The Relation Between Racial Attitudes and Facets of Impulsivity

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THE RELATION BETWEEN RACIAL ATTITUDES AND FACETS OF
IMPULSIVITY

by

Diana M. Perez

A thesis submitted in partial fulfillment
of the requirements for the degree
of
MASTER OF SCIENCE

In
Psychology

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ABSTRACT

The Relation Between Racial Attitudes and Facets of Impulsivity

by

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Utah State University, 2023

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To address the perpetuation of racism, it is important to understand the underlying mechanisms that allow for automatic racial biases to dictate behavior. The relation between impulsivity and racial bias has seen limited research; nonetheless, the elements that control for the ability to interrupt automatic processes or poor decisions making may be a key in addressing racial bias. One hundred eighty-seven White adult participants were recruited from Amazon Mechanical Turk (MTurk). A multiple regression was used to assess the predictive value of response inhibition and delay discounting on racial colorblindness (i.e., Color-Blind Racial Attitudes Scale; CoBRAS) and ethnocultural empathy (i.e., Scale of Ethnocultural Empathy; SEE). Response inhibition was a significant predictor of colorblindness and ethnocultural empathy. Specifically, participants that could quickly inhibit their responses were more aware of blatant racial issues and institutional discrimination. Participants with greater inhibitory control also had more acceptance of cultural differences and were more empathic perspective takers.
than those with less inhibitory control. Delay discounting did not significantly predict racial colorblindness nor ethnocultural empathy. Because of poor data quality from MTurk, many participants did not have systematic delay discounting data, which could have affected the results by introducing random variation. Based on the findings of the present study, researchers should examine the effects of response inhibition training in combination with a prejudice reduction intervention.
Racism is an ongoing issue in U.S. society. The present study examined the relation between racial attitudes and two types of impulsivity (i.e., behavioral inhibition and delay discounting). Prior research has not touched upon the relationship between impulsivity and racial bias; nonetheless, the factors that influence the ability to interfere with automatic thinking and bad decision making may be a way to address racial bias. One hundred eighty-seven White adult participants were recruited from Amazon Mechanical Turk (MTurk), an online survey taking website. The value participants place on future rewards (i.e., delay discounting) and the ability to stop their behavior (i.e., response inhibition) were assessed for the potential relationship they may have with two forms of racial bias (i.e., racial colorblindness and ethnocultural empathy). Response inhibition was significantly related to racially colorblind attitudes and ethnocultural empathy. Participants who took less time to stop their response (i.e., had better inhibitory control) were more aware of blatant racial issues and institutional discrimination. Participants with better inhibitory control also had more acceptance of cultural differences and were more empathic perspective takers than those with less inhibitory control. Delay discounting was not significantly related to racial colorblindness nor ethnocultural empathy. Because of poor data quality from MTurk, many participants produced random-like responses in the delay discounting task, which could have affected
the results by introducing unsystematic variation. Based on the findings of the present study researchers should examine how improving behavioral inhibition influences racial attitudes.
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Diana M. Perez
I grew up in a Latine enclave full of poor and working-class Latines. My community slowly became populated with wealthy college-educated White people. As newcomers took the cheap cost for housing and food as the perfect place to create a home, they were unaware of their impact on the Latine community. The increasing presence of White newcomers caused housing and rent inflation, which led to the displacement of long-time Latine residents, minority business foreclosure, and increased racial policing. The exploitation and cultural shift of my community is a modern form of colonization called gentrification. I learned more about gentrification and other forms of systemic racism through multicultural courses during my undergraduate career. My growing understanding of institutional racism motivated me to join an activist group that combated inequality towards Latine communities by removing barriers to higher education. Understanding more about the oppressive forces that impact Black, Indigenous, and people of color (BIPOC) hurt me but also deepened my appreciation for my culture and ancestry. My experiences and growth as a BIPOC fueled my interest in studying and dismantling the underlying processes that reinforce racism.
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The damaging effects of overt racism are salient across history; however, covert racism is not as widely known as an essential component to racial oppression (Williams & Wyatt, 2015). Overt racist acts are shocking and notable, whereas covert racism is much more subtle and socially acceptable whether expressed by individuals or institutions (Campbell & Brauer, 2021; Sue et al., 2007; Sue & Robertson, 2019). Yet many individuals in the U.S. consider overt acts of racism the central issue of racial discrimination when covert racism is vital to the sustainability of racism (Schaefer, 2008). Recently, researchers have marked a new era of racism (Bonilla-Silva & Yamashita, 2022): heightened overt racial prejudicial attitudes and actions (e.g., hate crimes; Canizales & Vallejo, 2021) enacted by individuals who identify as politically conservative (Malcom et al., 2022). Although overt acts of racism may be more readily identifiable, people can also hold covert prejudicial attitudes (i.e., implicit racial bias) while consciously and verbally expressing support for equity and civil justice (Barnes-Holmes et al., 2010; Gawronski & Bodenhausen, 2006). Colorblindness and ethnocultural empathy are two dimensions of racial bias.

