Does More US Education Foster Racial Cooperation? Lessons from a Study of Formal Education and Intergroup Behavior

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Prior research demonstrates that those with more formal education tend to report less intergroup *prejudice* towards many outgroups, including racial/ethnic outgroups, which is largely mediated by two intergroup ideological attitudes: right-wing authoritarianism and social dominance orientation. This study investigated the link between formal education and intergroup *behavior* displayed in an economic game, and how these two attitudes mediated this relationship. A continuous variant of the Prisoner's Dilemma game with racial/ethnic ingroup and outgroup members was employed as a behavioral measure because it requires a player to cooperate despite a risk of defection to get better payoffs. Given the null results that emerged, explanations and recommendations for future studies that draw from the lessons of the present study are discussed.

Keywords: formal education, prisoner's dilemma, RWA, SDO, intergroup prejudice

Inclusivity and diversity are virtues that the United States and most of its schools hold as central values. However, the extent to which the United States education system promotes diversity and inclusivity remains only partially answered in the psychological literature. One way this question has been examined is in studying the association between formal education (secondary and postsecondary education) and intergroup prejudice.

Formal Education and Intergroup Prejudice

One clear finding has emerged for the formal education-intergroup prejudice relationship: greater formal education is associated with slightly lower intergroup prejudice towards many traditionally marginalized outgroups on self-report measures (e.g., Greeley & Sheatsley, 1971; Hello et al., 2006; Maykovich, 1975; Quillian, 1995; Stouffer, 1955; Wagner & Zick, 1995). For racial, ethnic, and immigrant outgroups, this relationship has been observed in different countries across time for an array of dependent variables: the intention to keep distance from ethnic minorities (Hello et al., 2006), attitudes towards immigrants and immigration policy (Cavaillé & Marshall, 2019; Coender et al., 2008; Quillian, 1995), ethnic exclusion (Coenders & Scheepers, 2003), ethnocentrism (Meeusen et al., 2013) and racial prejudice (Carvacho et al., 2013; Federico, 2004, 2005; Quillian, 1995; Wagner & Zick, 1995). Formal education is also related to lower self-reported prejudice against other outgroups including sexual minorities (Carvacho et al., 2013; Napier & Jost, 2008), homeless and disabled individuals (Carvacho et al., 2013), obese individuals (Hilbert et al., 2008), and religious outgroups (Carvacho et al. 2013). Notably, however, this relationship does not extend to all outgroups as the well-educated tend to exhibit slightly greater self-reported prejudice towards the less educated (Kuppens et al., 2018) and political outgroups (Henry & Napier, 2017).

Intergroup Ideological Attitudes as Mediators

There are two dimensions of intergroup ideological attitudes fostered through formal education that appear to largely mediate the relationship between formal education and self-reported intergroup prejudice (Carvacho et al., 2013; Hello et al., 2006; Pettigrew et al., 2007). Based on the dual-process motivational model (e.g., Duckitt, 2006; Duckitt & Sibley, 2007), these two relatively independent dimensions are social dominance orientation (SDO) and right-wing authoritarianism (RWA).

SDO (e.g., Ho et al., 2015) is a measure of attitudes towards group-based hierarchy and inequality and contains two components: dominance and anti-egalitarianism. The dominance component constitutes a preference for systems of group-based dominance in which lower status groups are oppressed by higher status groups, while the anti-egalitarianism component constitutes a preference for systems of group-based inequality perpetuated by hierarchy-enhancing social policies and ideologies. Meanwhile, RWA (e.g., Altemeyer, 2008) is a measure of attitudes towards submitting to established authorities and norms, and towards those who do not submit to them. RWA has three components: authoritarian submissions, conventionalism, and authoritarian aggression. Authoritarian submission constitutes a preference for submitting to established authorities, while conventionalism constitutes a preference for adherence to established norms and traditions. Finally, authoritarian aggression constitutes a preference for tough responses to violations of social norms and affronts to established authorities.

Both intergroup ideological attitudes are moderately to strongly positively associated with self-reported intergroup prejudice (e.g., Duckitt, 2006; Duckitt & Sibley, 2007). Further, Carvacho et al. (2013) conducted two cross-sectional surveys in Europe and two longitudinal studies in Germany and Chile over the phone with large samples to analyze SDO and RWA as mediators of the formal education-intergroup prejudice relationship. In these studies, they employed shortened SDO and RWA scales as well as short scales of intergroup prejudice for groups including: Muslims, Jews, foreigners, homeless individuals, people with disabilities, gay individuals, as well as other races appropriate to the particular country being studied. They observed that both SDO and RWA, though RWA more consistently, mediated the relationships between these forms of intergroup prejudice and formal education. In other words, the well-educated tended to hold more egalitarian (lower SDO) and less traditional (lower RWA) attitudes that, in turn, were associated with lower self-reported intergroup prejudice.

