Investigating educators' implicit attitudes toward social groups

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Abstract

Given the importance of education and the role educators play on the outcomes of their students, the current research investigates implicit attitudes among a sample of mathematics educators. Implicit attitude measures are ones which investigate automatic associations between a target social group and a positive or negative feeling. These attitudes are important because they predict behaviors toward members of the target social group (e.g., Cameron, Brown-Iannuzzi, & Payne, 2012; Greenwald, Poehlman, Uhlmann, & Banaji, 2009). The current research also extends beyond previous research by investigating the association between educators' implicit racial attitudes toward black and white people and students' trust and respect for their educator. If educators' implicit attitudes are associated with how they interact with their students, it may be that we can uncover this relationship by asking students about their attitudes toward their educators. To analyze these questions, this study leverages data from the National Study of Learning Mindsets (NSLM), the largest-ever randomized controlled trial of a growth mindset program in the U.S. in K-12 settings, in which a brief online growth mindset program was administered to 9th grade students during the 2015-2016 academic year. The results suggest that educators have a more implicit positive reaction to women than men, and slightly more implicit positivity toward black men than white men. These implicit associations, however, are unrelated to students' trust and respect for their educator. The findings and implications are discussed.

Introduction

Implicit bias has become a “hot topic” among the research and lay community alike. Since the seminal paper on implicit bias (Devine, 1989), publications on implicit bias have increased dramatically. In fact, over the last five years there have been at least 100 peer-reviewed manuscripts per year mentioning ‘implicit bias’ (PsycInfo, 2020). Further, organizations like Starbucks, Facebook and Google have asked all employees to complete implicit bias training. And, implicit bias was mentioned in the 2016 Presidential Debate. So, what is implicit bias? Why is implicit bias an important topic? And, why is it useful to understand implicit bias among educators?

Cognition can be thought of as operating using dual processes. Explicit processing is deliberative, controlled, and takes time and resources (such as motivation). Alternatively, implicit processing is automatic, difficult to control, and efficient (e.g., Bargh, 1994; Gawronski Bodenhausen, 2006). Implicit bias, therefore, reflects automatic responses toward one social group relative to another social group. If one of the two groups is favored, then there is evidence for implicit bias against the non-favored group. If both groups are equally favored, then there is no evidence for implicit bias. Put differently, there is evidence for implicit egalitarian attitudes.

It is important to understand implicit bias because it predicts behavior. Summaries of empirical and experimental research suggest that implicit attitudes have a modest yet significant relationship with behavior (Cameron, Brown-Iannuzzi, & Payne, 2012; Greenwald, Poehlman, Uhlmann, & Banaji, 2009). And, these relationships persist when controlling for the relationship between explicit attitudes and behaviors. Thus, implicit and explicit bias may uniquely predict discriminatory behaviors.

It is important to understand the role of implicit and explicit bias among educators. Educational attainment represents a prominent way people can attain upward economic mobility. Thus, routes which may stymie one's educational attainment are important to identify and mitigate. One such impasse may be prejudice among educators. The current research investigates implicit bias among math educators.

Bias among Educators

Educators (and high school educators in particular) may represent a unique sample that is different from the majority of the U.S. adult population on several dimensions. In secondary schools, women are more likely to be educators than are men (National Center for Education Statistics, 2018). In addition, educators tend to be more educated than the general public with the majority of educators earning a postbaccalaureate degree (National Center for Education Statistics, 2018), whereas, the majority of U.S. adults have earned a high school diploma (Census, 2016). Together, these descriptive statistics suggest that compared to the U.S. population, high school educators are more educated and more likely to be women. This sample difference also has implications for prejudice. In particular, more educated individuals tend to have lower explicit and implicit bias than less educated individuals (e.g., Payne et al., 2010). Thus, we may anticipate lower levels of bias as compared to the U.S. population.