Racial attitudes such as colorblindness and ethnocultural empathy can provide important context for how covert expressions of racism can perpetuate racism. For instance, some individuals believe that skin color should be ignored, and everyone should be treated equally regardless of race (i.e., colorblindness; Neville et al., 2000); however, this belief dismisses racism and the lived experiences of Black, Indigenous, and People of
Color (BIPOC; Fryberg, 2010; Holoien & Shelton, 2012). Ignoring race allows individuals to avoid uncomfortable conversations about racial inequity when such conversations are essential to understanding differences across experiences, cultures, and perspectives of BIPOC, and perhaps more importantly, creating meaningful social change. In contrast, acknowledging and understanding ethnic-racial differences regarding culture, experiences, and feelings (i.e., ethnocultural empathy) can reduce intergroup conflict and discriminatory attitudes (Kapıkıran, 2021).

The negative impact of racism is evident in racial disparities within mental health (Okazaki, 2009; Spector, 2001), physical health (Blair et al., 2013; Nadal et al., 2017), educational success (Riddle & Sinclair, 2019), and public policy (Glaser et al., 2014). The American Public Health Association declared that racism is an ongoing health crisis that needs to be addressed (Benjamin, 2020). The American Psychological Association (APA) issued an apology for years of contributing to racism and racial discrimination; they also advocated for the psychological sciences to help dismantle systemic racism in education, criminal justice, and other psychological domains (APA, 2021). Individuals socialized in a structurally racist society develop implicit racial bias, which results in a collective of individual-level acts of racial discrimination that systemically impact BIPOC (e.g., Blair et al., 2013; Feagin & Bennefield, 2014; Nadal et al., 2017).

To address racism, scholars must identify potential variables that predict racism, preferably variables that are amenable to intervention and change. Subtle racial discrimination can be impulsive, automatic, stressed-induced, and unconscious (Bargh et al., 1992; Fiske, 1998). In the presence of BIPOC, some Whites become stressed or feel
threatened which can induce racially discriminatory behavior, even more so if the BIPOC holds equal or higher educational and socioeconomic status (SES) than the White person (Williams, 2020). Allen et al., (2017) report that participants who experienced acute social stress (i.e., Trier Social Stress Test, write and deliver a speech) resulted in impaired response inhibition. It may be that White people who are uncomfortable during interracial interactions struggle with the ability to control their racist ideas and thus behave impulsively by vocalizing racist attitudes. In order to understand two potential predictors that are malleable to intervention, this dissertation focuses on two facets of impulsivity—response inhibition and delay discounting—and explores the relationship between these two and racial bias as measured by colorblind racial attitudes and ethnocultural empathy.
CHAPTER II
LITERATURE REVIEW

Race and Racism

Researchers have shown that overt racism is being replaced with more subtle and covert forms of racism (Bonilla-Silva & Yamashita, 2022; Schaefer, 2008; Gawronski & Bodenhausen, 2006). Although White Americans (i.e., Whites in the U.S.) have shown positive changes in racial attitudes in the past 65 years, implicit racial bias is one of the roots of modern racism (Williams & Wyatt, 2015). Implicit racial biases are negative covert attitudes perpetuated by social groups and the environment (Gawronski & Bodenhausen, 2006). Social constructs such as racist stereotypes have been shown to be related to implicit biases (Spencer et al., 2016; Stewart et al., 2022). White individuals who hold implicit racial bias are typically unaware of their attitudes; however, researchers have found that implicit bias is significantly related to racial discrimination (e.g., microaggressions and color-blindness; Devine, 1989; Fiske, 1998; Gaertner & Dovidio, 1986; Neville et al., 2000; Sue et al., 2007; Wingfield, 2019).

Racial bias affects BIPOC at the societal (Evans et al., 2020) and individual (Sue et al., 2007) level. At the societal level racial bias is visible in hiring discrimination (Quillian et al., 2017), health disparities (Blair et al., 2013), and over-policing (Gelman et al., 2007). For instance, health disparities in the Latine and Black communities have been linked to racial bias of health care providers (Blair et al., 2013; Torres et al., 2011). Regarding public policy, researchers report the negative effect the Stop and Frisk law had
on BIPOC communities. Gelman et al. found that when controlling for race-specified crime participation, police officers stopped Latines and Blacks more frequently than Whites. At an individual level, racial bias is related to microaggressions or blatant acts of racism, which can mentally, physically, and emotionally stress BIPOC (Kwate et al., 2003; Sue et al., 2007; Williams, 2018). Racial microaggressions are discriminatory behaviors that are unintentional or intentional acts that are derogatory, hostile, or insulting toward BIPOC (Sue et al., 2007). In contrast, a racial aggression is an act of blatant racism and an intentional act, such as when Officer Chauvin’s excessive force resulted in George Floyd’s death. Although their effects are not as obvious, there is experimental evidence that racial microaggressions are also harmful and negatively affect psychological states (e.g., increase depression, anxiety, lower-self-regard; Deitch et al., 2003; Sue et al., 2007; Okazaki, 2009), academic success (e.g., poor performance; Keels et al., 2017; Patterson & Domenech Rodríguez, 2019), and physical health (e.g., cardiovascular health; Nadal et al., 2017) of BIPOC.

One thing that causes White people anxiety is their own racist attitudes. Aversive racism is an implicit racist attitude held by progressive and well-educated White people who otherwise value racial civil rights and equality (Dovidio & Gaertner, 1986). The underlying components of aversive racism are the internal conflict of Whites’ unconscious negative beliefs about BIPOC and the denial of personal prejudice (Schaefer, 2008). The internal conflict White people feel is heightened in the presence of BIPOC, especially if the person of color is of high social status (Williams, 2020). Thus, to avoid engaging in racially discriminatory behavior Whites may avoid interracial
interactions (Williams, 2020). Furthermore, interracial interactions require the ability to inhibit expressing negative attitudes (Gailliot et al., 2007; Richeson & Trawalter, 2005). Thus, individuals that struggle to inhibit their response may be more likely to engage in acts of racism. Also, individuals in a high state of anxiety or stress are more likely to make choices that result in immediate rewards (Rounds et al., 2007; Xia et al., 2017). However, researchers have yet to examine the relation between racial bias and response inhibition and impulsive choice. Thus far behavior analysis has limited insight on the functional contingencies and consequences of racially biased behavior (Matsuda et al., 2020). In the present study, the relations between racial bias and impulsive choice and response inhibition were examined.