The Prisoner's Dilemma

Research supports a consistent relationship between formal education and intergroup *prejudice* (e.g., Greeley & Sheatsley, 1971; Hello et al., 2006; Maykovich, 1975; Quillian, 1995; Stouffer, 1955; Wagner & Zick, 1995). However, the link between formal education and intergroup *behavior* has not been well explored. Cooperation displayed in a continuous variant of the Prisoner's Dilemma (PD) game is one such way to analyze intergroup behavior. In this variant of the PD, two players must decide how much money to contribute to a pool where the money increases by a factor of 1.5 before being evenly split between them. The *pair's payoff* is maximized if both players contribute to the pool. However, if one player contributes to the pool while the other does not, the free-rider benefits, while the contributor is better off having never contributed at all. Indeed, defecting is the dominant strategy. That is, always contributing nothing to the pool maximizes an *individual's payoffs*, yet most players still cooperate to some degree (e.g., Rapoport et al., 1965). Thus, overall, the PD tests the willingness of a player to cooperate in the face of a risk of defection. Further, the PD has been used as a measure of intergroup behavior in studies that have demonstrated that participants tend to play more cooperatively with ingroup members than outgroup members (Balliet et al., 2014), with both artificial groups (e.g., Ahmed, 2007; Yamagishi & Mifune, 2009; Yamagishi et al., 2008), and racial groups (e.g., Dorrough & Glöckner, 2016; Yamagishi et al., 2005).

Formal Education and Economic Games

As far as the authors are aware, no studies have directly tested the relationship between formal education and intergroup behavior in the PD. However, two studies have analyzed related associations. In a Mexican sample, a better-educated group of elementary school teachers and a less-educated group of fishermen played iterated PD games with members of their own group as well as members of another unspecified outgroup (Acedo-Carmona & Gomila, 2019). Results showed that the two groups did not differ in their cooperation with ingroup members. However, the better-educated group of elementary school teachers tended to play *more* cooperatively with outgroup members than the less-educated group of fishermen. Yet, because other factors varied between the two groups in addition to formal education level, strong conclusions about the effect of formal education on cooperation in the PD cannot be drawn from this study. In another study, a Dutch population of undergraduate students showed that those with better education of competition theories of economics tended to play *more* cooperatively than the less-educated towards individuals with no group affiliation in the PD (Boone & Witteloostuijn, 1999). Because formal education more broadly wasn't directly assessed, strong conclusions about formal education and cooperation in the PD, similarly, cannot be drawn from this study.

When considering other economic decision-making games, prior research has found mixed evidence for the relationship between formal education and general cooperation with players with no group affiliation, as well as the relationship between formal education and cooperation with ingroup vs outgroup members. For the former, the well-educated tended to play *more* cooperatively in an all-or-nothing dictator game in a Dutch population (Bekkers, 2007), while in a Japanese population, the well-educated tended to play *less* cooperatively in a series of theoretical dictator games (Ogawa & Ida, 2015). Further, those educated at US colleges in economic fields tend to behave *less* cooperatively in similar economic decision-making games, including the dictator and ultimatum games, than those in other fields of study (Carter & Irons, 1991; Miller, 1999; Wang et al., 2011). The differences in the results of these studies appear to be driven, at least in part, by broader cultural factors. For example, Japanese advanced education systems do not tend to offer classes on ethics, while those in more western cultures, like the Netherlands, tend to have such courses which may promote more prosocial behavior (Ogawa & Ida, 2015). Additionally, even within western cultures, like the US, education in economic fields tends to also promote more positive attitudes towards self-interest than other fields that can lead to less prosocial behavior in economic decision-making games (e.g., Wang et al., 2011).

In analyzing the relationship between formal education and cooperation with ingroup vs outgroup members, Kolstad and Wiig (2013) studied intergroup behavior in a series of dictator games at an Angolan microcredit institution. They found that the well-educated tended to show *more* intergroup bias toward those in the same credit group than the less-educated. This study, therefore, may be indicative of the restrictions on the type of outgroups where greater formal education is associated with more cooperative behavior and/or may also be reflective of cultural factors.

In total, mixed evidence in the relationship between formal education and behavior in other economic decision-making games may indicate that this relationship is complex and varies with context, including cultural sample recruited, economic game used, and group membership information given to the players. Given this complexity, how formal education is related to intergroup behavior in the PD is an interesting question for additional investigation.

