

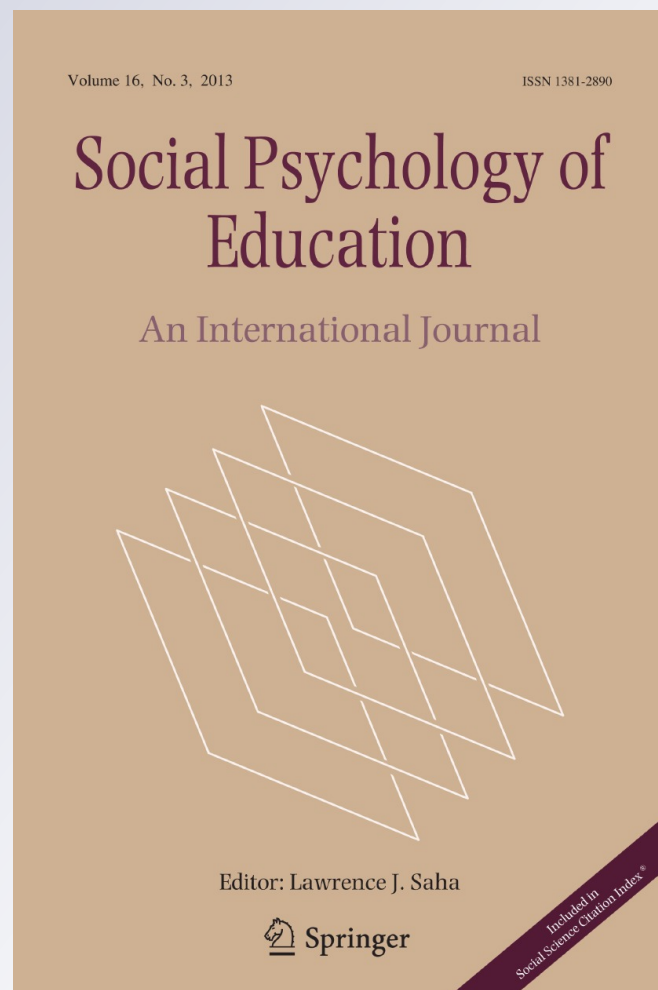
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Reactions to the implicit association test as an educational tool: A mixed methods study

Amy L. Hillard · Carey S. Ryan · Sarah J. Gervais

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Abstract We examined reactions to the Race Implicit Association Test (IAT), which has been widely used but rarely examined as an educational tool to raise awareness about racial bias. College students ($N = 172$) were assigned to read that the IAT reflected either personal beliefs or both personal and extrapersonal factors (single vs. multiple explanation conditions). They then completed the IAT and quantitative measures of affect, attitudes, and belief in bias. A subset of participants ($n = 32$) also wrote reaction papers, which were used to develop qualitative themes to more fully describe reactions to the IAT. Quantitative results revealed that participants with a stronger implicit preference for European Americans more strongly believed in implicit bias in the multiple (vs. single) explanation condition. Mixed methods analyses using data transformation and typology development indicated that participants whose qualitative IAT responses were more negative were subsequently more likely to help an African American.

Keywords Implicit bias · Prejudice reduction · Diversity training · Mixed methods

1 Introduction

Although members of racial and ethnic minority groups continue to encounter racism with alarming frequency (Swim et al. 2003), people are less willing than in the past to

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express racist beliefs in public (Crandall et al. 2002; Monteith and Voils 2001). Modern theories of racism (Gaertner and Dovidio 1986; McConahay 1986) propose that decreased explicitly endorsed racism is a result of stronger egalitarian norms, which have caused overt racism to be replaced with more subtle forms (e.g., microaggressions; Sue et al. 2009). Thus, fewer people report racist attitudes even though racism remains a common occurrence.

In an effort to assess more subtle forms of racism, social psychologists have developed implicit measures—in which attitudes are measured indirectly—to minimize self-presentational biases that may affect self-report measures. The most commonly used implicit measure is the Implicit Association Test (IAT; Greenwald et al. 1998). The IAT is widely used in research and has been utilized to measure an array of constructs. However, it is frequently used to measure a sensitive construct—implicit bias. Because it has been taken over five million times online (Nosek et al. 2007), the web-based IAT is arguably one of the most widely used measures in psychology.

The IAT also has been used as a consciousness-raising tool in classrooms (Morris and Ashburn-Nardo 2010) and diversity training (Castillo et al. 2007). Boysen (2010) made a case for educators teaching counseling students about implicit bias by having them complete the IAT, which “provides students with immediate and easily interpreted evidence of their implicit bias” (p. 218). In fact, over 70% of participants who take the web-based Race IAT are told that they have some level (i.e., slight, moderate, or strong) of implicit preference for European American (EA) over African American (AA; Nosek et al. 2007). However, it is unclear how this feedback—received by millions online—affects participants, their awareness of prejudice, and their later behavior.

The purpose of the present research was to examine student responses to the IAT as a tool to raise awareness of bias. Further, we examined how one might potentially maximize the positive consequences (e.g., increased awareness of implicit bias) and minimize the negative consequences (e.g., negative affect and backlash) of doing so. Toward this end, we compared the effect of a single explanation (i.e., that IAT scores reflect personal beliefs) versus multiple explanations (i.e., acknowledging that IAT scores may also be influenced by the knowledge of cultural stereotypes) of IAT scores on participants' reactions to the IAT. Our manipulation was inspired by research on the construct validity of the IAT, to which we turn next.

1.1 The IAT construct validity debate

The IAT assesses the association between attributes and an attitude object by having participants quickly categorize words or images and measuring reaction time. Implicit racial bias (i.e., implicit preference for EA over AA) is indicated by faster responses to AA paired with unpleasant attributes and slower responses to AA paired with pleasant attributes—relative to the corresponding pairings for the other social group (e.g., EA).

Despite its broad use in research, scientists have debated about the construct that the IAT measures. Those who developed the IAT (i.e., Greenwald et al. 1998) argue that

the IAT measures implicit preferences of the individual, citing evidence that the IAT relates to subtle behaviors in interracial interactions (Greenwald et al. 2009). However, critics have questioned the IAT's construct validity (e.g., Blanton and Jaccard 2008; Gawronski 2009). For example, IAT results have been associated with cognitive skills (Blanton et al. 2006), familiarity with stimuli (Rothermund et al. 2005), fears of appearing racist (Hausmann and Ryan 2004), and/or sympathy rather than antipathy toward AAs (Uhlmann et al. 2006). Further, some research has shown that the traditional IAT measures knowledge of cultural associations but does not predict individual beliefs or behavior (Karpinski and Hilton 2001; Olson and Fazio 2004). The sides of the construct validity debate can thus be summarized as suggesting either that the IAT measures an individual's implicit prejudice (as the IAT developers argue) or that the IAT measures cultural and/or other factors irrelevant to an individual's attitude, preference, or behavior.