Although there may be lower levels of bias among educators as compared to the rest of the U.S. population, there exists variability in bias. That is, some educators may be more biased than other educators. Further, this difference in bias may impact students' outcomes. In particular, expectancy confirmation research suggests that instructors' expectations of students predicts students' academic outcomes (e.g., Word, Zanna & Cooper, 1974). These expectations may be biased by racial prejudice. As a consequence, minority students tend to have worse

academic outcomes when taught by more racially prejudiced instructors (measured both implicitly and explicitly) than when taught by less racially prejudiced instructors (e.g., Peterson, Rubie-Davies, Osborne, Sibley, 2016; Rubovits & Maehr, 1973; Weinstein, Gregory, & Strambler, 2004). In addition, Black students are more likely to receive harsher academic punishments (such as suspension or expulsion) in counties where implicit bias against Black people is higher (Riddle & Sinclair, 2019). Relatedly, research finds that the ethnic gap in students' grades are explained, in part, by educators' implicit bias (van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010). Further, experimental findings indicate that prejudiced instructors teach worse lessons when they are asked to teach a lesson for a Black (vs. White) student (Jacoby-Senghor, Sinclair, & Shelton, 2016). These findings suggest that the race/ethnic achievement gap may be perpetuated, in part, by instructors' racial bias.

Measuring Bias among Educators

No single measure best captures bias. As described above, both implicit and explicit measures of attitudes predict behavior (e.g., Cameron, Brown-Iannuzzi, & Payne, 2012; Greenwald, Poehlman, Uhlmann, & Banaji, 2009). Although explicit attitude measures tend to predict behavior more strongly than do implicit attitude measures (e.g., Cameron, Brown-Iannuzzi, & Payne, 2012; Greenwald, Poehlman, Uhlmann, & Banaji, 2009), researchers also theorize that explicit and implicit attitude measures may predict different types of behavior. For example, White participants' explicit bias against Black people predicted bias in their verbal behavior when interacting with a Black (vs. White) confederate (Dovidio, Kawakami, & Gaertner, 2002). And, White participants' implicit bias against Black people predicted non-verbal behaviors when interacting with a Black (vs. White) confederate (Dovidio, Kawakami, & Gaertner, 2002). Further, both verbal and non-verbal behaviors predict whether Black

participants enjoy interacting with White people (e.g., Richeson & Shelton, 2007). Together, these findings suggest that explicit bias may predict deliberative behaviors whereas implicit bias may predict subtle, non-verbal behaviors. However, both types of behavior (verbal and non-verbal behavior) impact Black participants' attitudes about the interaction. Thus, it may be important to measure both explicit and implicit bias among educators.

In addition, it is also important to consider the influence of social desirability. Because of the nature of explicit processing – relatively slower and more deliberative than implicit processing – explicit attitudes may be shaped by social desirability concerns. In particular, when investigating attitudes about socially controversial topics, explicit attitude measures may be uniquely impacted as compared to implicit attitude measures (e.g., Nosek, 2007). Because implicit measures require people to respond quickly, these measures may circumvent social desirability concerns because people do not have time to alter their responding. For this reason, implicit measures have often been assumed to be immune to social desirability concerns and thus are frequently the desired measure when assessing socially controversial topics – such as racial and gender bias.

Although implicit bias measures may be advantageous in some respects, these measures tend to exhibit low reliability, both within a given testing session and across testing sessions (Payne & Lundberg, 2014; Payne, Vuletich, & Lundberg, 2017). Issues of low reliability are troubling because they inflate both type I and type II error (e.g., Cronbach, 1951; DeVellis, 2003). That is, low reliability can increase the chance of finding a significant difference when no difference exists in the population. And, low reliability can increase the chance of missing an actual difference that exists in the population. As a result, it is difficult to replicate findings using measures that exhibit low reliability – a point we return to in the discussion section.