The Present Study

The present study assesses the relationship between formal education and cooperation in a continuous variant of the PD with outgroup versus ingroup members and analyzes SDO and RWA as mediators of this relationship. Balliet et al. (2014) conducted a meta-analysis of 212 studies that analyzed what factors of an economic game led to greater intergroup bias. They found that economic decision-making games that (1) require interdependence, (2) where players act simultaneously, and (3) where group membership is common knowledge invoke the greatest intergroup bias. In the present research, these criteria were satisfied by using a simultaneous, continuous variant of the PD where racial/ethnic group membership was known and manipulated. Specifically, *only* White participants were recruited, while the other "player" was artificially designated as White or Black.

In total, the authors predicted that (Hypothesis 1) individuals would contribute more to the pool when their game partner was an ingroup member (White) than an outgroup member (Black), (Hypothesis 2) there would be an interaction between formal education and group membership such that formal education would be associated with contributions in the outgroup condition but not in the ingroup condition, and (Hypothesis 3) using a moderated mediation model, SDO and RWA would mediate the effect of formal education on contributions in the outgroup but not ingroup condition. See Figure 1.
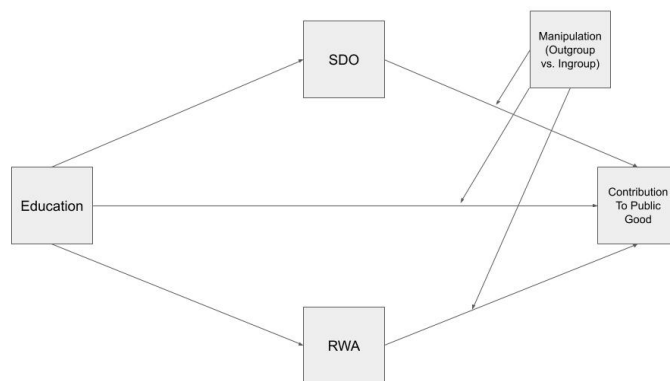

Figure 1. Custom Moderated Mediation Model

Method

Participants

There were 426 participants in the present study, after exclusions (see Data Cleaning section below). G*Power was used to determine sample size, power = .80, alpha = .05 and effect size f^2 = .02. The authors chose to calculate power based on the ability to detect a change in R^2 in a regression model based on three tested predictors (Faul et al., 2007). This analysis suggested that 395 participants were needed. However, to account for participants who would be excluded from analysis or would not qualify to play to the PD, 530 participants were recruited.

The subject population was recruited through Amazon's Mechanical Turk (MTurk), and the name of the study was posted online on the MTurk platform. To qualify, participants had to self-identify as ethnically White, have an MTurk account, be at least 18 years of age, speak English, and be physically located in the U.S. The Turk Prime platform was used to recruit participants so that participants were unaware of how they qualified to be in the study (Litman et al., 2016). People who were interested in participating could click on a link to complete the questionnaire.

Of the 426 participants remaining after exclusions (see Data Cleaning section below), the sample ranged in age from 18 to 82 years (M = 40.30, SD = 13.14) and was composed of 197 males, 229 females. The sample included individuals spanning the socioeconomic ladder. When asked to indicate the rung where they stand at this time in their life, relative to other people in the United States on the socioeconomic ladder (1 = 'bottom rung', 10 = 'top rung'), participants' placements ranged from 1 to 9 (M = 4.79, SD = 1.73). The median income range indicated for the sample was twenty-five to fifty thousand dollars with 27.7% indicating this income range. When asked to indicate their highest level of formal education, 1.2% did not complete high school or obtain a GED, 22.8% earned a high school diploma or GED, 14.8% had some college but no degree, 4.2% earned a post-secondary vocational certificate, 11.7% earned an associate's degree, 29.3% earned a bachelor's degree, 3.1% had some graduate school but no degree, 11.7% earned a master's degree, and 1.2% earned a doctoral degree or another advanced degree (Ph.D., JD., MD).

Procedure and Measures

Participants who were interested in participating clicked on a link to the consent script (See Appendix A; Appendices A–H can be found at https://osf.io/zmf9k/?view_only=ee64d5e6bc604b 188c2f8de08fd9e26c). If they decided to participate, they clicked "continue" and began the study. Participants first completed a short demographic questionnaire (See Appendix B) and then received instructions on how to play the PD (See Appendix C). This continuous variant of the PD is a two-player economic game that has one round where players act simultaneously. The participant is told that they and the other player (actually fictitious) must independently decide how much of their $1.00 to contribute to a pool where the money increases by a factor of 1.5 before being evenly split between the participant and the other player.