Despite this debate, the IAT has received attention as a consciousness-raising tool in the broader culture. For example, the IAT has been featured on television (e.g., CNN and Discovery channel) and in the *New York Times* (Tierney 2009). However, to our knowledge, only one study has measured outcomes of the IAT as an educational tool. Morris and Ashburn-Nardo (2010) found that college students had more positive than negative emotional reactions to the IAT and positively evaluated the IAT as a classroom demonstration. Anecdotally, the IAT seems to be used in classrooms and diversity training, but how educators might best present the IAT to students—especially in light of the scientific debate about the mechanism driving IAT scores—remains an open question. We argue that indicating that the IAT measures personal bias may inspire more personal conflict than indicating that the IAT may measure personal bias or other factors. In support of this argument, previous research indicates that, to the extent that people contributed difficulty pairing AA with pleasant attributes on the IAT to personal bias, they experienced greater guilt and negative affect (Monteith et al. 2001). Still, researchers, theorists, and practitioners have debated the consequences of using more or less direct and personalized messages in attempts to reduce prejudice, which we review next.

1.2 More direct messages

Conflict in the classroom can be seen as divisive or an opportunity for positive outcomes (Johnson et al. 1986). Some research suggests that more direct and personal messages may be necessary to reduce prejudice. For example, critical race theorists advocate for radical changes rather than for multicultural and colorblind approaches (Dixson and Rousseau 2005; Ladson-Billings and Tate 1995). From a critical race perspective, multicultural approaches are sometimes too incremental or superficial rather than a call for action, and colorblindness functions to maintain the existing racial hierarchy. Consistent with this perspective, research indicates that colorblindness is associated with greater prejudice (Richeson and Nussbaum 2004; Ryan et al. 2007) perhaps at least partly because colorblindness enables people to ignore racial inequities. Similarly, racial identity theorists have argued that experiencing conflict assists progression through developmental

stages towards racial identity (Phinney 1990), perhaps culminating in an anti-racist, activist orientation (Cross 1971; Helms 1990). Thus, both critical race and racial identity theories suggest that a more direct and personal anti-racist message may increase racial awareness (Leonardo and Porter 2010), leading to reductions in prejudice.

Indeed, Wagner (2005) argues that one goal of anti-racist teaching is “unsettling students’ ways of thinking” (p. 264), resulting in “visceral reactions” and a “tumultuous process” (p. 263). In support of this approach, EA activists for racial equality have reported that moral shock after personally witnessing racism spurred their activism (Warren 2010). In this case, perhaps the most likely IAT result—that the person has an implicit preference for EA over AA—may provide the moral shock and personal experience that will inspire action toward racial justice.

1.3 Less direct messages

Although some theorists support using conflict in diversity education, other theorists take the opposite view. For example, a ‘safe’ classroom discourse (e.g., featuring confidentiality and avoiding judgments) on race issues may inspire change, given that individuals are in different stages of racial identity awareness (Tatum 1992). By definition, a safe discourse should be less direct and personal, although it does not entirely avoid negative emotions. Instead, properly addressing common responses to talking about oppression and privilege (e.g., guilt, shame, anger) in a safe environment may prevent students from resisting learning and increase understanding and acceptance of the material.

Some research also suggests that less direct approaches can reduce prejudice. For example, speaking out against prejudice in interpersonal encounters (i.e., confronting prejudice) reduces prejudice and stereotyping regardless of how direct and hostile the message (Czopp et al. 2006). In other words, less direct approaches seem to be as effective as more direct and hostile messages. Similarly, confrontation hostility does not appear to influence observers’ attributions of prejudice (Gervais and Hillard, *in press*). In these studies, however, high hostility confrontations produced more negative evaluations of the confronter. This research suggests that a more direct, personalized message—such as the single, personal beliefs explanation of the IAT—may cause negative evaluations of the educator, although it may be similarly effective as a less direct message in reducing prejudice, which may cause less negative educator evaluations.

Confrontation research further indicates that the effect of confronting prejudice depends on how prejudiced the target of the confrontation is. When confronted, low prejudice individuals experience more negative affect and decreased stereotyping compared to high prejudice individuals (Czopp et al. 2006). Level of implicit preference may thus influence the effect of more versus less direct and personal explanations of the IAT. That is, being told that one has a strong (vs. little or no) implicit preference for EAs may be perceived as more directly hostile by participants who have been told only that the IAT assesses their personal beliefs (i.e., single explanation) rather than their personal beliefs or knowledge of the cultural stereotype (i.e., multiple explanations).

1.4 Overview of study

Given the conflicting theory and sparse previous research on responses to the IAT, we broadly explored participants' reactions to the IAT through a mixed methods study. Although qualitative and quantitative research are often seen as antagonistic and divergent (e.g., Griffin and Phoenix 1994), mixed methods is a growing area with developing procedures that allow researchers to answer related but different questions about human behavior (e.g., Creswell and Plano Clark 2007; Mayring et al. 2007). Our overall research question was: How do students react to the IAT as an educational tool? To address this question, we used an embedded mixed methods design in which the quantitative results are supplemented with qualitative description (Creswell and Plano Clark 2007; Teddlie and Tashakkori 2006). We collected qualitative data to gain deeper understanding of personal experiences, given that little is known about peoples' responses to the IAT. We further examined whether participants' affect, attitudes, and beliefs about bias depended on their level of implicit preference and whether they were told that the IAT measures personal factors (i.e., the single, more direct explanation) or personal factors and a host of factors not necessarily specific to an individual's prejudice (i.e., multiple, less direct explanations) through quantitative measures. We collected and analyzed quantitative and qualitative data concurrently. In addition to using the two types of data to compare or corroborate results (Bryman 2006), we also conducted a mixed method analysis to examine how qualitative responses related to quantitative data. Specifically, we explored whether qualitative response typologies were related to different quantitative outcomes, including affect, attitudes, and behavior.