**Racial Bias**

In the proposed study, racial color-blindness and ethnocultural empathy were used to examine two dimensions of implicit racial bias. Color-blindness is the belief or attitude that race does not and should not matter (Neville et al., 2000). Some individuals adopt color-blind beliefs to avoid expressing their racial bias (Tettegah, 2016). Ethnocultural empathy is a moral emotion developed by a collective of experiences, attitudes, thoughts, and behavior towards ethnic, racial, or cultural groups different from one’s own (Irimia, 2010; Ridley et al., 2008; Y. W. Wang et al., 2003). An essential component of cultural empathy is the ability to take the perspective of other racial groups (Y. W. Wang et al., 2003).
Racial Colorblindness

Racial colorblindness is the disregard for social categories (i.e., race and ethnicity) on the preconception that everyone will receive the same treatment regardless of race (Firebaugh & Davis, 1988). Penner and Dovidio (2016) found that health care workers with colorblind values contribute to the discriminatory treatment experienced by BIPOC, which may be one of the causes for racial health disparities. Furthermore, researchers found that college students who adopted a colorblind approach had higher degrees of racial bias (Richeson & Nussbaum, 2004). In the proposed study, the relation between colorblindness and impulsivity (i.e., delay discounting and response inhibition) was examined.

Ethnocultural Empathy

White people may be unaware or have difficulty understanding the perspective of BIPOC, which results in a lack of empathy towards people in those racial groups (Tettegah, 2016). Empathy bias can result in an individual’s inability to understand cultural perspectives other than their own. Empathy bias consists of a lack of concern, care, and compassion for individuals based on their personal characteristics and group membership (Tettegah, 2016). Empathy bias can result in an increased likelihood of engaging in negative stereotyping and discriminatory behavior. The ability to perspective take is predictive of anti-racist behavior; for example, individuals with anti-racist attitudes are more likely to consider BIPOC experiences and address their racial biases (Davis et al., 2021). Conversely, Karafantis (2011) found that participants with low ethnocultural empathy toward women were more likely to stereotype female athletes.
Brouwer and Boros (2010) found that participants with high ethnocultural empathy also had positive attitudes towards interracial interactions and ethnic diversity. In the proposed study, ethnocultural empathy was examined for the potential relation empathy has with delay discounting and response inhibition.

**Whiteness**

White is a term that describes the lightness of skin; however, it also implies that people have historically gained from their light-skin privilege (Lindner, 2018). Whiteness is considered the standard, as it does not refer to a specific ethnic, cultural, or national background (Lindner, 2018). However, Whiteness is an identity that would not exist without identities such as Latine, Black, and Asian (Garner, 2007; Helms, 2018). Whiteness alludes to the absence of color, which is why non-White people identify themselves as “people of color” (Altman, 2006; Helms, 2018).

White is a racialized identity that is derived from a national, racial regime (Garner, 2007). For example, in the U.S. colonial period Whiteness meant that an individual was fit to self-govern (Jacobson, 1999). Therefore, only people with Anglo-Saxon origins could govern themselves and people of color needed to be supervised and controlled (Jacobson, 1999). Now, institutions in the U.S. are systemically rooted in providing Whites with more opportunities than other racial groups (Lindner, 2018). McIntosh (2007) states that White people are socialized to believe that they are morally neutral, the norm, and the ideal. The frame of mind comes from meritocracy, which is the myth that everyone has equal access to opportunities (McIntosh, 2007). Meritocracy
normalizes systemic racism because it misguides Whites to believe that racial disparities are due to the individual decisions BIPOC make (McIntosh, 2007).

As McIntosh (2007) describes, White privilege is an unconscious advantage in society that is not afforded to BIPOC, but it is also what started and perpetuates racism (Collins, 2018). The word privilege makes poor Whites upset due to the connotation that they have never had to work hard for something (Collins, 2018). However, White privilege does not mean that Whites have never experienced struggle, but that the adversities they have faced are not due to their skin color (Law, 1999). The manner in which Whites are socialized from the perspective of their skin tone blinds them to the experience of BIPOC (Helms, 2018). However, historically, White privilege originated from Whites deliberately and consciously performing acts that have negatively impacted BIPOC (e.g., enslavement, lynching, genocide, forced relocation; Collins, 2018). White privilege has been cultivated from generations of racism and racial bias towards BIPOC.

