which allowed us to determine change over time within each participant. Because there are other variables beyond participation in the contact program that varied across time and because of the absence of random assignment, our quasi-experimental design does not allow for precise causal inferences.

Method

Participants. We obtained data from two separate cohorts of American students who completed the virtual contact program in Spring 2016 ($n = 104$) and Fall 2016 ($n = 189$). Of the 293 American students who engaged in the virtual contact program, 10 failed the pre-program attention check question, leaving 283 participants ($M_{age} = 20.75$, $SD = 2.59$; 65.0% female). At the end of the program, participants were asked to complete a post-program survey identical to the pre-program survey, with some additional program assessment questions at the end. The post-program survey was completed by 192 of the original participants (68%), all of whom passed the post-program attention check question ($M_{age} = 20.63$, $SD = 2.58$; 65.1% female). Based on this sample, sensitivity power analysis indicated that our analysis was sufficiently powered to detect a small effect size (Cohen's $d = .20$) with 80% power.

Surveys. Participants in the virtual contact condition completed pre-program surveys as a pre-requisite to registering for the program, and completed the post-program surveys within a week of their last session. The survey, used for both Studies 3a and 3b, included measures of self-group overlap, prejudice, trust and hope, and collective blame, followed by (only in the pre-program survey) questions about quality and quantity of past contact with Muslims. These items were not the focus of this research, but are presented in pages 6 to 10 in the Supplemental Material. We then presented participants with the two key measures of dehumanization and meta-dehumanization, which were followed by items Soliya included for their own internal evaluation.

Meta-dehumanization was assessed by providing American students with the "Ascent of (Hu)man" diagram (Kteily et al., 2015) and asking them to move sliders associated with five groups (Americans, Europeans, Muslims, Christians, and Jewish people) to the position on the diagram that they thought the average Muslim student would place Americans:

> Using the graphic and sliders below, 500 Muslim college students from the Middle East and South Asia were asked to rate how "evolved and civilized" were a number of groups. Please move the sliders next to each group until they represent how "evolved and civilized" you think **Muslim students**, on average, rated each group.

We used as our measure of meta-dehumanization how far students thought Muslim students would rate Americans

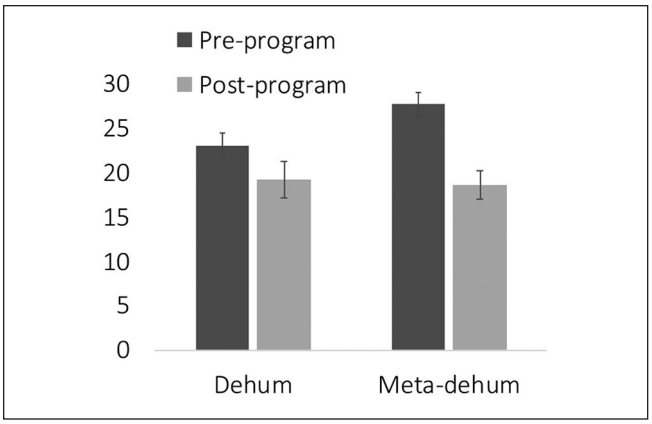

Figure 3. Dehumanization and meta-dehumanization among American participants assessed before and after engaging in a virtual contact program in Study 3a.
Note. Error bars represent standard errors.

below the maximum (i.e., reverse-scoring the rating on the 0–100 scale).

Trait dehumanization was assessed with six traits (e.g., "Muslims are backward and primitive"; Spring 2016 pre: $\alpha = .89$/post: $\alpha = .88$; Fall 2016 pre: $\alpha = .80$/post: $\alpha = .91$), using unmarked sliders anchored at 0 ("strongly disagree") and 100 ("strongly agree").

Results

For dropout bias analysis, and mean responses and variable inter-correlations at each time point, see the Supplemental Material (p. 6 and Table S37). To determine if participants showed lower levels of dehumanization and/or meta-dehumanization after (vs. before) participating in the virtual contact program, we conducted paired samples *t*-tests for each of the measures. As predicted, we found that pre-program levels of dehumanization ($M = 23.09$, $SD = 18.79$) and meta-dehumanization ($M = 27.71$, $SD = 28.65$) were significantly reduced after the program, dehumanization: $M = 19.28$, $SD = 18.34$; $t(191) = 3.42$, $p < .001$, $d = .21$; meta-dehumanization: $M = 18.63$, $SD = 22.95$; $t(187) = 4.41$, $p < .001$, $d = .35$; see Figure 3. These effects were consistent across each cohort (see Table S38). For analysis of changes across time of meta-dehumanization and prejudice with regard to additional target groups, see Table S39.