Although the qualitative and mixed method research was by design more exploratory, the past research provided some evidence for quantitative hypotheses. We expected that a stronger implicit preference for EAs relative to AAs would be associated with more negative affect, guilt, and surprise as well as more negative attitudes toward the IAT (Hypothesis 1), particularly among participants who had been told that the IAT measured their personal beliefs (i.e., the single explanation condition; Hypothesis 2). Also, consistent with a previous study on the IAT as an educational tool (Morris and Ashburn-Nardo 2010), we expected participants to experience more positive than negative affect (Hypothesis 3a) and to rate the IAT activity positively (Hypothesis 3b).

2 Method

2.1 Participants

Undergraduate students ($N = 172$) from a U.S. Midwestern University enrolled in psychology courses in which the IAT was used as a lecture tool (i.e., 200-level Social Psychology and 300-level Psychology of Diversity) participated in this experiment for class credit. Participating in the IAT activity and study was one of several options for class credit; participation in this particular activity was not required. Participants had a mean age of 20.73 years ($SD = 4.65$) and were mostly EA/White (86.0%). The

remaining participants identified as Asian- (4.0%), Hispanic/Latino- (3.5%), African- (2.3%), and Indian- (0.06%) Americans; a few participants (0.03%) identified as bi- or multi-racial; and one participant did not specify. More than half (61.6%) were women.

2.2 Procedure

APA and IRB standards for treatment of participants were followed. Participants completed informed consent forms and received a packet containing instructions about completing the IAT and the dependent measures, which they completed outside of class. Instructions for participants in the 'single explanation' condition ($n = 91$) indicated that the IAT measures only personal beliefs:

The IAT has been taken over five million times on the internet and has been used extensively in scientific research. This research indicates that the IAT is a useful method for detecting automatic preferences or implicit stereotypes. Thus, your IAT score will reveal your personal beliefs, which may influence your interactions with racial/ethnic group members.

Instructions for participants in the 'multiple explanation' condition ($n = 81$) indicated that the IAT may measure personal beliefs as well as other factors:

The IAT has been used extensively in scientific research, but researchers disagree about what the IAT actually measures. Although the IAT has been found to assess biases or preferences, these preferences could be caused by, or at least influenced by, things other than your personal beliefs. Many studies have shown that IAT scores are influenced by how aware of the cultural stereotypes about a group you are, whether you identify with one group more than the other, and whether you are afraid of appearing prejudiced. Thus, your IAT score may reveal your personal beliefs, knowledge of the cultural stereotype, or fear of appearing prejudiced, which may influence your interactions with racial/ethnic group members.

Participants then completed the Race (i.e., AA–EA) IAT demonstration on the Project Implicit website (<http://implicit.harvard.edu/implicit/>) and printed their score page. Note that participants did not receive their precise scores (i.e., reaction time); rather, they received feedback indicating that they had either a strong, moderate, or slight preference for EAs; no implicit preference; or a strong, moderate, or slight preference for AAs. A test of our Hypothesis 1 requires participants to know their preference for EAs (vs. AAs), but not their specific score. After completing the measures in the order they are described below, participants indicated their age, ethnicity, and gender. They returned their completed survey packets and IAT score printouts at the next class meeting.

One day after returning the completed packets, participants received a "lost email" (modified from [Bushman and Bonacci 2004](#)). The email was addressed to a person with a stereotypically AA name (i.e., Lamar or Latisha, to match the gender of the participant; [Greenwald et al. 1998](#)), announcing that Lamar/Latisha, a high school student, was chosen for a prestigious college scholarship and requesting a response in

the next 48 hours concerning its acceptance. Replying to the lost email to inform the sender that the email did not get to Lamar/Latisha was conceptualized as helping.

Participants were debriefed at the next class period in a lecture that detailed the IAT debate. All Social Psychology class members ($N = 129$) then evaluated the IAT activity and/or lecture and reported whether they had participated in the IAT study.

3 Measures

3.1 Qualitative responses

Two tasks provided qualitative data. After completing the IAT, all participants were given an open-ended prompt, which asked them to write 3–5 sentences “describing your thoughts about the IAT, and how you feel and think about the score you received.” Participants from both courses were asked to further volunteer by writing a longer (i.e., 2 typed pages) reflection paper on the experience: “Please focus on your personal reaction to the IAT and/or your score.” Thus, a subset of participants ($n = 32$) voluntarily provided a longer reflection on the IAT experience for research purposes.

3.2 Affect

Participants completed the Positive and Negative Affect Scales (PANAS; [Watson et al. 1988](#)) to assess positive affect (10 items, including “excited” and “inspired,” $\alpha = .83$) and negative affect (10 items, including “upset” and “irritable,” $\alpha = .87$). Participants completed items from the PANAS-Extended ([Watson and Clark 1992](#)) to assess guilt (six items, including “blameworthy” and “angry at self,” $\alpha = .92$) and surprise (“surprised” and “astonished,” $\alpha = .78$). Finally, participants completed a measure of negative, other-directed affect (i.e., “angry at others,” “dissatisfied with others,” and “disgusted with others,” $\alpha = .85$; [Czopp et al. 2006](#)). Participants responded to all affect items on a scale of 1 (*very slightly or not at all*) to 5 (*extremely*).

3.3 Attitudes toward the IAT

We created 13 items (e.g., “The IAT has no use whatsoever” and “I disagree wholeheartedly with my IAT results”) to measure negative attitudes toward the IAT ($\alpha = .73$). Participants responded on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

3.4 Perceived self and other bias

Participants completed four items each for how biased they believed themselves to be (e.g., “To what extent do you think YOU are biased against African Americans?” $\alpha = .77$) and how biased they perceived other students to be (e.g., “To what extent do you think university students, on average, could have unconscious bias against African Americans that they are not even aware of?” $\alpha = .84$; [Morris and Ashburn-Nardo](#)

2010). Participants also completed four items that indicated the degree to which they believed they had unconscious biases against groups other than AAs (i.e., “ethnic or racial groups,” “women,” “homosexuals,” and “other groups”; $\alpha = .78$). Participants responded to these items on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*).

3.5 Evaluation of the IAT for classroom use

Both study participants as well as students who opted not to complete the study evaluated the IAT activity and/or lecture. The individual items included, “How much did you learn about the IAT?” “How much did it prompt useful class discussion?” and “How much do you recommend your instructor use the IAT in the future?” (Morris and Ashburn-Nardo 2010). Participants responded on a scale of 1 (*none/not at all*) to 7 (*very much*).