In the U.S., White people hold positions of power at a higher proportion than BIPOC, and White people in power make conscious choices that uphold White privileges such as hiring procedures, laws, education curriculum, and racialized media (Collins, 2018). White privilege is both consciously maintained and unconsciously enjoyed. Whiteness is a key ingredient to the perpetuation of racism in the U.S.; therefore, it is White peoples’ responsibility to end racism (Helms, 2018). Given the unique positionality of Whiteness, the present study focuses on the relation of racial bias and impulsivity in White participants.
Impulsivity

Broadly, impulsivity is defined as the habit of engaging in maladaptive and inappropriate behaviors (de Wit, 2009). Impulsivity has been used to define a number of maladaptive behaviors, including being unable to suppress responses, insensitivity to negative or delayed outcomes, and inability to wait to obtain a positive outcome. Researchers consider impulsivity a multidimensional construct (Castellanos & Tannock 2002; de Wit, 2009; Verbruggen et al., 2019). Thus, the present study examined the relation of racial bias across two facets of impulsivity, delay discounting and response inhibition.

Delay Discounting

Delay discounting is a component of decision-making defined as the decrease in the value of a reward as a function of delay (Odum, 2011). Delay discounting measures a pattern of preferences between small immediate rewards and larger delayed rewards (Mazur, 1987). A tendency to prefer a smaller immediate reward (i.e., the impulsive option) over a larger delayed reward (i.e., the self-controlled option; Ainslie, 1974) is characterized as steep delay discounting. Individuals who engage in maladaptive behaviors tend to steeply discount future rewards (e.g., Bickel et al., 2012). Substance use disorders (e.g., Yi et al., 2010), gambling (e.g., Reynolds, 2006), criminal activity (e.g., Lee et al., 2017), poor academic performance (e.g., S. Wang et al., 2017), and obesity (e.g., Rasmussen et al., 2010) are linked to steep discounting.

Working memory has been shown to be related to delay discounting (Wesley &
Bickel, 2014) and racial bias (Yaros et al., 2019). Regions in the brain known for activation during working memory tasks (i.e., neocortical structures) have been shown to overlap with neural activation during delay discounting tasks (Wesley & Bickel, 2014). Research suggests that working memory and discounting future rewards work together as components that make up executive function (Sessa et al., 2012; Shamosh et al., 2008; Wesley & Bickel, 2014). Working memory is a system where information is stored and manipulated as an essential component of goal-directed behavior (Miller et al., 2018). Shamosh et al. found that delay discounting was negatively correlated with working memory; individuals with poor working memory more steeply discounted delayed rewards compared to individuals with greater working memory In a different respect, visual working memory has been shown to be affected by racial bias (Yaros et al., 2019). Lack of exposure to diversity can lead to deficits in visual working memory that affect the ability to process facial features of other-race members compared to same-race faces (the “other-race effect”; Sessa et al., 2012). The other-race effect is due to deficits in working memory, specifically, deficits in interference processing (i.e., the process that allows for the focus on task-related information while simultaneously disregarding unrelated information; Yaros et al., 2019). Thus, if delay discounting and heightened racial bias are related to working memory deficits, discounting of future rewards and racial bias may be related.

**Behavioral Inhibition**

Evolutionarily speaking, automatic processes are valuable because they allow individuals to efficiently develop patterns of responding to adapt to their environment
Automatic processing is adaptive because it enables an efficient pattern of responding, thus decreasing the need to engage in deliberate processes which require more cognitive energy. However, automatic processing can also have substantial shortcomings. When the environment changes, individuals must inhibit old patterns of responding and replace them with more adaptive or acceptable ways of responding. When individuals recalibrate their automatic responding, they need to engage in response inhibition, which is the ability to withhold maladaptive, inappropriate, or undesired impulses and actions (Verbruggen et al., 2019). White individuals with higher degrees of racist attitudes towards African Americans have been shown to also have low self-esteem and high levels of anxiety (Utsey et al., 2002). To be clear, the impact racism has on Whites is not comparable to the impact on BIPOC; nonetheless, racial prejudice has been correlated with negative psychological and behavioral impacts on Whites (Grzanka et al., 2020; Spanierman et al., 2008). In the present study, we examined if the ability to inhibit responses is associated with implicit and explicit racial bias.

The literature indicates that inhibition may influence individual differences in implicit bias associations (Glaser & Knowles, 2008; Gonsalkorale et al., 2009; Park et al., 2008). A consensus among researchers is that stereotypes and implicit bias can be automatically activated in the presence of a group member based on their gender, facial features, skin color, and body (Brewer, 1988; Devine, 1989; Greenwald et al., 1990; Monteith et al., 2002; Moskowitz, 2010; Sassenberg & Moskowitz, 2005). Researchers have debated the role inhibitory processes play in individual differences in bias relations (e.g., implicit bias; Glaser & Knowles, 2008; Moskowitz et al., 1999; Park et al., 2008).
For nonbiased responding to occur, individuals must identify when to suppress and inhibit biased behavior (Monteith et al., 2002). Monteith et al. assert that response inhibition is an important mechanism in interrupting automatic biases. Interestingly, when individuals are informed of their stereotypical biases, response inhibition is evident by a brief pause before a response (Chaney & Sanchez, 2018; Monteith et al., 2002; Moskowitz & Li, 2011). The pause may be an attempt to inhibit automatic evaluations (e.g., stereotypes). Thus, it is possible that an individual with proficient response inhibition may be able to better suppress racial bias compared to those with poor response inhibition.