Discussion

Study 3a provided evidence that those who engaged in a (virtual) contact program with outgroup members subsequently held lower levels of both blatant animalistic dehumanization and meta-dehumanization. The results of Study 3a align with the results of Studies 1 and 2 and extend them by considering pre–post change for those who actually engaged in a contact program. The fact that the effect of participation in the contact program on post-program dehumanization held even when controlling for pre-program contact quantity and quality (see pp. 6–7 in the Supplemental Material) provides further confidence in these results. However, there were two main limitations with this study. First, nearly one third of the sample did not complete the post-program survey. As mentioned above, sensitivity power analysis indicated that we still had sufficient power to detect a small effect size, and we did not find any evidence that those who completed the survey differed from those who did not in terms of their demographics (beyond age) or in their initial evaluations of (meta) dehumanization of Muslims. However, it is still possible that those who did not complete the post-program survey differed in some meaningful way from those who did, and that the observed effects represent over- (or under-) estimates of change across all participants. Second, the evaluation did not include a control group, reducing confidence that the improvement was specific to those exposed to the contact program. We sought to address both of these limitations in Study 3b.

Study 3b

In Study 3b we extended the results of Study 3a by examining a new cohort of non-Muslim American students who went through the Soliya virtual contact program with Muslim students. Among this cohort, participants completed post-program surveys as part of the final session of the program (rather than in the week following), which improved participant retention. Moreover, we included a control group of students who did not participate in the virtual contact program and whose attitudes we assessed over the same time period.

Method

Participants. Study 3b included two participant groups, American students who engaged in the virtual contact program in Spring 2017 (experimental group: $n = 325$), and a group of control students who did not (control group: $n = 38$). To maximize the similarity between the groups, we recruited control participants from the classes of professors who previously had their students engage in the Soliya program, but who were not currently involved (despite remaining in contact with the organization). Therefore, although our design did not involve random assignment, our control group was composed of students who took courses similar to those in the virtual contact program from professors who were familiar and sympathetic with the virtual contact program. Of the 325 students who engaged in the virtual contact program, 12 failed the pre-program attention check question, leaving 313 participants ($M_{age} = 20.76$, $SD = 2.59$; 61.7% female). Of the controls, one failed the pre-program attention check question, leaving 37 participants ($M_{age} = 22.19$, $SD = 4.41$; 59.5% female). The controls tended to be marginally older, $t(39) = 1.94$, $p = .060$, but the groups did not differ by

gender distribution, $\chi^2(N = 350) = .07$, $p = .859$, or by their pre-program levels of dehumanization or meta-dehumanization, ts < 1, ps $> .326$.

Participants completed a post-program survey as in Study 3a. For the participants in the experimental group, 309 of those who completed the pre-program survey also completed the post-program survey; 14 of these participants failed the post-program check question, resulting in a final total of 295 participants (91% retention rate; $M_{age} = 20.96$, $SD = 2.60$; 62.7% female). For controls, 19 of those who completed the pre-program survey also completed the post-program survey, with one of these participants failing the post-program check question, resulting in 18 controls (49% retention rate; $M_{age} = 22.50$, $SD = 4.36$; 72.2% female). The control group participants remained slightly, but not significantly, older than the experimental group participants, $t(17) = 1.49$, $p = .155$, and remained similar by gender distribution, $\chi^2(N = 313) = .66$, $p = .464$, and by pre-program measures of dehumanization and meta-dehumanization, ts < 1, ps $> .744$. Sensitivity power analysis indicated that we had sufficient power to detect a small effect size for the Time of Measurement (within-subject) × Group (between-subject) interaction (partial $\eta^2 = .005$) with 80% power. However, expectedly, this analysis also indicated that while the experimental condition sample size enabled us to detect a small effect size (Cohen's $d = .16$), with 80% power; the control condition sample size only enabled us to detect a medium to big effect size (Cohen's $d = .70$), with 80% power.

Surveys. Participants in the virtual contact condition completed pre-program surveys prior to registering for the program, and completed the post-program surveys during their last session (to ensure maximum participation). Participants in the control group were sent a link to the pre- and post-program surveys at the same time that program participants were completing their surveys. The survey measures and format were identical for both treatment and control participants. The surveys were identical to the surveys from Study 3a, including the two key measures of *trait dehumanization* (pre: $\alpha = .91$; post: $\alpha = .88$) and *meta-dehumanization*.