4 Results

Consistent with our embedded mixed methods design, qualitative and quantitative analyses were conducted separately before conducting mixed methods analyses. The initial qualitative analysis was based on the reflection papers provided by the subset of participants ($n = 32$). The quantitative analysis followed this initial exploration of reflection papers, focusing on the differences between explanation conditions and the relationships between implicit preference level and our quantitative measures of affect, attitudes, and perceived self and other bias. Finally, mixed method data analyses involved “quantifying” (i.e., data transformation; Caracelli and Greene 1993) the short responses all participants wrote after taking the IAT to examine the frequencies of the qualitative themes derived from reflection papers. We then categorized participants according to the main theme to compare quantitative outcomes by type of qualitative response (i.e., typology development; Caracelli and Greene). Each step of the data analyses is fully described below.

4.1 Qualitative findings

Thematic analysis (Braun and Clarke 2006), which takes an inductive approach and focuses on common experiences, was used to examine participants’ reactions to the IAT. After repeated readings of the 32 reflection papers, the first author coded each segment with a descriptive label in MAXQDA, with a preference for in vivo coding (i.e., using participants’ own words, which are presented in quotations). The codes (presented in italics) were compared across transcripts and examined for redundancy and/or overlap; any redundancy or overlap resulted in merging codes. These codes were further examined for higher-order themes; five themes emerged, as described below. Quotations to support each code within each theme and code are presented in Table 1.

4.1.1 Theme 1: negative reactions to the IAT experience

Participants expressed several negative emotional reactions to the IAT experience, including *discomfort*, *confusion*, and *shock*. Discomfort also emerged in the discus-

Table 1 Qualitative themes, codes, and examples derived from reflection papers

Theme 1: Negative reactions	
<i>Discomfort</i> (n = 5)	“I was instantly uncomfortable with the task at hand” “I felt like [I] was on trial... when I said I felt more comfortable with Whites”
<i>Confusion</i> (n = 9)	“When I took the IAT I was a little confused on what exactly it was supposed to show me” “I think the test was designed in part to confuse the participant, so they would get some wrong just because of the confusion in the test taking process”
<i>Shock</i> (n = 14)	“When I received my IAT score I was at first somewhat shocked” “This IAT gave me a score that was both expected and surprising at the same time”
Theme 2: Positive reactions	
<i>“Eye opening”</i> (n=6)	“I am not upset about my score. It has really opened my eyes to the way people interpret things such as words and pictures, and how people can categorize things with no actual thought—with just implicit stereotypes” “The IAT I just completed was extremely interesting and quite an eye opener, I may add”
<i>Overcoming bias</i> (n = 9)	“The effect of American racism on my subconscious was displayed for me in a very palpable manner, and I was very interested in overcoming this uncomfortable feeling I experience around cultures that are not my own” “I would like to say that, even though I am appalled of my score, I will take the study results with me for life... I will look at it as a learning experience and will avoid any racist stereotype, preference, joke, etc”
<i>Recommend to others</i> (n = 9)	“...I think it would be wise if more students, employers, and employees used this test as a starting point. I think being aware of your shortcomings is the first step to becoming more diverse and accepting of other cultures” “It was a great experience and I would be willing to do another”
Theme 3: “Accurate” measure of personal beliefs	
<i>Agreement</i> (n = 15)	“After seeing my score it makes me realize that, even though I don’t want to have biases against anyone I haven’t met or don’t know personally, I do” “I was surprised at my results, but I do believe at a subconscious level they have the ability to reflect what I think”
<i>Personal beliefs</i> (n = 9)	“I really believe that my score reflected my personal opinions and beliefs” “After finishing the IAT, I thought about all the stereotypes that I have of African Americans. Although it is hard to admit, I carry many of the stereotypes that we discussed in class regarding African Americans”

sion conducted after debriefing students; one woman reported not completing the experiment because the IAT task made her uncomfortable. Participants also expressed *confusion* about how the IAT works and *shock* in response to their IAT scores. Some participants mentioned being shocked because they did not see themselves as having

Table 1 continued

Theme 4: Depersonalization of IAT score	
<i>Question accuracy</i> (n = 15)	“I do not believe that the IAT is 100 percent accurate” “In my opinion, I am not anywhere close to moderately racist, and I am not sure that it is as accurate as it states, but I think there is some validity”
<i>Cultural knowledge</i> (n = 18)	“I think it’s more of a test of the dominant culture as a whole” “I wonder if the IAT determines societal feelings towards Whites and Blacks and my knowledge of those stereotypes rather than determining my actual feelings towards Blacks and Whites”
<i>Environment “growing up”</i> (n = 21)	“I think that the main reason for ‘preferring’ White people to Black people is because I grew up in a small rural community in southeast Nebraska” “I grew up around a large majority of whites, which is probably a big reason why I got the results I did”
<i>Presentation order</i> (n = 12)	“I wouldn’t say it is a preference. I think it was just easier to associate the good words on the right since that’s how it was practiced first” “I feel like the order of the tests that I took was somewhat set up for me to have a preference for European Americans”
Theme 5: Interethnic ideology	
<i>Colorblind</i> (n = 7)	“Preference between races is that I strive to see a person as a fellow human...” “Seeing what unites people is more effective than focusing on how we differ”
<i>Multicultural</i> (n = 3)	“I believe it is important to embrace, accept, and celebrate these differences in order to create a more tolerable and accepting world”

a preference; some participants mentioned being surprised that their scores did not show a preference (or in a few cases a preference for AAs).

4.1.2 Theme 2: positive reactions to the IAT experience

Participants expressed several positive reactions to the IAT experience, including that it was “*eye opening*,” that it would help them *overcome bias*, and that they would *recommend the IAT to others*. One participant mentioned that her initially negative reaction went away after realizing “that this could be a very useful tool.” Understanding implicit bias led participants to want to overcome their biases. Participants wanted others to experience the Race IAT; they also expressed interest in taking other IATs.

4.1.3 Theme 3: “Accurate” measure of personal beliefs

Some participants saw their IAT scores (and thus the IAT itself) as *accurate*. These participants showed *agreement* with their scores. Also, some participants mentioned

that their scores reflected their *personal beliefs*; this seemed to be the case especially for those who were told they had little to no implicit preference.