**Knowledge Gap and Objectives**

In the proposed study, multiple gaps in the literature were identified. Delay discounting is related to many important social behaviors, yet there is no research on the potential relation between delay discounting and racial bias. Racial bias and delay discounting have both been shown to be significantly related to working memory; thus, racial bias and delay discounting may work through similar processes. Furthermore, researchers have not yet examined if deficits in response inhibition may be related to racial colorblindness and ethnocultural empathy. The proposed study had two main objectives: examine if racial colorblindness and ethnocultural empathy can be predicted by (a) delay discounting and (b) response inhibition on. Both of these variables have been found to be amenable to intervention and findings from this research could elucidate the underlying processes that relate to prejudice. Participants completed a correlational study
with four measures. The Color-Blind Racial Attitudes Scale (CoBRAS) and Scale of Ethnocultural Empathy (SEE) were used to measure racial attitudes. Delay discounting was used to measure temporal decision making. Last, the stop-signal task was used to measure response inhibition.
CHAPTER III

METHOD

Participants

Two hundred and six participants were recruited from MTurk. Eligible participants were Mturk employees with an IP address from the United States, who had completed more than 50 Human Intelligent Tasks (HITs) and held a HIT completion rating greater than 90%. Eligible participants \( n = 193 \) were 18 years or older, identified as non-Latine White, completed the entire study, and correctly answered at least one attention check question. Only White participants were included because they were the group of interest (i.e., the dominant racial group in society who benefit from systemic racism the most; Helms, 2018). A multiple regression interval estimation was used to calculate the \( \text{a priori} \) sample size. In the multiple regression, the main outcomes of the delay discounting and the stop-signal task were predictors for racial bias. The sample size was estimated with Bonett and Wright’s (2011) Equation 2. Estimation was calculated with an \( \alpha = .05 \), power \( (1 - \beta) = .95 \), two predictors (i.e., delay discounting and stop-signal task), two outcomes (i.e., SEE, CoBRAS) and across multiple effect sizes (i.e., \( R^2 = .02, .10, .30 \)) to estimate an appropriate sample size with sufficient power. The values \( .05, .10, \) and \( .15 \) were used as constants to set the upper and lower bounds for each effect size. Three power analyses were conducted for each of the three effect sizes, which provided nine sample estimates. The median estimated sample size from the nine sample estimates was 93 participants, which was rounded up to at least 150 participants to
Measures

Screening and Demographic Survey

Participants who met eligibility requirements completed a full demographic survey that included gender, age, political affiliation, education level, sexual orientation, and religiosity (J. L. Hughes et al., 2016; see Appendix B and C). Although the impact of these demographic variables is of interest, their impact on the variables under study is unknown, and therefore a correlation matrix was examined with these variables as a preliminary step to understand their influence.

Delay Discounting

The delay discounting procedure identifies the point at which two rewards, one that is delayed and the other that is immediate, share the same present value (Odum, 2011). Participants were asked to choose between hypothetical amounts of money they could receive immediately or after a delay (e.g., $500 now versus $1,000 in 3 months; Rachlin et al., 1991). The primary dependent variable measured in delay discounting procedures are indifference points. An indifference point is the immediate-reward amount at which the value of the immediate and delayed rewards are equivalent (Frye et al., 2016).

In the adjusting amount procedure, the amount of the immediate reward was increased or decreased by the algorithm based on the prior choice to quantify the indifference point (Du et al., 2002; Frye et al., 2016). The smaller sooner reward was
titrated (e.g., increased or decreased) by half of the difference between the larger later reward and the smaller sooner reward. For example, given the option of $500 now or $1,000 later, if the larger later reward was selected, in the subsequent trial the smaller sooner reward would increase to $750. Likewise, if the smaller sooner reward was selected, the smaller sooner reward would decrease to $250 for the next trial. The adjustments were half of the initial difference sequentially (e.g., $250, $125.00, $62.50) across choice trials (Du et al., 2002). This titration procedure took place across six trials for each of seven delays: 1 week, 2 weeks, 1 month, 6 months, 1 year, 5 years, and 25 years (Frye et al., 2016). The indifference point was the amount of the immediate reward after the final adjustment.

The present study included an adjusting amount procedure with two delayed magnitudes (i.e., $100 and $1,000; Du et al., 2002). Two delayed amounts were included to demonstrate experimental control, internal validity, and to replicate a well-known effect in which smaller magnitudes are discounted more steeply than larger magnitudes (e.g., Myerson et al., 2001). The order of magnitude of delayed amounts was randomized and counterbalanced across participants.

Area Under the Curve (AUC) was quantified from the indifference points (Myerson et al., 2001). AUC provides a univariate measure of discounting outside of a theoretical model (Myerson et al., 2001). AUC was calculated using normalized delays and indifference points. To normalize the data, delays and indifference points were divided by the corresponding largest value (i.e., delay and amount). For example, a delay of 356 days (i.e., 1 year) was divided by 9,125 days (i.e., 25 years) to yield a normalized
delay of .04. To compare the degree of delay discounting across magnitudes, indifference points were normalized by dividing each point by the corresponding delayed amount. For example, an indifference point of $58 in the smaller magnitude would be divided by $100 to equal .58, and an indifference point of $580 in the large magnitude would be divided by $1,000 to also equal .58. Equation 2 was used to calculate AUC (Myerson et al., 2001).

\[
\frac{x_1-x_2}{2}[(y_1-y_2)]
\]  

(1)

In Equation 2, \(x_1\) and \(x_2\) are consecutive normalized delays and \(y_1\) and \(y_2\) are normalized indifference points for the corresponding delays. The sum of the trapezoidal area across each set of adjacent indifference points makes up AUC (Myerson et al., 2001). AUC ranges from 0 to 1, with higher values indicating less discounting. The normalized data were depicted by plotting the value of the indifference points as a function of delay.