Results

For mean responses and variable inter-correlations at each time point, see Table S40. To determine if participation in the virtual contact program was associated with reduced dehumanization and/or meta-dehumanization, we conducted mixed analyses of variance (ANOVAs), with time as a within-subjects factor (pre-program, post-program) and group as a between-subjects factor (virtual contact, control). As predicted, we found a significant Time × Condition interaction, $F(1, 311) = 8.89$, $p = .003$, partial $\eta^2 = .028$. There were no significant main effects of Time, $F(1, 311) = 0.47$, $p = .496$, partial $\eta^2 = .001$, or Condition, $F(1, 311) = 0.73$, $p = .395$, partial $\eta^2 = .002$. Although pre-program levels of dehumanization were nearly identical for the experimental group ($M = 24.73$, $SD = 19.93$) and the control group ($M = 23.18$, $SD = 19.69$), planned comparisons indicated that dehumanization became significantly lower in the experimental group, $M = 20.57$, $SD = 19.80$; $F(1, 311) = 22.98$, $p < .001$, partial $\eta^2 = .069$, over time, whereas it became marginally significantly higher in the control group, $M = 29.81$, $SD = 25.39$; $F(1, 311) = 3.56$, $p = .060$, partial $\eta^2 = .011$, See Figure 4.

A similar pattern emerged for meta-dehumanization, although the Time x Condition interaction was only marginally significant, $F(1, 301) = 2.86$, $p = .092$, partial $\eta^2 = .009$. Again, there were no significant main effects of Time, $F(1, 301) = 0.91$, $p = .342$, partial $\eta^2 = .003$, or Condition, $F(1, 301) = 0.24$, $p = .627$, partial $\eta^2 = .001$. Although pre-program levels of meta-dehumanization were similar for the experimental group ($M = 26.30$, $SD = 30.93$) and the control group ($M = 23.83$, $SD = 35.78$), post-program meta-dehumanization was significantly lower than pre-program for the experimental group, $M = 17.76$, $SD = 25.39$, $F(1, 301) = 29.43$, $p < .001$, partial $\eta^2 = .089$, and numerically (but nonsignificantly) higher in the control group, $M = 26.22$, $SD = 30.54$, $F(1, 301) = 0.15$, $p = .703$, partial $\eta^2 = .000$ (see Figure 4). For additional analyses, see pages 8 to 10 and Table S41 in the Supplemental Material.

Discussion

Study 3b provided additional quasi-experimental evidence that, compared with a control condition and replicating Study 3a, virtual contact that was designed to facilitate positive intergroup contact was associated with reductions in blatant animalistic dehumanization and meta-dehumanization over time. However, one notable limitation of this study is the small control group we obtained. Our attempt to sample a control group from the same population as the experimental group, and the fact the control participants were asked to complete the survey during their free time, led to a rather small control group. As another limitation, although we attempted to match participant populations as much as possible across conditions, we did not have random assignment. Thus, although Studies 3a and 3b both point to a positive role of participating in the virtual contact program (especially with regard to reduced dehumanization), they cannot definitively rule out alternative explanations. We further address the limitations of Studies 3a and 3b in the general discussion.

General Discussion

In this research we report evidence for the association between contact with outgroup members, and the dehumanization of—and meta-dehumanization by—the outgroup. In particular, while the amount of contact that participants report having with outgroup members was only weakly correlated with both dehumanization and meta-dehumanization across a