Two simple comprehension questions were asked to ensure that the participant understood the game. Participants who correctly answered these questions qualified to play the PD. If a participant did not qualify to play the PD, they were paid $.50 for their participation.

Participants who qualified to participate in the PD were instructed to choose an avatar from an array of emojis of White faces of varying appearances (See Appendix D). After choosing an avatar, the participant was told to create a username for the purposes of the study and then told to wait while they were "paired" with another player. Participants then played one round of the PD in which they were randomly assigned to be presented with a fictitious game partner who either appeared to be a Black American or a White American, as their names (Freyer & Levitt, 2004) and avatars suggested (See Appendix E).

Following the game, participants were asked if they had played a similar game before, and a manipulation check was conducted in which the participant was asked what ethnicity and gender they believed the other player was (See Appendix F). Next, they completed the 16-item SDO scale (Ho et al., 2015) and 22-item RWA scale (Altemeyer, 2008). Finally, participants viewed debriefing information (See Appendix G). The entire study took approximately 10-minutes. Participants who completed the entire experiment were paid $.50 as a show-up fee and a $1.50 bonus for qualifying to play the PD and completing the entirety of the study regardless of behavior in the PD given their game partner was fictitious.

Formal Education. Participants indicated their highest level of formal education on a 9-point scale. In data analysis, this 9-point scale was condensed into a 5-point scale to equate educational programs that tend to take a similar number of years to complete. Having not completed high school or obtained a GED is indicated by 1. Having earned a high school diploma or GED is indicated by 2. Having had some college but no degree, having earned a post-secondary vocational certificate, or having earned an associate's degree is indicated by 3. Having earned a bachelor's degree is indicated by 4. Finally, having had some graduate school but no degree, having earned a master's degree, or having earned a doctoral degree or another advanced degree (Ph.D., JD., MD) is indicated by 5. Notably, though post-bachelor programs can vary in length, they were ultimately combined given the anticipated low samples in the "some graduate school but no degree" and "having earned a doctoral degree or another advanced degree (Ph.D., JD., MD)" categories.

Contributions in the Prisoner's Dilemma Game. Participants indicated their contributions to the pool on a $0-1.00 scale with specificity to the cent.

Social Dominance Orientation Scale. The SDO scale (Ho et al., 2015) contains 16 items in which participants were asked to show how much they favor or oppose each idea. Examples of items are "Some groups must be kept in their place" and "No one group should dominate in society". The answers were indicated on a 7-point Likert scale ranging from *Strongly Oppose* (1) to *Strongly Favor* (7). The scale demonstrated adequate reliability (α = .95).

Right-Wing Authoritarianism Scale. The RWA scale (Altemeyer, 2008) contains 20 items in which participants were

asked to show how much they agree or disagree with each statement. Examples of items are "The 'old-fashioned ways' and the 'old-fashioned values' still show the best way to live" and "What our country really needs is a strong, determined leader who will crush evil, and take us back to our true path." The answers were indicated on a 9-point Likert scale ranging from *Disagree Strongly* (1) to *Agree Strongly* (9). The scale demonstrated adequate reliability (α = .96).

Income. Participant income was measured on a 12-point scale that ranges from <10K to >750K.

"Subjective" Socioeconomic Status (SES). "Subjective" SES was measured using an image of a ladder and asking participants to place themselves on the ladder relative to others in the U.S., using a scale that ranges from 1 (lowest) to 10 (highest).

Gender. Participants indicated their gender utilizing three categories: male, female, and "other: please specify". Because participants were paired with an artificial game partner of the same gender, participants who indicated "other: please specify" were excluded from the sample.

Data Cleaning. In total, 530 participants consented to take part in the study. Of these participants, 31 were excluded because they self-identified as being an ethnicity other than solely White, two were excluded because they self-identified as being a gender other than male or female, and one was excluded because they did not report their gender. Of the remaining participants, 53 were excluded because they did not answer both PD instruction comprehension checks correctly. Of the participants who qualified to play the PD, two dropped out of the study, two did not indicate a contribution in the PD, one did not consent to the use of their data, and seven did not respond to the question asking for consent to the use of their data. Finally, the authors decided to exclude five more participants because, in the comment section, they indicated suspicion that the other player was artificial. This left a total of 426 participants in the sample.

Additionally, the distributions for RWA, SDO, and income were checked for outliers. Scores that were more than three standard deviations away from the mean were winsorized.