**Response Inhibition**

The stop-signal task (Verbruggen, 2019) was used to examine response inhibition by comparing response latency on go trials and latency to inhibit a response on stop trials (Verbruggen et al., 2019). In the go trials, participants react to the presentation of right or left arrows by pressing the left or right key. A trial begins with a black dot in the center of the screen for 250 ms followed by the go stimulus (i.e., black outlined left or right arrow). The go stimulus is presented for 1,250 ms or until a response (i.e., pressing the left or right arrow key) is emitted. In the stop trials, a solid red arrow is presented after a variable stop signal delay. The stop signal delay (SSD) is the time between the presentation of the go stimulus and the onset of the stop signal. Stop Signal Response
Time (SSRT) can be estimated from the distribution of the observed reaction times on go trials and the observed probability of responses on the stop signal trials. The initial SSD was set to 300 ms and continuously adjusted; when a response was inhibited the SSD increased by 50 ms and when inhibition was unsuccessful (i.e., either of the arrow keys are pressed) the SSD decreased by 50 ms. The stop-signal procedure contained two phases, the practice and the experimental phase. The practice phase had one block with 32 trials. The experimental phase contained four blocks with 64 trials each. In the practice phase, feedback was given for incorrect responses, no responses in a go trial, responding before the go stimulus, and responding on a go trial. Feedback was no longer provided in the experimental phase.

The stop-signal task yields a variety of values to conceptualize response inhibition using the independent race model (Logan & Cowan, 1984; see Appendix D). The outcomes of the stop-signal task were mean probability of responding on stop-signal trials (i.e., p[respond|signal]), SSRT, the average delay between the presentation of the go trial and the stop signal across trials (i.e., SSD), the proportion of missed responses on go-signal trials, mean signal-respond response time, no-signal response time, and proportion of correct responses on no-signal trials (Verbruggen & Logan, 2008). The main outcome measure of the stop-signal task is the SSRT, which was used to determine response inhibition (Verbruggen & Logan, 2008). SSRT was calculated using the ANALYZE-IT program (Verbruggen, 2019) which uses the integrational method to replace go omissions.
Ethnocultural Empathy

Ethnocultural empathy was measured using the Scale of Ethnocultural Empathy (SEE; Y. W. Wang et al., 2003; see Appendix E). The SEE is a 31-item questionnaire with a 6-point Likert scale; 1 for strongly disagree that this describes me to 6 for strongly agree that this describes me (Y. W. Wang et al., 2003). The task has four subscales: Empathic Perspective-Taking (7 items), Empathic Feeling and Expression (15 items), Acceptance of Cultural Differences (5 items), and Empathic Awareness (4 items). The Empathic Perspective-Taking subscale consists of items evaluating one’s attempt to understand the experience and emotions of people of a different ethnic or racial group by taking their point of view of the world (e.g., “I know what it feels like to be the only person of a certain race or ethnicity in a group of people”). The Empathic Feeling and Expression subscale measures the communication of awareness of discriminatory attitudes and examines emotional and affective responses to the experience and/or emotions of people from a different racial or ethnic group (e.g., “I get disturbed when other people experience misfortunes due to their racial background”). The Acceptance of Cultural Differences subscale measures the degree to which one recognizes and values cultural traditions and customs of BIPOC (e.g., “I feel annoyed when people do not speak standard English”; reverse coded). Lastly, the Empathic Awareness subscale measures knowledge and awareness of the experiences that individuals of a different ethnic or racial group have that are different from one’s own (e.g., “I recognize that the media often portrays people based on racial or ethnic stereotypes”; Albiero & Matricardi, 2013). SEE total scores range from 31 to 185; higher scores indicate higher levels of
ethnocultural empathy. Previous Cronbach alpha scores (i.e., internal consistency) for the SEE have been good (ranging from .76 to .91; Y. W. Wang et al., 2003).

**Racial Colorblindness**

Racial colorblindness was measured using the CoBRAS (Neville et al., 2000). Racial colorblindness is the belief that racial membership should and does not matter (Neville et al., 2000; see Appendix F). CoBRAS is a 20-item, 6-point Likert scale with responses ranging from 1 for *strongly disagree* to 6 for *strongly agree* (Neville et al., 2000). CoBRAS measures the degree to which individuals are aware of the following constructs: Racial Privilege, Institutional Discrimination, and Blatant Racial bias. Racial Privilege describes advantages in society that are only experienced by those with a White European identity (e.g., “Everyone who works hard, no matter what race they are, has an equal chance to become rich”). Furthermore, Institutional Discrimination is the understanding of racial exclusion and discrimination within institutions and social systems (e.g., “social policies, such as affirmative action, discriminate unfairly against White people”). Blatant Racial Issues examines the awareness of common acts of racial discrimination (e.g., “racial problems in the U.S. are rare, isolated situations”). Total scores on the CoBRAS sum to 20–120; higher scores reflect a higher level of colorblindness and racial prejudice (Neville et al., 2000). The previous Cronbach Alpha range for CoBRAS is .70 to .86 (see Neville et al., 2000).