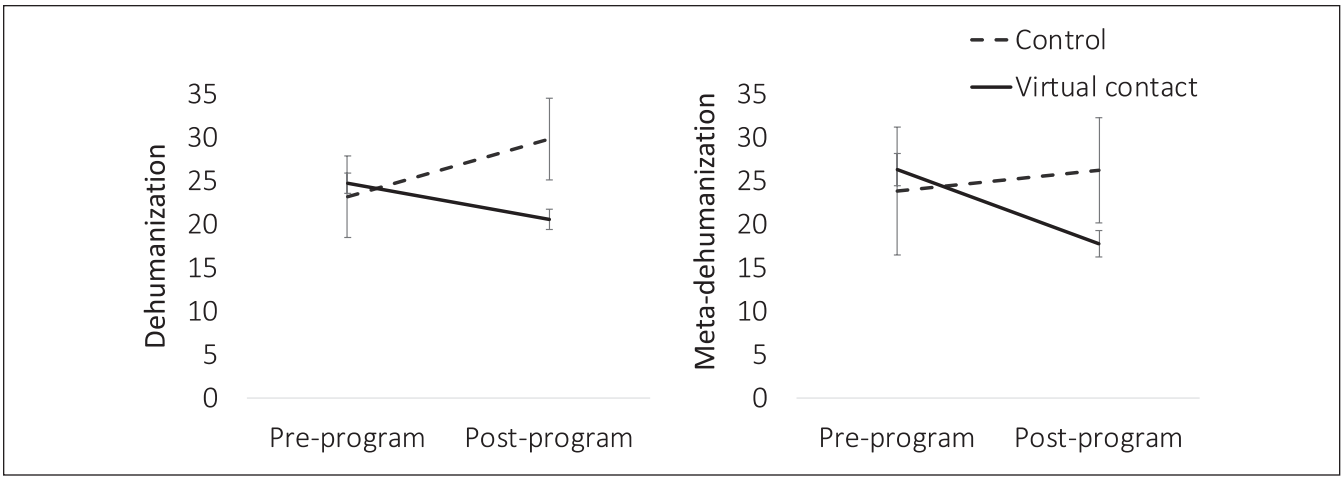

Figure 4. Dehumanization and meta-dehumanization among American participants in a virtual contact program (solid) and controls (dashed) assessed before and after the virtual contact program in Study 3b.
Note. Error bars represent standard errors.

range of cultural contexts and toward a number of target groups, quality of contact was strongly associated with both dehumanization and meta-dehumanization in nearly every context. Longitudinal data supported these results: contact quality at Time 1 predicted dehumanization and meta-dehumanization at Time 2, while contact quantity did not. Finally, quasi-experimental evidence provided converging evidence for the association between contact quality and both dehumanization and meta-dehumanization. In particular, Study 3b provided evidence for an improvement in attitudes and meta-perceptions toward Muslims among those who participated in the contact program relative to a (small) control sample who—despite being similar to the students in the experimental condition—did not participate in the program.

A significant amount of research has established a strong link between intergroup contact and prejudice, but much less research has examined the effect of contact on dehumanization, particularly in its blatant forms. Why does this matter? Previous research has established that blatant dehumanization is distinct from dislike (Bruneau, Jacoby, et al., 2018; Kteily et al., 2015). Without considering dehumanization, one could not know whether contact quality might make a target group appear likable without also making them, for example, seem sophisticated, civilized, and rational (traits central to full humanity). The fact that contact quality appears to independently be effective at reducing dehumanization (even controlling for prejudice) is therefore encouraging. This independence of prejudice and dehumanization has important implications for interventions that aim to reduce intergroup conflict. If prejudice and dehumanization represent two independent routes to intergroup hostility, they also represent two potential routes of conflict reduction. It also may be true that in some circumstances where dehumanization is the prime driver of discrimination (such as teacher tracking discrimination against minority students; Bruneau et al., 2020), interventions that target prejudice may not be the most effective approaches to reducing discrimination (see also Tropp & Barlow, 2018).

One of the most significant contributions of this research is to highlight the role of meta-dehumanization in intergroup contact. Previous research has mostly examined the effect of meta-perceptions on contact, rather than the potential impact of positive contact on meta-perceptions. Given that negative meta-perceptions are reliably overestimated (Frey & Tropp, 2006; Moore-Berg et al., 2020), they represent a prime target for interventions (Kteily et al., 2016). Interestingly, although all studies showed that intergroup contact (and in particular, contact quality) was associated with meta-dehumanization, it was also evident in all studies that contact quality was more strongly associated with dehumanization than with meta-dehumanization. One possible explanation for these somewhat weaker effects is that most of our studies considered contact quality between high-power group participants (e.g., Americans, Europeans) and target outgroup members from low-power groups (e.g., Muslim immigrants, the Roma minority). Because low-power targets tend to be dehumanized more than high-power targets (especially animalistically; Gwinn et al., 2013; Haslam & Loughnan, 2014), it may be that high-power individuals (correctly) perceive that they are less animalistically dehumanized by low-power targets in the first place (and more likely to themselves animalistically dehumanize the outgroup). If so, then dehumanization may have more room to move than meta-dehumanization when considering high-power group individuals' perceptions with respect to low-power or low-status outgroups. Future work could examine this by considering the associations between contact and (meta)dehumanization among high- and low-power perceivers. Negative meta-perceptions may be particularly relevant and salient for low-power and minority group members, and it may therefore be the case that high-quality

contact does more to reduce meta-dehumanization among low- versus high-power perceivers. Beyond the potential role of intergroup power, it is also possible that people attend more to how they see others when they engage with them than on how they think these others see them, rendering contact more effective at changing outgroup perceptions than meta-perceptions.