In addition, the assumption that implicit attitude measures are immune to social desirability concerns has been challenged in recent research. For example, research suggests implicit attitudes may be flexibly changed based on the motivation of the participant or by simple experimental manipulation (e.g., Gawronski & Bodenhausen, 2005; Gawronski, Hofmann, & Wilbur, 2006). In addition, recent work suggests that people may intentionally influence their responding on certain implicit attitude measures in order to appear unbiased (e.g., Bar-Anan & Nosek, 2012; Cummins, Hughes, & Hussey, 2019; Cummins & De Houwer, 2019). Other work, however, suggests that even when people intentionally try to influence their responding on certain implicit attitude measures, bias may persist (e.g., Mann et al., 2019). Together, these findings suggest that it is at least unclear whether implicit attitude measures are immune to social desirability concerns, or whether they are relatively less influenced by social desirability concerns than are explicit measures.

The current research

Overall, these findings suggest that it is important to understand educators' bias and to investigate whether this bias may be associated with students' attitudes toward their educators. The current research investigates implicit attitudes among a sample of mathematics educators. Although it may be best to use multiple measures to assess attitudes toward social groups, there are also competing concerns with respect to resources which often limit the number and type of measures which can be included in a survey. The current research utilizes one of the most reliable measures of implicit bias: The Affect Misattribution Procedure (Payne et al., 2005). In addition, the current research measures these attitudes among a diverse sample of educators – a population which is difficult to attain.

The current research extends beyond previous research by investigating the association between educators' implicit racial attitudes toward Black and White people and students' trust and respect for their educator. If educators' implicit attitudes are associated with how they interact with their students, it may be that we can uncover this relationship by asking students about their attitudes toward their educators. To analyze these questions, this study leverages data from the National Study of Learning Mindsets (NSLM), the largest-ever randomized controlled trial of a growth mindset program in the U.S. in K-12 settings, in which a brief online growth mindset program was administered to 9th grade students during the 2015-2016 academic year. The NSLM features a nationally representative probability sample of regular U.S. public high schools. Specifically, this study analyzed mathematics educators' responses to several survey items. The sample included data from approximately 220 educators.

Method

This project uses a subset of data collected as part of a randomized-controlled trial investigating the efficacy of learning mindset interventions. This randomized-controlled trial utilized a nationally representative sample of public high schools in the United States and has followed students over the course of several years. As part of this experiment, students and educators were asked to complete survey items. To assess educators' implicit racial prejudice, we use educators' responses on the Affect Misattribution Procedure (Payne et al., 2005).

Importantly, only the students who were not part of the experimental trial were included in analyses. We describe the sample and procedure for the current analyses next.

Participants.

Educators. Because educators were not required to complete this (or any) measure, the sample of educators used in this analysis is not reflective of all educators surveyed for the

experiment. The total number of educators which completed the main measure of interest was 252. Of these educators, 92 were men, 158 were women, and one identified as “other”. In addition, 213 were White, 11 were Black, and 27 were another race/ethnicity. The average age of the sample was born in 1978 ($SD = 10.64$).

Students. We utilized students who did not receive the mindset intervention. Further, we only utilized students who had only one math educator, so it was clear who their responses were about. The total number of students who were not in the treatment condition and had one math educator was 2107. Of these students, 49% were men, 51% were women. In addition, 1195 were White, 197 were Black, 502 were Hispanic, and 213 were another race/ethnicity.

Procedure.

Educators. Math educators were asked to complete a battery of surveys. Towards the end of the survey, educators were asked to complete the Affect Misattribution Procedure (AMP; Payne et al., 2005). Because this was a measure that was quite different from the other surveys in the battery, educators were given unique and specific instructions. Specifically, they were told:

“Last, we would like to ask for your help in trying out a new type of task that researchers have developed. It measures people’s judgments of novel language symbols. It takes about 2 minutes. Specifically, the task measures people’s attitudes about different language symbols called “pictograms.” Before each pictogram you will see real life images of people. Researchers use this task to study how people can avoid being biased. Understanding this would be an important scientific advance. Because this is a new task that differs somewhat from the rest of the survey, we wanted to give you the chance to say whether you’d like to participate. We hope you will. Many educators have said they

liked contributing to research, and said that they found the task interesting. However, if you do not participate there is no penalty, and your choice will remain confidential.”