**Procedures**

The present study was a correlational study with four variables: delay discounting
(Du et al., 2002), response inhibition (Verbruggen et al., 2019), ethnocultural empathy (SEE; Y. W. Wang et al., 2003), and color-blindness (CoBRAS; Neville et al., 2000). The Utah State University Institutional Review Board approved all of the procedures. Participants completed the study from their personal computers. After participants were screened, passed a CAPTCHA (Completely Automated Public Turing test to tell Computers and Humans Apart), and had completed consent procedures (see Appendix A for informed consent), they started the study with the delay discounting task followed by the stop-signal task. The SEE and CoBRAS were next delivered in random counterbalanced order. After the completion of these racial bias measures, participants were given the opportunity to share their thoughts on the study through an open-ended feedback questionnaire (Appendix G). Unique 4-digit ID codes were given to participants after they completed the study. Participants entered the 4-digit ID code into Mturk to acquire compensation (i.e., $6.00). Participants were disqualified from compensation and removed from the sample if they had two survey entries assigned to the same IP address, did not complete all tasks, or entered an incorrect participant ID.

**Attention Checks and Data Quality**

Four attention-check questions were randomly placed in each task in the study (except for the Stop Signal Task which essentially has multiple built-in attention checks as part of the procedure). Attention checks were formatted to appear similar to survey questions and required participants to select a set answer. For example, the two tasks that used Likert scales (i.e., CoBRAS and SEE) had attention checks similar to the item:
“This is an attention check question, please select ‘strongly agree.’” The other two attention checks were in the delay discounting tasks. Participants had to choose between $0 now and the delayed magnitude but immediate (i.e., “Would you rather have $0.00 now or $100 now?”; Craft et al., 2022).

Data quality was evaluated for delay discounting and the stop-signal task. Two criteria were applied to the delay discounting data: (a) the attention check questions within the $100 and $1,000 DD tasks and (b) the application of the Johnson and Bickel (2008) nonsystematic indifference point criteria. If any indifference point (starting with the second delay) was greater than the preceding indifference point by a magnitude greater than 20% of the larger later reward (i.e., $100 and $1,000; Johnson & Bickel 2008), or if the last (i.e., 25-year) indifference point was not less than the first (1 week) indifference point by at least a magnitude equal to 10% of the larger later reward (i.e., $10 or $100), that data set was considered non-systematic. Many participants who failed the delay discounting attention checks met systematic data criteria therefore the two attention checks were not used to screen data. For the stop-signal task, data indicated inattention or lack of adherence to instructions when mean response time (RT) on unsuccessful stop trials was greater than the mean RT on go trials or the probability of responding on a stop trial (i.e., p[respond|signal]) was lower than .25 or higher than .75 (Band et al., 2003; Verbruggen et al., 2019).

Data Analysis

The hypothesis of the present study was that participants who were more
impulsive (i.e., had low AUC and long SSRT) would have higher scores of
colorblindness and lower scores of ethnocultural empathy compared to less impulsive
counterparts. This hypothesis was tested using multiple linear regressions with AUC for
the delayed amount of $1,000 and SSRT as predictors and CoBRAS and SEE scores as
outcomes. Only AUC for the delayed amount of $1,000 was used to avoid
multicollinearity across predictors in the multiple regression models because AUC for
both delayed amounts was highly correlated. AUC for the $1,000 delayed amount was
selected rather than the $100 amount due to the lower values of kurtosis for the $1,000
amount. Multiple regressions were also conducted on the subscales for each racial bias
measure with the same predictors. Preliminary analyses were conducted on all measures
and demographics before the main analysis to examine linearity assumptions and to select
significantly correlated covariates to consider in the linear models.
CHAPTER IV

RESULTS

Data Preparation

All data organizing and AUC calculations for the delay discounting tasks were conducted in R statistical software (R Core Team, 2014). All other statistical analyses were conducted using Jamovi (Jamovi Project, 2022). Participants were excluded from the main analysis if they failed to complete the entire study, more than two attention checks, or the race model assumptions. For the multiple regressions below only AUC for the delayed amount of US $1,000 was used regardless of whether data were systematic. That is, unsystematic and systematic delay discounting data were used in the main analysis. A post hoc analysis was also conducted to examine the predictive value of AUCs of participants who passed the systematic data criteria.

Predictor Variables

In the full sample ($N = 187$), AUC values for the two delayed amounts (i.e., $100$ and $1,000$) were significantly and strongly positively correlated ($r = .85$, $p < .001$). A paired-samples $t$ test showed that AUC across the two delayed amounts were not significantly different, $t(186) = -1.83$ $p = .07$; $d = -0.13$. A large portion of the delay discounting data were unsystematic according to the criteria developed by Johnson and Bickel (2008); only 56 participants (30.1%) passed both criteria for both delayed amounts (see Table 1 for details and Appendix H for full sample delay discounting data). For systematic data (i.e., the restricted sample), the mean AUC for the $100$ task was
Table 1

Participants Meeting the Johnson and Bickle (2008) Criteria for Systematic Delay Discounting Data ($N = 187$)

<table>
<thead>
<tr>
<th>Passed</th>
<th>Delayed amounts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$100$</td>
</tr>
<tr>
<td>Criterion 1</td>
<td>114</td>
</tr>
<tr>
<td>Criterion 2</td>
<td>110</td>
</tr>
<tr>
<td>Both criteria</td>
<td>76</td>
</tr>
</tbody>
</table>

*Note.* Frequency and proportions of participants that passed Johnson and Bickel (2008) systematic delay discounting criteria.