The research reported here consistently demonstrated a relationship between contact quality and both dehumanization and meta-dehumanization in large, diverse cross-sectional samples, a longitudinal sample, and three independent quasi-experimental samples. At the same time, it is important to acknowledge some limitations and remaining questions. First, the final quasi-experimental sample involved only a small control group with no random assignment. Thus, we cannot completely rule out that the observed changes across time were due to something other than the virtual contact program, such as the liberalizing influence of one semester at college (e.g., Hanson et al., 2012), background socio-political events (e.g., the American elections), or selection bias in the participants who decide to opt-in to or drop out from a virtual contact intervention (see Binder et al., 2009). Although the experimental and control groups were matched on pre-program variables, it will still be important in the future to ensure larger "waitlist" control samples, or random assignment across conditions. Second, as mentioned above, the Soliya program is conducted in English, which is not the native language for most of the Muslim participants. This means that for the American participants, the intergroup contact might have been perceived as being with atypical members of the outgroup. Although we did find significant reduction in (meta)dehumanization across time, this might have harmed the extent to which the positive impact of the intervention has generalized to the entire Muslim group (e.g., Brown & Hewstone, 2005). Communicating in English might have also somewhat reinforced power relations between the two groups. Third, it will also be important to address the important concern raised by Paluck et al. (2019) that few studies examining contact explore the effects over time. Having a longitudinal evaluation, in addition to a true randomized control group, will provide the strongest test of the impact of contact interventions on dehumanization and meta-dehumanization.

It is also worth noting that our analyses supported bi-directional influence between contact and dehumanization (but not meta-dehumanization; see also Barlow et al., 2012; Capozza et al., 2017). Thus, developing an intervention that reduces dehumanization and/or increases humanization could be an effective route to improving the quality of contact with outgroup members and to making future positive contact with outgroup members more likely. And in parallel, identifying opportunities for positive contact can itself help overcome dehumanizing perceptions of the outgroup.

Finally, this research focused on blatant animalistic (meta) dehumanization, as it has been found to be particularly relevant in the contexts we focused on in this research (i.e., conflictual contexts and attitudes toward minorities, for example, Kteily & Bruneau, 2017b). However, it is plausible that similar processes could emerge when examining mechanistic meta-dehumanization. In cases where groups are stereotypically perceived as machine-like (see, for example, Andrighetto et al., 2014), there is reason to believe that the mechanistically dehumanized group will also perceive that they are meta-dehumanized. Thus, it will be valuable for future research to explore whether contact quality and quantity are associated with lower levels of mechanistic meta-dehumanization.

In conclusion, this research provides strong evidence that contact quality is a significant predictor of (meta)dehumanization and that these effects are consistent across a variety of different contexts. Furthermore, we demonstrate that sustained virtual contact between American and Muslim college students is associated with Americans' reduced levels of dehumanization of, and meta-dehumanization by, Muslims, suggesting that positive intergroup contact can have a significant impact on decreasing the belief that our group is dehumanized by the outgroup and our tendency to dehumanize them in kind.

Declaration of Conflicting Interests

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Supplemental Material

Supplemental material is available online with this article.

Notes

1. Although we focus on the main effects of contact quantity and quality, we also considered whether they interacted to predict outcomes, and found no evidence to support that (see Tables S32–S33).
2. We include information about indirect effects from contact to dehumanization through meta-dehumanization and indirect effects from contact to meta-dehumanization through dehumanization in pages 4 and 5 of the Supplemental Material.
3. After controlling for contact quality, the sign of the associations reversed, such that we observed a (very small) *positive* association between contact quantity and each of meta-dehumanization and dehumanization. This suggests that the negative association between contact quantity and meta-dehumanization and dehumanization may have been solely due the typically positive correlation between contact quality and quantity.

4. At the same time, it is worth noting that with only two waves of data a cross-lagged panel design can only estimate between-person changes rather than within-person changes (see Orth et al., in press).
5. We also specifically assessed the quantity of contact with low-status and high-status targets as well as the quantity of contact involving an exchange of ideas (see pp. 3–4 in the Supplemental Material).
6. When we examined these models while controlling for Time 1 measures of both dehumanization and meta-dehumanization, contact quality remained a significant predictor of dehumanization ($p < .001$), but was only trending for meta-dehumanization ($p = .116$).

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