4.1.4 Theme 4: depersonalization of IAT score

Some participants expressed qualified agreement with their IAT scores. For example, participants *questioned the accuracy* by suggesting that *cultural knowledge*, their *environment "growing up,"* or the IAT's *presentation order* influenced their IAT scores rather than their IAT scores reflecting their personal beliefs. More specifically, some participants wrote that the IAT measured their knowledge of cultural stereotypes. Instead of being a measure of their personal beliefs, participants saw their IAT scores as influenced by the dominant culture or the diversity (or lack thereof) in their families, neighborhoods, schools, and friends. These explanations of the IAT de-personalize the scores and suggest that the IAT is "not completely accurate" as a measure of personal beliefs. Similarly, some participants argued that the presentation order (i.e., the order in which stimuli were presented) was the source of the association between pleasant/EA and unpleasant/AA.

4.1.5 Theme 5: interethnic ideology

Some participants mentioned their preference for *colorblindness* or *multiculturalism* when dealing with diversity issues, although this was less prevalent and thus is represented as one theme. Participants discussing colorblindness mentioned that they did not believe that they evaluated others based on skin color, whereas participants discussing multiculturalism focused on the need to recognize differences.

4.2 Quantitative results

Consistent with past research (Nosek et al. 2007), most participants (73.7%) had an implicit preference for EAs (strong, $n = 45$; moderate, $n = 2$; slight, $n = 29$). A minority of participants (17.4%, $n = 30$) had little or no implicit preference or had an implicit preference for AAs (8.7%; slight, $n = 14$; moderate, $n = 1$). Participants' level of implicit preference did not differ as a function of explanation condition, $t < 1$. In addition, 24.1% of participants responded to the lost email, which is a typical response rate in previous research employing this measure (Bushman and Bonacci 2004).

Initial analyses indicated that the effects of explanation did not depend on participant ethnicity (i.e., minority vs. EA), gender, or course. The only significant effects that emerged concerned perceptions of bias (all other $ps > .22$). Specifically, EA participants ($M = 2.74$, $SD = 0.83$) perceived themselves to be more biased than did ethnic minority participants ($M = 2.33$, $SD = 0.68$), $t(170) = 2.30$, $p < .05$, $d = .54$. Men ($M = 2.92$, $SD = 0.87$) perceived themselves as more biased than did women ($M = 2.59$, $SD = 0.89$), $t(135) = 2.40$, $p < .05$, $d = .71$. Finally, participants from the Psychology of Diversity course ($M = 3.60$, $SD = 0.71$) perceived other students to be more biased than did participants from the Social Psychology course

Table 2 Mean reactions to the IAT by explanation condition

	Single explanation (<i>n</i> = 91)	Multiple explanations (<i>n</i> = 81)	Difference test
<i>Affective reactions</i>			
Positive affect	2.39 (0.69)	2.60 (0.77)	$t(167) = 1.86, p = .07$
Negative affect	1.63 (0.61)	1.73 (0.80)	$t(167) < 1$
Guilt	1.63 (0.88)	1.65 (0.97)	$t(167) < 1$
Surprise	1.88 (0.91)	1.96 (0.94)	$t(167) < 1$
Negative other-directed affect ⁺	1.47 (0.63)	1.55 (0.99)	$t(167) < 1$
<i>Attitudes toward the IAT</i>			
Negative IAT	2.79 (0.57)	2.86 (0.52)	$t(168) < 1$
Self bias	2.68 (0.80)	2.69 (0.85)	$t(170) < 1$
Other bias	3.31 (0.76)	3.30 (0.76)	$t(170) < 1$
Bias toward others	2.78 (0.90)	2.63 (0.88)	$t(168) = 1.05, p = .29$
<i>Helping</i>			
Email	0.23 (0.42)	0.24 (0.43)	$t(160) < 1$

Standard deviations are in parentheses

($M = 3.25, SD = 0.75$), $t(170) = 2.13, p < .05, d = .48$. Thus, we collapsed across ethnicity, gender, and course for all analyses.

4.2.1 Effects of explanation condition and implicit preference

The mean scores for each dependent measure are reported by explanation condition in Table 2. We analyzed each dependent variable as a function of single versus multiple explanation condition (contrast coded as -1 and 1 , respectively) and level of implicit preference, treating the latter as a continuous variable with higher values indicating a stronger preference for EAs (e.g., little/no preference = 0 and strong preference = 3), which was then centered. In each case, we tested the interaction between explanation and implicit preference in a separate regression equation. Participants with a preference for AAs were excluded from the analyses we report for interpretability; however, the results were similar when all participants were included.

Affect Consistent with Hypothesis 1, a stronger implicit preference for EAs predicted greater negative affect, $\beta = .37, t(147) = 4.83, p < .001$; guilt, $\beta = .33, t(147) = 4.19, p < .001$; surprise, $\beta = .37, t(147) = 4.77, p < .001$; and negative, other-directed affect, $\beta = .17, t(147) = 2.04, p < .05$. Parallel analyses for positive affect did not produce significant effects, all $ps > .10$.

The association between implicit preference for EAs and negative affect was also expected to be greater for participants in the single (vs. multiple) explanation condition. However, this hypothesis was not supported; neither the main effect of explanation nor the interaction between implicit preference and explanation was significant, both $ps > .29$.

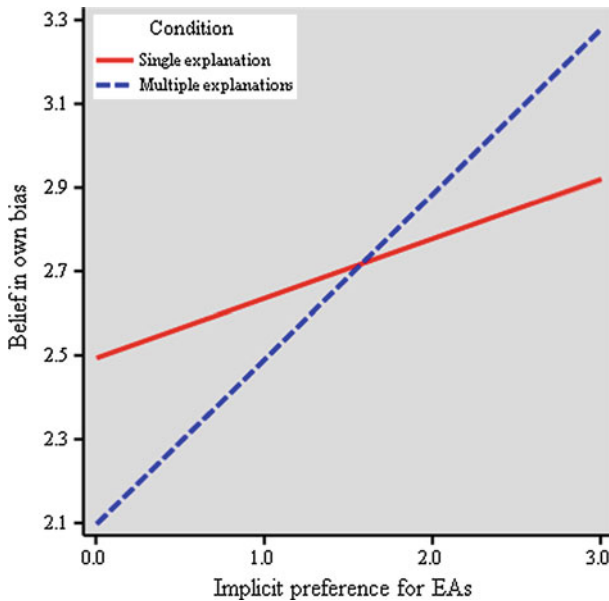


Fig. 1 Relationship between participants' preference for EAs and their beliefs that they may be biased as a function of single versus multiple explanation condition

Attitudes toward the IAT A stronger implicit preference for EAs predicted more negative attitudes toward the IAT, $\beta = .37$, $t(149) = 4.96$, $p < .001$. Neither the main effect of explanation nor its interaction with implicit preference was significant, both $ps > .30$. These findings again provide support for Hypothesis 1 (i.e., positive association between implicit preference and negative affect), but not for Hypothesis 2 (i.e., a greater positive association for the single than for the multiple explanation condition).