Educators then chose to opt-in or opt-out of taking the AMP. Our analysis consists of 252 educators who took the AMP. The educators who opted-in were presented with a set of instructions which are relatively typical for the AMP. In particular, the instructions read:

“On the next page, you will see pairs of flashing images. The first image will be a real life image and the second will be a pictogram. It will be flashed quickly, so pay attention. Your task is to rate the pictogram as relatively pleasant or unpleasant, by relying on your intuition. Remember, we want people’s responses to be as unbiased as possible. Please try NOT to let the real life image affect your response. Instead, try to ignore the real life image. Please don’t say that all the pictograms are pleasant or that all of them are unpleasant. Try to sort them into the more pleasant half and the less pleasant half. Just respond based on your intuitions. (...) Press the spacebar to begin.”

Participants then completed 160 trials of the AMP (see Figure 1 for a schematic of a single trial). Each trial began with a prime photo presented for 100 ms. The prime photos represented eight categories: Asian men, Asian women, Black men, Black women, Hispanic men, Hispanic women, White men, and White women. The photos were taken from the Chicago Face Database (Ma, Correll, & Wittenbrink, 2015). The prime photos were covered up by a target photo, a Chinese symbol, presented for 125 ms. Finally, the target photo is covered up by a mask which remained on the screen until participants responded. To avoid order effects, primes and targets were randomly selected without replacement and trial order was randomly presented.

Figure 1. Schematic of an AMP trial.

For data reduction and analytic purposes, we created a proportion of pleasant responses (coded 1) for each prime category: Asian men, Asian women, Black men, Black women, Hispanic men, Hispanic women, White men, and White women. Thus, higher numbers reflect more positive attitudes toward the Chinese symbol when preceded by a specific prime category. This proportion served as our estimate of implicit attitudes toward each race/gender category.

Students. As part of a larger survey, students responded to the following questions about their math educator: “I trust my math educator” and “My math educator treats me with respect” with response options ranging from 1 (not at all true) to 5 (extremely true).

Results

Data Inspection and Descriptive Statistics

First, we inspected the data to investigate whether anyone pressed a single type of response, such as always indicating the target symbol was pleasant or unpleasant, throughout the whole task. We found that 17 educators pressed a single type of response (3 always responded ‘unpleasant’ and 14 always responded ‘pleasant’). Because the instructions explicitly asked participants to not press a single key throughout the task, we excluded these participants’ data from analyses.

Next, we investigated the distributions of responses when preceded by each prime category (Asian men, Asian women, Black men, Black women, Hispanic men, Hispanic women, White men, and White women). See Figure 2 for a graphical display of the distributions and Table 1 for descriptive statistics. The distributions were all negatively skewed and the central tendency was quite high. Although these distributions were unexpected, many of the inferential statistics we pre-registered¹ are quite robust to skewed distributions, so we proceeded with our analytic plan.

Figure 2. Graphical display of the distribution of pleasant responses toward each prime category.

¹ To view the pre-registration see: <https://osf.io/5sgbd/>

Table 1.

Descriptive statistics of the proportion of pleasant responses on the AMP split by prime type.

	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Median</i>
Asian men	226	0.59	0.24	0.64
Asian women	226	0.62	0.22	0.58
Black men	228	0.62	0.23	0.64
Black women	229	0.61	0.23	0.64
Latino men	227	0.58	0.23	0.58
Latina women	228	0.61	0.22	0.58
White men	227	0.56	0.24	0.67
White women	229	0.62	0.24	0.58

Implicit Attitudes

We investigated whether participants' responses toward the target symbol differed when preceded by each prime category. To investigate this question, we conducted a repeated measures ANOVA with gender as one factor (male vs. female) and race/ethnicity as another factor (Asian, Black, Latinx, and White). See Figure 3 for means and 95% confidence intervals for each prime category. The results revealed a main effect of gender such that participants were more positive toward female primes ($M = .62$, $SD = .19$) than male primes ($M = .59$, $SD = .17$), $F(1, 217) = 9.47$, $p = .002$. There was not a main effect of race/ethnicity, $F(3, 217) = 3.78$, $p = .06$. These main effects, however, were qualified by a race/ethnicity by gender interaction, $F(3, 217) = 3.78$, $p = .003$.