Results

Manipulation Check

A chi-square test of independence was performed to examine the relationship between condition (having a Black or White game partner) and what race/ethnicity the participant believed their game partner was after playing the PD. The relation between these variables was significant, $X^2(2) = 264.42$, $\phi = .79$, $p < .001$. Participants with a Black game partner correctly identified their game partner's race/ethnicity (78.0%) significantly less often than those with a White game partner (97.7%).

Primary Analyses

To test the prediction that individuals would contribute more when the other player was an ingroup member than an outgroup member (Hypothesis 1), a two-tailed independent samples t-test was conducted. Inconsistent with Hypothesis 1, no significant difference in contributions in the PD between those with a Black game partner ($M = .62$, $SD = .31$) and those with a White game partner ($M = .66$, $SD = .31$) was found, $t(424) = -1.45$, $d = -.14$, $p = .148$.

To test the prediction that there would be an interaction between formal education and group membership such that formal education would be associated with contributions in the outgroup condition but not in the ingroup condition (Hypothesis 2), a two-tailed, multiple regression analysis was conducted excluding covariates. Specifically, contributions in the PD were regressed on formal education level, the manipulation (ingroup vs. outgroup game partner), and their interaction. Following the recommendations of Aiken and West (1991), formal education level was first centered before performing the regression analysis. The model was insignificant, $R^2 = .006$, $F(3, 422) = .83$, $p = .478$. See Table 1. Inconsistent with the Hypothesis 2, the interaction term did not significantly predict contributions in the PD, $\beta = .04$, $p = .548$. Further, formal education level did not significantly predict contributions in the PD, $\beta = -.04$, $p = .543$. Likewise, having a Black versus a White game partner did not significantly predict contributions in the PD, $\beta = .07$, $p = .150$.

To test the prediction that SDO and RWA would mediate the effect of formal education on contributions in the outgroup but not ingroup condition (Hypothesis 3), first, two-tailed Pearson correlations between formal education, RWA, SDO, and contributions in the PD were calculated. See Table 2. Contributions in the PD were significantly negatively correlated

Table 1. Contributions in the PD Regressed on Formal Education Level, Condition, and Their Interaction

	Contributions in the PD				
	B	*SE B*	β	*t*	*p*
Constant	.62***	.02		29.40	< .001
Education	-.01	.02	-.04	-.61	.543
Condition	.04	.03	.07	1.44	.150
Education × Condition	.02	.03	.04	.55	.584

Note. *** = p < .001. A two-tailed test was used. PD = prisoner's dilemma game. SE B = standard error of B.

Table 2. Pearson Correlations

	1	2	3	4	5	6
1. Formal Education	-					
2. SDO	.01	-				
3. RWA	-.12*	.63**	-			
4. Contributions in PD	-.02	-.13**	-.13**	-		
5. Subjective SES	.42**	.21**	.11*	-.01	-	
6. Income	.34**	.16**	.03	.02	.60**	-

Note. * = p < .05. ** = p < .01. A two-tailed test was used. PD = prisoner's dilemma game; SES = socioeconomic status.

with RWA, $r = -.13$, $p = .009$, and SDO, $r = -.13$, $p = .006$. Formal education was significantly negatively correlated with RWA, $r = -.11$, $p = .018$. However, formal education was not significantly correlated with SDO, $r = .01$, $p = .826$. Therefore, the preconditions for running the custom model in Figure 1 were not met. Rather, a model in which only RWA was tested as a mediator could be run. Specifically, a bootstrapping procedure was used to test the moderated mediation predictions involving only RWA as a mediator in Model 15 in the PROCESS macro developed for SPSS by Hayes (Hayes, 2017). There was no evidence of moderated mediation, *index of moderated mediation* = .003, 95% CI [−.004, .012]. That is, inconsistent with Hypothesis 3, there was no evidence that the indirect effect of formal education on contributions in the PD differed by condition.

The results for Hypothesis 1 and Hypothesis 2 but not Hypothesis 3 were unaffected by the exclusion of participants who failed the manipulation check, i.e., did not accurately identify the race of their game partner after playing the PD. See Appendix H.

Discussion

The present study sought to examine the association between formal education and intergroup behavior. Previous work has so far established a reliable small relationship between formal education and self-reported intergroup prejudice, but there is mixed evidence that this translates to actual intergroup behavior in economic decision-making games. Given that in America and most of its schools, both inclusivity and diversity are central values, understanding how formal education relates to racial/ethnic intergroup behavior is integral for assessing the extent to which these values are truly upheld.