A stronger preference for EAs predicted a stronger belief in one's own bias, $\beta = .33$, $t(150) = 4.31$, $p < .001$, and this effect was stronger for participants in the multiple (vs. single) explanation condition, $\beta = .18$, $t(149) = 2.17$, $p = .03$ (see Fig. 1). The latter interaction can also be interpreted as indicating that participants who exhibited a weaker preference for EAs were more likely to believe that they may be biased if they were in the single (vs. multiple) explanation condition, whereas the reverse was true of participants who exhibited a stronger implicit preference for EAs. The main effect of explanation was not significant, $p > .79$.

A parallel analysis of belief in others' bias yielded a similar pattern of results. Participants who had a stronger preference for EAs were more likely to believe that others were biased, $\beta = .15$, $t(150) = 1.90$, $p = .06$; again, this effect was stronger for participants in the multiple (vs. single) explanation condition, $\beta = .25$, $t(149) = 3.13$, $p < .01$ (see Fig. 2). Once again, however, the interaction indicated that participants who exhibited a weaker implicit preference for EAs were more likely to believe that others may be biased if they were in the single (vs. multiple) explanation condition, whereas the reverse was true for participants who had a stronger preference. The main effect of explanation was not significant, $p > .88$.

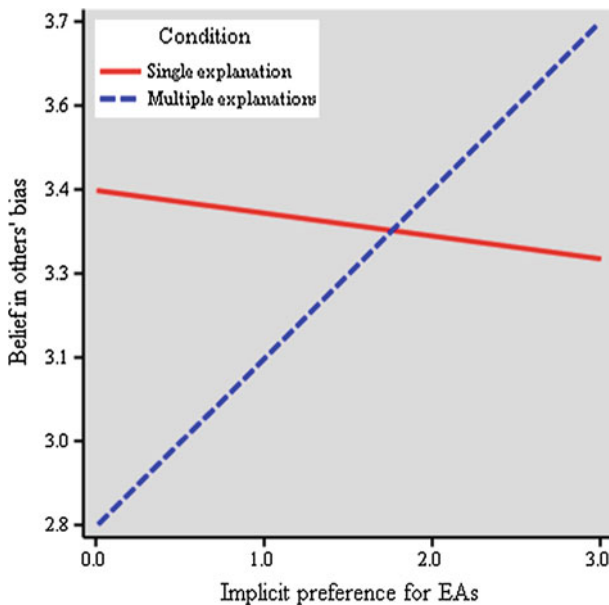


Fig. 2 Relationship between participants' preference for EAs and their beliefs that others may be biased as a function of single versus multiple explanation condition

Parallel analyses for belief in bias towards other groups produced an effect of implicit preference that approached significance, $\beta = .15$, $t(149) = 1.84$, $p = .07$, which indicates marginally greater belief in bias towards other groups when implicit preference was stronger. However, the effect of explanation and the implicit preference \times explanation interaction were not significant, $ps > .25$, indicating that the interaction between implicit preference and explanation condition for belief in bias was specific to AAs—the subject of the IAT.

Helping We used logistic regression to examine the effects of explanation, implicit preference, and their interaction on helping (i.e., whether participants responded to the lost email). This analysis revealed no significant effects of explanation, implicit preference, or their interaction, all $ps > .48$.

Summary Consistent with Hypothesis 1, participants who had a stronger preference for EAs reported more negative affect (i.e., negative affect, guilt, surprise, and negative, other-directed affect) and had more negative attitudes toward the IAT than did those with a weaker preference. Although there was no effect of explanation condition on affect or attitudes toward the IAT (contrary to Hypothesis 2), explanation condition influenced beliefs in bias. For belief in both one's own and others' bias, participants given multiple explanations for the IAT were more likely to believe in bias when they had received IAT results indicating they had a stronger preference for EAs, whereas participants given the single explanation were more likely to believe in bias if they had received IAT results indicating they had a weaker preference for EAs.

4.2.2 IAT as an educational tool

We considered the consequences of using the IAT as an educational tool in two ways. First, we examined whether participants experienced more positive or negative affect. We conducted a mixed model ANCOVA for affect valence (positive and negative, within participants) after taking the IAT as a function of explanation condition (single or multiple, between participants, contrast-coded) and implicit preference (centered). The results indicated that participants experienced more positive than negative affect, $F(1, 143) = 100.11$, $p < .001$, $\eta_p^2 = .41$; this effect did not depend on explanation, $F < 1$. However, there was an interaction between affect valence and implicit preference, $F(3, 143) = 4.39$, $p < .01$, $\eta_p^2 = .08$. Focused tests indicated that the finding of greater positive than negative affect was weaker for participants with a stronger preference for EAs ($M = 2.38$, $SD = 0.85$, and $M = 2.01$, $SD = 0.78$, for positive and negative affect, respectively) than for those with weaker implicit preference ($M = 2.36$, $SD = 0.76$, and $M = 1.27$, $SD = 0.37$ for positive and negative affect, respectively), $p < .01$. The 3-way interaction was not significant, $p = .24$. Thus, consistent with Hypothesis 3a, students generally experienced more positive than negative affect—although this effect was weaker when they had stronger implicit preferences for EAs.

Second, we analyzed all Social Psychology students' evaluations of the IAT class lecture as a function of whether they did or did not complete the IAT assignment. Consistent with Hypothesis 3b that participants would rate the IAT activity positively, study participants ($M = 5.11$, $SD = 1.27$) reported that they learned more about the IAT than did non-participants ($M = 4.33$, $SD = 1.27$), $t(127) = 2.83$, $p < .01$, $d = 0.61$; judged the class discussion to be more useful ($M = 4.50$, $SD = 1.49$) than did non-participants ($M = 3.37$, $SD = 1.52$), $t(127) = 3.48$, $p = .001$, $d = .75$; and more strongly recommended classroom use of the IAT ($M = 4.79$, $SD = 1.44$) than did non-participants ($M = 4.00$, $SD = 1.60$), $t(127) = 2.45$, $p < .05$, $d = .52$.