Figure 3. Means and 95% confidence intervals for each prime category.

We probed this interaction with post-hoc analyses using a Bonferroni correction for multiple comparisons. The results revealed a significant difference between white male targets and white female targets, $M_{dif} = 0.06$, $p_{Bonferroni} = .008$. Participants were more positive toward white female targets than toward white male targets. In addition, there was a significant difference between white male targets and black male targets, $M_{dif} = 0.06$, $p_{Bonferroni} = .02$. Participants were more positive toward black male targets than toward white male targets. Overall, these results are not consistent with previous research (see Payne & Lundberg, 2014 for a review).

In addition, we investigated whether these results were moderated by educators' race/ethnicity or gender in separate analyses. Because there were very few educators who were part of underrepresented races/ethnicities ($n = 38$), we created a dummy variable which represented whether the educator was White (1) or non-White (0). In addition, we created a

dummy variable which represented whether the educator was a man (1) or a woman (0). The findings suggest that implicit attitudes were not moderated by educators' race/ethnicity, all p 's > .10. There was significant moderation by target gender and educators' gender, $F(1, 216) = 4.19$, $p = .004$, $\eta_p^2 = .019$. Women educators were slightly more positive toward female targets ($M = 0.62$, $SD = 0.23$) than toward male targets ($M = 0.57$, $SD = 0.23$). However, men educators rated female targets ($M = 0.62$, $SD = 0.22$) and male targets ($M = 0.62$, $SD = 0.20$) similarly.

Exploratory Analyses: Relationship between educators' implicit racial attitudes and students' explicit attitudes toward their educator

Although the implicit attitude findings were unanticipated, we investigated whether individual difference on implicit attitudes predicted students' attitudes toward their math educator. Specifically, based on previous research and theory, we anticipated that negative implicit attitudes toward Black people relative to White people would predict underrepresented racial/ethnic students' trust and respect toward their math educator. To investigate this question, we created an average of students' trust and respect toward their math educator which served as our dependent variable. Then, we created a difference score of implicit attitudes by subtracting implicit positivity toward Black primes from White primes, collapsing across the prime gender. Thus, higher numbers reflect more implicit positivity toward White people relative to Black people. We then used this variable as a level 2 predictor in a multilevel model which accounted for the fact that students were nested within educators. We also used students' race/ethnicity (1 = White, 0 = non-White) as a level 1 predictor, and we calculated a cross-level interaction between educators' implicit attitudes and students' race/ethnicity. Finally, we controlled for the educators' gender and race/ethnicity and students' prior math achievement.

With respect to predicting students' trust for their math educator, no significant effects.

See Table 1 for full results.

Predictor	Estimate	SE	<i>t</i>	<i>p</i> -value
Implicit pro-White bias	-0.05	0.25	-0.18	0.859
Student race (1 = White, 0 = non-White)	0.00	0.04	0.07	0.947
Implicit pro-White bias X Student race	0.29	0.25	1.15	0.251
Teacher race (1 = White, 0 = non-White)	-0.03	0.04	-0.70	0.485
Teacher gender (1 = man, 0 = woman)	0.03	0.05	0.60	0.551
Math level combined (Dummy code level 1)	-0.07	0.08	-0.93	0.351
Math level combined (Dummy code level 2)	0.04	0.09	0.50	0.620
Math level combined (Dummy code level 3)	0.01	0.14	0.06	0.494