Hypothesis 1

The results showed that, though trending in the direction consistent with Hypothesis 1, no significant difference in contributions in the PD was found between those with a Black game partner and those with a White game partner. Given that in many cases, prior studies have evidenced intergroup bias, the method of the current study likely accounts for this result. In particular, the covert method of suggesting the game partner's race/ethnicity through names and pictures, compared to overtly stating it, likely accounts for the failure of participants to show intergroup bias. Each of these studies in which participants displayed intergroup bias in the PD within artificial groups (Ahmed, 2007; Yamagishi & Mifune, 2009; Yamagishi et al., 2008) and racial groups (Dorrough & Glöckner, 2016; Yamagishi et al., 2005) overtly and often exclusively announced to participants the group membership of their game partners.

However similarly to the present study, two studies that used covert methods also found no intergroup bias. Tusicisny (2017) had Hindu participants in Mumbai play a series of online PD games with artificial game partners depicted as either Hindu or Muslim through a series of covert cues: a photograph, first name, and neighborhood. Meanwhile, Hemesath and Pomponio (1998)

told several American and Chinese students to mingle and play with four different PD game partners with a mix of gender and citizenship but made no explicit reference to playing with a set of racial/ethnic ingroup and outgroup members. In both studies, similarly to the present one, no racial/ethnic intergroup bias in the PD was observed.

Covert methods like these may lessen racial/ethnic group membership salience as well as heighten salience of other competing group memberships that can both attenuate racial/ethnic intergroup bias. A large body of literature shows that interindividual interactions tend to be more cooperative than intergroup interactions in games like the PD (for a review, see Wildschut et al., 2003). Additionally, group membership salience heightens intergroup dynamics in the PD (e.g., Charness et al., 2007). Thus, when using a covert method that doesn't make group membership as salient, participants may play the PD as more of an *interindividual* interaction than an *intergroup* interaction that leads them to cooperate more. Additionally, other competing group memberships to racial/ethnic groups, such as a shared gender in the case of the present study, that do not elicit similar ingroup favoritism or outgroup derogation dynamics may also become salient and, thus, prevent intergroup bias along racial/ethnic lines (Chen et al., 2014).

Notably, participants with a Black game partner correctly identified their game partner's race/ethnicity 78.0% of the time, while those with a White game partner correctly identified theirs 97.7% of the time. This may support the notion that group membership salience was strong enough, at least in the ingroup condition, to evoke intergroup bias. However, it is not clear how close the link is between being able to recall the game partner's race/ethnicity after the fact and factoring in the game partner's race/ethnicity into the decision-making process of the PD. Additionally, even if there is a close link, other competing factors may have also been salient with contrasting effects on intergroup bias. As consistent with these conclusions, even when participants who answered the manipulation check incorrectly were excluded from analysis, intergroup bias was still not observed. See Appendix H. Thus, overall, the covert method used in the present study may have better individualized the game partner such that racial/ethnic group membership wasn't the only nor, perhaps, primary factor by which participants made their PD decision.

Hypothesis 2

Inconsistent with Hypothesis 2, there was no evidence for an interaction between formal education and group membership such that formal education would be associated with contributions in the outgroup condition (playing with a Black game partner) but not in the ingroup condition (playing with a White game partner). Additionally, formal education did not exhibit a main effect on contributions in the PD. Therefore, formal education did not affect contributions in the PD overall and there were similarly null effects of formal education on contributions in the ingroup and outgroup conditions.

To assess these results, first, consider some background

information. Intergroup prejudice can be understood as stemming from some combination of ingroup and outgroup favoritism (e.g., Axt et al., 2018) and ingroup and outgroup derogation (e.g., Wu et al., 2019).). Among White individuals, there is little reason to generally suspect ingroup derogation toward other White individuals nor outgroup favoritism toward Black individuals. As such, formal education was considered for its effects on outgroup derogation and ingroup favoritism. It was initially inferred that, since greater formal education is associated with lower intergroup prejudice towards racial/ethnic minorities, those White individuals with greater formal education would exhibit less outgroup derogation (cooperate more with Black game partners) than those with less formal education. Meanwhile, formal education wasn't expected to impact ingroup favoritism when their game partner was White.

These particular inferences, from which Hypothesis 2 was derived, is contingent on at least four assumptions being true that weren't examined well enough before the study was conducted. First, it assumes that participants are likely to show intergroup bias using the method of the present study. Second, it assumes that formal education is likely to only affect outgroup derogation and not ingroup favoritism. Third, it assumes that if better formally educated individuals tend to exhibit less outgroup derogation, then those participants with greater formal education would likely contribute more than those with less formal education when paired with a Black game partner. Fourth, it assumes that intergroup bias in the PD would stem, at least in part, from outgroup derogation. Each assumption is assessed in turn.