4.3 Mixed methods findings

The shorter qualitative data (provided by every participant) were coded in two ways. The two procedures, that is, data transformation and typology development (Caracelli and Greene 1993), have been used separately in previous studies to merge qualitative and quantitative data (e.g., Pagano et al. 2002; Wittink et al. 2006). The present study is novel in its integration of both mixed methods procedures. First, the short responses all participants wrote after taking the IAT were transformed to quantitative data to examine the frequencies of the qualitative themes derived from reflection papers. Each short response was coded for the presence or absence of each of the five themes that emerged from the longer reflection papers (i.e., 1 = present, 0 = absent; Sandelowski et al. 2009), which allowed for each participant to express multiple themes. Second, each short response was categorized according to the one main or most dominant theme in order to develop a qualitative typology. That is, the 3–5 sentences were taken as a whole to determine the main theme; if multiple themes were present, the main

Table 3 Frequencies of qualitative themes in short responses

Theme	Present/absent coding	Main theme
1: Negative	51 (29.7 %)	21 (12.2 %)
2: Positive	19 (11.0 %)	7 (4.1 %)
3: Personal	73 (42.4 %)	40 (23.3 %)
4: Depersonalized	118 (68.6 %)	95 (55.2 %)
5: Colorblind	7 (4.1 %)	0 (0 %)
Total	268 (100 %)	163 (100 %)

theme was the one the participant used the most words to discuss.¹ Two independent coders identified the main theme for 20% of the data, and interrater reliability was good (kappa = .81).

As shown in Table 3, Theme 4 (depersonalized) was the most frequent response for both coding types (i.e., present/absent and main theme coding). Theme 5 (colorblind) was the least common of the themes with the present/absent coding and was never included as a participant's main theme. Thus, the qualitative response types were defined as the four main themes (i.e., Themes 1–4). We examined differences in the quantitative, dependent variables across these four qualitative response types.

4.3.1 Relationships between implicit preferences and themes

Consistent with our qualitative observations, a 4 (Qualitative Response Type: Themes 1–4) × 4 (Implicit Preference: little/no, slight, moderate, or strong preference) chi square analysis revealed that implicit preferences predicted the themes in participants' open-ended responses, $\chi^2(9, N = 146) = 41.58, p < .001, \Phi = .53$. Participants who considered their scores to be an accurate measure of their personal beliefs (Theme 3) tended to have little or no implicit preference (48.7 %; cf., slight preference for EA, 20.5 %; moderate preference for EA, 12.8 %; and strong preference for EA, 17.9 %). However, participants who depersonalized their scores (Theme 4) tended to have a moderate (37.8 %) or strong (31.7 %) implicit preference for EA (cf., little/no bias, 7.3 %; slight preference for EA, 23.2 %). In addition, most participants who had a negative response to the IAT (Theme 1) had a strong (50.0 %) or moderate (27.8 %) preference for EA (cf., little/no bias, 16.7 %; slight preference for EA, 5.6 %).

¹ This process was very similar to lean coding, where a text segment (i.e., paragraph) is summarized as a whole. For example, this passage was coded as mainly Theme 4 (depersonalized):

I think the study is flawed in that it switches the EA and AA buttons but not the good or bad buttons. I had gotten used to it one way and had trouble remembering on the 2nd part of the test. While it is interesting and eye-opening, I think it could be improved.

Although the participant mentions that the test was eye-opening (i.e., Theme 2: positive), the main point of the passage is that he believed his score had to do with the presentation order rather than reflecting something about him, which is conceptually consistent with Theme 4 (depersonalized). Similarly, he spends more space discussing the presentation order than his eye-opening reaction.

Table 4 Mean reactions to the IAT by qualitative theme

Reaction type	1: Negative (n = 21)	2: Positive (n = 7)	3: Personal (n = 40)	4: Depersonalized (n = 95)
<i>Affective reactions</i>				
Positive affect	2.31 (0.63)	2.53 (0.39)	2.64 (0.78)	2.46 (0.78)
Negative affect*	2.27 (0.76) _a	1.56 (0.40) _b	1.47 (0.63) _b	1.65 (0.69) _b
Guilt*	2.62 (1.29) _a	1.60 (0.70) _b	1.36 (0.65) _b	1.56 (0.81) _b
Surprise*	2.87 (1.02) _a	2.10 (0.46) _b	1.61 (0.62) _b	1.86 (0.91) _b
Negative other-directed affect ⁺	1.93 (1.21)	1.29 (0.30)	1.37 (0.52)	1.51 (0.84)
<i>Attitudes toward the IAT</i>				
Negative IAT*	3.15 (0.57) _a	2.77 (0.52) _a	2.37 (0.42) _b	2.95 (0.45) _a
Self bias	2.50 (0.95)	2.93 (0.62)	2.75 (1.06)	2.69 (0.70)
Other bias	3.35 (0.90)	3.00 (0.89)	3.48 (0.78)	3.24 (0.72)
Bias toward others*	2.20 (1.08) _a	2.68 (0.66) _{ab}	2.59 (0.97) _{ab}	2.85 (0.80) _b

Means with different subscripts within rows significantly differ, $p < .05$

* $p < .05$; ⁺ $p < .10$

4.3.2 Relationships of themes to affect, IAT attitudes, and help

As shown in Table 4, participants whose main experience with the IAT was negative (Theme 1) had the most negative affect, $F(3, 156) = 6.40, p < .001, \eta_p^2 = .11$; guilt, $F(3, 156) = 10.49, p < .001, \eta_p^2 = .17$; and surprise, $F(3, 156) = 10.11, p < .001, \eta_p^2 = .16$; as well as marginally more negative other-directed affect, $F(3, 156) = 2.32, p = .078, \eta_p^2 = .08$. Participants whose main response to the IAT was negative also had more negative attitudes toward the IAT than did those who depersonalized their scores (Theme 4), $F(3, 158) = 18.87, p < .001, \eta_p^2 = .26$. Participants who depersonalized their scores also saw themselves as more likely to be biased toward other groups than did those with negative responses, $F(3, 158) = 3.39, p = .02, \eta_p^2 = .06$.

Finally, participants who had negative responses to the IAT (Theme 1) were more likely to help an African-American (i.e., reply to the lost email; 52.6%) than were participants with other response types (Themes 2–4, ranging from 14.3 to 22.7%), $\chi^2(3, N = 53) = 9.48, p < .03, \Phi = .25$. However, participants were about as likely to help regardless of whether they personalized their scores (Theme 3, 17.9%) or not (Theme 4, 22.7%).