Discussion

The data suggest that educators, on average, display more implicit positive reactions to women than men. In addition, women educators display more implicit positive reactions to women than men; whereas, male educators did not display an implicit preference for a specific gender. These findings are consistent with previously published research (e.g., Dunham, Baron & Banaji, 2015; Rudman & Goodwin, 2004). Inconsistent with previous research, educators, on average, displayed more implicit positive reactions to underrepresented race/ethnicities in the U.S. than to white individuals. In particular, educators reported more positivity toward black men than to white men. This is in stark contrast to previous research which finds U.S. residents tend to display more implicit positive reactions to white men than black men, or other underrepresented race/ethnicities in the U.S. (e.g., Greenwald, Poehlman, Uhlmann, & Banaji, 2009; Payne et al., 2010; Payne & Lundberg, 2014).

In addition, the exploratory analyses investigated the relationship between educators' implicit attitudes and their students' trust and respect for their educator. If educators' implicit attitudes are associated with how they interact with their students, it may be that we could

uncover this relationship by asking students about their attitudes toward their educators. The results, however, suggest there is no relationship between educators' implicit attitudes and students' trust and respect of their educator.

Although there exist several plausible interpretations of these data, we detail only a few possible explanations of these data here. With respect to the implicit attitude findings, it may be that educators have little implicit bias against underrepresented racial/ethnic minority individuals, and may, at least in some situations, implicitly favor underrepresented racial/ethnic minority individuals over white individuals. As discussed above, these findings may be related to the education level of the sample. Educators, on average, are more educated than the adult U.S. population (Census, 2016; National Center for Education Statistics, 2018). More educated individuals tend to have lower explicit and implicit bias than less educated individuals (e.g., Payne et al., 2010). Thus, the implicit bias results reported here may be attributed to the relatively high education level of the sample.

Another plausible explanation for the implicit attitudes findings is that social desirability concerns may have influenced educators' responses on the implicit attitude measure (e.g., Cummins, Hughes, & Hussey, 2019). Emerging research suggests that implicit attitude measures may not fully circumvent social desirability concerns. And, given the intrapersonal and interpersonal consequences of displaying racial/ethnic prejudice (e.g., Crandall & Eshleman, 2003), educators' may be motivated to respond in a socially desirable manner.

A third plausible explanation is that educators' responses may reflect cognitive fatigue. The AMP was one of the last measures the educators' completed among a battery of measures. The negatively skewed distributions may be reflective of educators wanting to provide quick, "good" answers for the purpose of quickly completing a task as opposed to providing answers

reflective of their opinions (e.g., Simon, 1956; Krosnick, 1991). Indeed, previous research suggests that educators do employ this time-saving strategy when faced with a long survey, and particularly when near the end of a long survey (Hamby & Taylor, 2016). Unfortunately, based on the current data, we cannot distinguish which one of these possible explanations best fits the pattern of implicit attitude findings.

With respect to the exploratory analyses investigating the relationship between educators' implicit attitudes and students' trust and response for their educator, there, again, exist several possible explanations for the null results. First, it may be that regardless of the educators' implicit bias, it is not influencing their interactions with the students. Thus, there would be no relationship between educators' bias and students' attitudes toward their educator. It may also be that students are not noticing the behavioral signals of the educators' implicit bias. Third, given the relatively low reliability of implicit attitude measures (even when using the AMP) and the single-item scales used to measure students' attitudes and trust, these data may not have been adequately reliable to detect a relationship. Finally, if the implicit measure was not functioning properly, then we would not expect a relationship with students' attitudes toward their educator. Again, based on the current data, we cannot distinguish which one of these possible explanations best fits the current findings. Additional data collection and experiments may help shed light on the current findings.

Conclusion

It is important to understand educators' bias against particular social groups because this bias may be associated with students' outcomes. The current research investigated implicit attitudes among a sample of mathematics educators. The findings suggest that educators display relatively little bias, and, if anything, slightly more bias in favor women and underrepresented

racial/ethnic minorities in the U.S. These attitudes, however, are unrelated to students' attitudes toward their educator. Future research is needed to better understand both educators' attitudes toward social groups and whether these attitudes predict students' reactions toward their educator.

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