When considering the result and discussion of Hypothesis 1, the first assumption that the method of the present study would likely result in ingroup bias is called into question when considering the covert method of group membership indication used in the present study.

Next, the second assumption is considered: formal education is likely to only affect outgroup derogation and not ingroup favoritism. It is often ambiguous whether an attitude that preferences one's group over another or derogates another group over one's group ultimately comes from a like of the ingroup or a dislike for the outgroup. Thus, ingroup favoritism and outgroup derogation are often not disentangled within the current formal education literature in measures of intergroup prejudice since a reference to both the ingroup and outgroup is implicit in many of the items. However, in studies assessing the effect of formal education on intergroup prejudice, measures of intergroup prejudice, when looking at the item content, appear to assess outgroup derogation more closely, some even to the point of appearing to entirely assess outgroup derogation. For example, measures used in studies of formal education that were used to assess intergroup prejudice that assess direct liking of outgroups (e.g., Carvacho et al., 2013; Hilbert et al., 2008; Wagner & Zick, 1995) or ethnic distance (e.g., Hello et al., 2006) have also been used elsewhere as direct measures of outgroup derogation (e.g., Obaidi et al., 2018; Oswald, 2005; Schlueter et al., 2008). Since the well-educated tend to show significantly lower scores on these types of measures,

then the formal education-intergroup prejudice relationship is likely driven, at least in part, by a decline in outgroup derogation.

Meanwhile, the extent to which ingroup favoritism underlies the formal education-intergroup prejudice relationship is not well outlined in the literature. In a survey of twenty-two countries, Coenders and Scheepers (2003) analyzed the roles of two forms of ingroup favoritism, chauvinism and patriotism, in the formal education-intergroup prejudice relationship. Chauvinism is the blind attachment to the perspective that one's own country and racial/ethnic ingroup are superior and unique, while patriotism is the pride in and love for one's own country and racial/ethnic ingroup based on critical understanding. Coenders and Scheepers (2003) found that formal education level is strongly negatively related to chauvinism but not patriotism. Thus, this study supports that formal education is related to ingroup favoritism via a reduction in chauvinism. However, Kolstad and Wiig (2013) found evidence that calls this conclusion into question. In a study analyzing cooperation in an economic decision-making game at an Angolan microcredit institution, Kolstad and Wiig (2013) found that the well-educated tended to show *more* intergroup bias toward those in the same credit group than the less-educated due to *more* ingroup favoritism. In total, the extent to which the formal education-intergroup prejudice relationship functions through ingroup favoritism remains understudied and unclear. Overall, the literature largely supports the second assumption in that formal education affects intergroup bias primarily through its effect on outgroup derogation and little through its effect on ingroup favoritism.

Next, the third assumption is considered: if better formally educated individuals tend to exhibit less outgroup derogation, then those participants with greater formal education would likely contribute more than those with less formal education when paired with a Black game partner. In the present study, no control condition was used where racial/ethnic group membership wasn't indicated, so ingroup favoritism and outgroup derogation can't be assessed by comparing decisions when paired with a member of a specified group (outgroup or ingroup) versus an unspecified group. In line with this limitation, if better educated participants had donated more than less formally educated participants when paired with a Black game partner, it doesn't necessarily indicate that greater formal education was related to less outgroup derogation. Rather, it could have similarly been observed when paired with game partners with no group membership information provided. Thus, on the one hand, if the predicted interaction of Hypothesis 2 was supported it *may* indicate that greater formal education is associated with lower outgroup derogation and not lower ingroup favoritism, but it does not *necessarily* indicate that. A baseline would be necessary to draw such a conclusion. On the other hand, if greater formal education is associated with lower outgroup derogation and not lower ingroup favoritism, then this would be reflected by support for the predicted interaction of Hypothesis 2. Overall, the third assumption is supported, though a control condition in which participants were paired with a game partner whose race/ethnicity information wasn't provided would

be necessary to rule out alternative explanations.