4.3.3 Summary

The mixed methods analyses provided support for an observation based on the qualitative analysis; participants who considered their scores to accurately measure their personal beliefs (Theme 3) more frequently exhibited little or no implicit preference (vs. slight, moderate, or strong preference), whereas participants who depersonalized their scores (Theme 4) more frequently exhibited moderate or strong implicit preferences (vs. little/no or slight preference). The mixed methods analyses also indicated

that participants whose main response to the IAT was negative (Theme 1) reported more negative affect and had more negative attitudes toward the IAT than did participants with other response typologies. However, participants whose main response to the IAT was negative (Theme 1) were as likely to believe that they were biased toward other groups as were those whose main response was positive (Theme 2) and those who saw their scores as accurately measuring their personal beliefs (Theme 3). Finally, theme predicted subsequent behavior. Participants whose main response to the IAT was *negative* (Theme 1) were more likely to respond to the lost email—thus helping an African American—than were participants whose responses reflected any other theme.

5 Discussion

To examine the consequences of using the IAT as a consciousness-raising tool in educational settings, this research examined students' qualitative and quantitative reactions to taking the IAT as well as the effect a priori information they received about the IAT (i.e., whether it assessed personal beliefs vs. other factors) and their level of implicit preference for EAs. The qualitative analysis provided a deeper understanding of responses to the IAT, which supplemented the quantitative analysis but also highlighted meanings participants ascribed to the IAT not included in the quantitative measures.

Quantitative results indicated that participants who had stronger implicit preferences for EAs reported more negative affect and had more negative attitudes toward the IAT (consistent with Hypothesis 1), although these effects did not depend on explanation condition, as we had hypothesized (Hypothesis 2). Other results, however, provided some support for Hypothesis 2. The interactions between explanation condition and implicit preference for beliefs in bias indicated that participants with stronger preferences for EAs were more likely to believe that they and others may be biased when they were in the multiple (vs. single) explanation condition. Thus, the effect of the explanation provided about the IAT on beliefs in bias depended on participants' implicit preferences.

Finally, findings concerning students' views of the IAT as a class activity are consistent with, yet extend, previous work. Participants generally experienced more positive than negative affect (Hypothesis 3a); however, this tendency was weaker among participants who had stronger preferences for EAs. The latter result extends past research (Morris and Ashburn-Nardo 2010) by showing that the level of implicit preference for EAs relates to affective reactions to the IAT. Consistent with Hypothesis 3b, study participants evaluated the IAT activity more positively than did non-participants, which extends previous research in that it directly compared students who completed the IAT with those who did not (vs. midpoint comparisons; Morris and Ashburn-Nardo 2010). Overall, this study provides more evidence that participating in an IAT can facilitate participants' in-class experiences.

Others have called for more integrated data analysis for quantitative and qualitative data (Jang et al. 2008). This study contributes to this literature through integrative use of these procedures (i.e., data transformation and typology development), which showed that participants with negative qualitative responses were more likely to help a minority

by responding to the lost email. Thus, qualitative (but not quantitatively assessed) reactions were shown to predict subsequent behavior, providing some evidence that negative reactions to the IAT may indeed increase awareness of bias and motivate pro-social behavior.

5.1 Limitations and implications

Of course, this study has limitations. We did not manipulate levels of implicit bias; participants received their “true” IAT scores.² This procedure enhances external validity because it parallels the way the IAT is used in educational settings as well as by millions on the internet. However, a controlled experiment could avoid this confound and maximize internal validity by randomly assigning student to feedback conditions, independent of their actual scores. In addition, our sample consisted of primarily EA college students in psychology classes. Racial and ethnic minorities, older adults, and non-psychology students may differently respond to the IAT. It may be particularly important to consider and empirically examine the extent to which the present findings extend to broader educational contexts—for example, diversity training in organizations—in which the IAT is used as a consciousness-raising tool.

The present results suggest that including the IAT activity prior to a lecture/discussion on implicit bias is likely to be an effective educational tool. However, our findings also suggest that the effect of a more or less direct approach depends on implicit bias. Importantly, most people who take the IAT are told that they have some level of implicit bias (Nosek et al. 2007), which suggests that a less direct approach (i.e., multiple explanations) may increase beliefs in bias for most but not all. The qualitative data also contribute practical knowledge about the experience of taking the IAT, which is helpful for educators considering using the IAT in their classrooms. Knowing the common responses students have to the IAT may prepare educators for leading discussion about the IAT, implicit bias, and prejudice in general.

One concern educators might have about doing an IAT class activity is that it may lead to negative reactions. Our findings suggest that negative evaluations are more likely to occur from students who have stronger implicit preference for EAs as they are likely to experience more negative, other-directed affect in response to their IAT results. This increase in negative other-directed affect may manifest itself in evaluations of educators who use the IAT as a consciousness-raising tool. However, a negative qualitative response, which was also associated with more negative affect on quantitative measures, was related to increased likelihood of helping a student from a racial minority. Even though students may experience negative self- and other-directed affect as a result of taking the IAT, taking the IAT has the potential to raise consciousness about implicit bias and motivate pro-social, anti-racist behavior.

Indeed, educators should carefully examine their learning objectives and goals for the IAT activity when choosing how to present it to students. If the educator's primary

² However, those who created the IAT argue against using the IAT as a diagnostic tool; that is, the measure is not reliable enough to be the basis for decisions made about specific individuals (Nosek et al. 2007).

goal is to *promote egalitarian behavior*, our findings show that approaches that increase negative responses to the IAT may increase helping behaviors toward minorities, which suggests a greater awareness of bias that may also reduce discriminatory behaviors. The present study did not reveal any direct effects of explanation condition on negative affect or responses. However, other approaches may cause more negative reactions, which should not necessarily be avoided if the goal is consciousness-raising. This suggestion is consistent with a more personal and tumultuous approach to anti-racist teaching advocated by critical race theorists (e.g., [Wagner 2005](#)). On the other hand, if the educator's primary goal is to *increase students' belief in bias*, our findings indicate that providing multiple (vs. single) explanations of the IAT would be more effective in increasing beliefs in bias for students with a moderate or strong implicit preference for EAs over AAs, which was the majority of students in our sample.

6 Conclusion

Across qualitative, quantitative, and mixed methods analyses, this research describes responses to the IAT and the degree to which the IAT may be used to raise consciousness about implicit bias. Most participants come to see taking the IAT as a positive experience that they would recommend to others. Importantly, negative qualitative responses do not necessarily lead to negative consequences; participants who had a negative qualitative response to the IAT were more likely to engage in pro-social behavior. Combined, these findings suggest that the IAT can be an effective tool for educators to increase awareness of bias regardless of participants' positive and/or negative responses to the experience.

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