Finally, the fourth assumption is considered: intergroup bias in the PD stems, at least in part, from outgroup derogation. A meta-analysis assessing a breadth of economic decision-making games found that intergroup bias displayed in these games was a result of ingroup favoritism and not outgroup derogation (Balliet et al., 2014). A parallel notion is echoed in studies assessing PD games directly with artificial groups. Ahmed (2007) had Swedish undergraduates play PD games with participants specified as in the same experiment session (in-group), a different session (outgroup), or an unspecified session (control). Meanwhile, Yamagishi and Mifune (2009) had Japanese undergraduates play PD games with those in the same picture preference group (ingroup), the other picture preference group (outgroup), or those in an unspecified group (control). Both of these studies found that ingroup favoritism and not outgroup derogation accounted for the ingroup bias displayed by participants. Finally, one study assessed intergroup bias using the PD with racial/ethnic groups and found divergent findings. Yamigishi et al. (2005) had Australian and Japanese participants play online PD games with members of their own race/ethnicity (ingroup), members of the other race/ethnicity (outgroup), and members of an unspecified race/ethnicity (control). They found no evidence of ingroup favoritism and, instead, found a pattern of outgroup-favoritism due to fairness concerns among the Australian participants and positive stereotypes of Australians held by the Japanese participants. Overall, the PD used in the present study appears ill-equipped to evoke outgroup derogation and is, rather, better used to assess ingroup favoritism, so the fourth assumption is also called into question.

In conclusion, two of four assumptions made that were used to derive Hypothesis 2 were not well upheld. Contrary to the first assumption, the PD used in the present study wasn't likely to evoke intergroup bias due to its covert method of informing group membership. In support of the second assumption, formal education is likely to primarily affect outgroup derogation with little effect on ingroup favoritism. In support of the third assumption, if better formally educated individuals tend to exhibit less outgroup derogation, then those participants with greater formal education would, indeed, likely contribute more than those with less formal education when paired with a Black game partner, though a control condition would be necessary to rule out alternative explanations. Finally, contrary to the fourth assumption, the PD used in the present study wasn't likely to evoke outgroup derogation but rather primarily ingroup favoritism. Overall, Hypothesis 2 was generated from at least two under-analyzed assumptions and, thus, was a poor prediction based on the method used in the present study. In this light, the null results are unsurprising.

Hypothesis 3

Finally, inconsistent with Hypothesis 3, neither SDO nor RWA mediated the effect of formal education on contributions in the outgroup but not in the ingroup condition. Prior research supports that, through SDO and RWA, greater formal education leads to

a decline in intergroup prejudice on self-report measures, and this decline is likely at least partially driven by a decline in outgroup derogation. Thus, it was suspected that SDO and RWA would mediate any decline in outgroup derogation in the outgroup condition associated with greater formal education. Therefore, because formal education did not affect cooperation in the outgroup condition, likely for reasons discussed, a null outcome is unsurprising.

Limitations

Several limitations to this study are at play. First, because participants who did not understand the instructions of the PD may have tended to be less educated, less educated individuals may have been disproportionately screened out. To test this possibility, an independent samples, two-tailed t-test was run and showed a significant difference in formal education level between those who answered both PD instruction comprehension checks correctly ($M = 3.35$, $SD = 1.04$) and those who did not ($M = 2.94$, $SD = 1.01$), $t(494) = -2.67$, $p = .008$, such that those who answered the checks correctly tended to be better-educated than those who did not. This shows that a selection effect was present in the study.

Second, as discussed with Hypothesis 2, the present study method had several limitations on accurately assessing the study questions. Because group membership was indicated covertly, the present study wasn't likely to evoke intergroup bias. Further, any intergroup bias observed in the PD would likely result from ingroup favoritism and not outgroup derogation when formal education was thought to primarily affect outgroup derogation. Additionally, the absence of a control condition prevented the differentiation between ingroup favoritism and outgroup derogation within intergroup bias.

Finally, participants did not play against real players who are part of an ingroup or outgroup, but only emojis and names were used to depict them. This design may have led some participants to correctly believe that their game partner was not real. Indeed, five participants voluntarily indicated such suspicion in the comment section.

Conclusion

In sum, the current literature supports a correlational relationship between formal education and intergroup prejudice, but the link between formal education and intergroup behavior remains largely unexplored. The present study attempted to address this gap but was considerably limited by several factors that researchers should consider in future studies. First, future studies should take steps to attenuate or even eliminate a selection effect by formal education level when assessing comprehension of the PD, such as including a practice round with feedback for participants to become acquainted with the game. Next, future studies should look to use methods that elevate salience of the target group membership and attenuate salience of others to increase intergroup bias. Additionally, studies using economic games to analyze intergroup bias should be cautious if the focus is on outgroup derogation and not ingroup favoritism, as many

economic games tend to better elicit the latter and not the former.

Finally, the roots of intergroup bias, ingroup favoritism and outgroup derogation, have been understudied in the literature assessing the effects of formal education. Though a decline in outgroup derogation and a decline in ingroup favoritism have identical effects in the decline of intergroup bias, the interpretation and resulting conclusions differ greatly. Thus, future studies should consider including measures that distinguish between ingroup favoritism and outgroup derogation to assess the effects of formal education more holistically.

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