Significantly less than the AUC for $1,000, t[56] = -3.84 p < .001; d = -0.51. The indifference points for systematic data were plotted across delays in Figure 1 and show a magnitude effect in that $100 was discounted to a greater degree than $1,000 (cf. Myerson et al., 2001; also see Figure 2 for AUC distribution). The main analysis (i.e., multiple linear regression) was conducted with the full sample but only data collected from the task with the delayed amount of $1,000 were used, given the small size of the restricted sample. The small sample size would significantly reduce power and increase the risk of a Type II Error. The post hoc analyses were conducted with only systematic data for the delayed amount of $1,000.

Stop-signal responses were examined for meeting model assumptions as recommended by Verbruggen et al. (2019). The stop-signal reaction time (SSRT) was calculated using the integration method (with replacement of go omissions; Verbruggen et al., 2019). The end of the stop process is estimated by integrating the RT distribution and finding the point at which the integral equals $p(\text{respond}|\text{signal})$. Thirty participants
Figure 1

Median Indifference Points for the Restricted Sample

Note. Standardized indifference points across delays for the delayed amounts of $100 and $1,000 for participants who passed the Johnson and Bickel (2008) criteria for both amounts.

Figure 2

Area Under the Curve for the Restricted Sample

Note. Area under the curve (AUC) for delayed amounts of $100 and $1,000 for participants who passed the Johnson & Bickel (2008) criteria for both amounts.
From the full sample did not meet Stop Signal requirements (i.e., mean RT on unsuccessful stop trials was greater than the mean RT on go trials or the probability of responding on a stop trial was lower than .25 or higher than .75; Band et al., 2003; Verbruggen et al., 2019) thus their data were removed from the multiple regression analyses.

Pairwise correlations, one-way analysis of variance (ANOVA), and independent sample t tests were used to assess the relation between demographic variables and predictor variables (i.e., AUC and SSRT). Age was significantly correlated with AUC for the delayed amount of $100 ($r = .17, p = .021$) and SSRT ($r = -.17, p = .028$), showing that older individuals had larger AUCs and shorter SSRTs compared to younger individuals. The delayed amount of $1,000 was not significantly correlated with age ($r = .13, p = .084$). Subjective economic status was significantly positively correlated with SSRT ($r = .38, p < .001$) but it was not correlated with AUC for delayed amount $100 (r = .04, p = .557) or $1,000 (r = -.01, p = .869). Thus, individuals with poor behavioral inhibition were likely to rank themselves highly in subjective economic status. SSRT was significantly different across level of education, $F[2, 96.9] = 82.13, p < .001$. That is, individuals with a master’s and/or bachelor’s degree took significantly longer to inhibit their response compared with individuals without those degrees. There was no significant difference in AUC across levels of education for the delayed amount of $100, F[2, 75.3] = 1.04, p = .358 and $1,000, F[2, 76.9] = 0.84, p = .417. SSRT was significantly different across marital status, $t[73.4] = -6.44, p < .001, d = -1.13$, in that unmarried participants had better response inhibition (shorter SSRTs) compared to married participants.
Interestingly there was a significant difference in AUC for the delayed amount of $1,000 across religious affiliation, $F[5, 181] = 2.50, p = .033$, specifically people who self-identified as Christian discounted future rewards significantly less than people who identified as Catholic. SSRT and AUC for the delayed amount of $100 did not significantly differ across religious affiliation. There was no significant difference in SSRT nor AUC across groups for gender, political affiliation, or sexual orientation.

**Preliminary Analysis**

Once data were reviewed for skewness, kurtosis, and missing data, continuous demographic variables were examined for inclusion as covariates in the multiple regression analysis using a nonparametric Spearman’s Rho correlation matrix (see Table 2 for descriptive statistics). Age was significantly positively correlated with SEE, specifically Empathic Perspective-Taking ($r = .16, p = .012$) and Empathic Feeling and Expression ($r = .22, p = .004$). The MacArthur Subjective Economic Status was also significantly negatively correlated with Acceptance of Cultural Differences ($r = -.39, p < .001$), Empathic Perspective-Taking ($r = -.18, p = .016$), and Empathic Feeling and Expression ($r = -.18, p = .014$). However, Subjective Economic Status was positively related to unawareness of Blatant Racial Issues ($r = .17, p = .021$), and Institutional Discrimination ($r = .29, p < .001$).

Categorical demographic variables were examined for inclusion using One-Way ANOVA and independent sample $t$ tests. Some demographic variables were collapsed across levels due to small cell sizes (see demographics details in Table 3). An
Table 2

Descriptive Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>Median</th>
<th>Poss. Range</th>
<th>Act. Range</th>
<th>Skewness</th>
<th>SE</th>
<th>Kurtosis</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>39</td>
<td>12.5</td>
<td>36</td>
<td>18+</td>
<td>18 – 73</td>
<td>0.59</td>
<td>0.18</td>
<td>-0.67</td>
<td>0.35</td>
</tr>
<tr>
<td>MacArthur</td>
<td>6.58</td>
<td>2.32</td>
<td>7</td>
<td>1 – 10</td>
<td>1 – 10</td>
<td>-0.38</td>
<td>0.18</td>
<td>-0.57</td>
<td>0.35</td>
</tr>
<tr>
<td>DD100 AUC</td>
<td>.36</td>
<td>.33</td>
<td>.29</td>
<td>.01 – 1.0</td>
<td>.01 – .99</td>
<td>0.51</td>
<td>0.18</td>
<td>-1.13</td>
<td>0.35</td>
</tr>
<tr>
<td>DD1,000 AUC</td>
<td>.40</td>
<td>.34</td>
<td>.35</td>
<td>.01 – 1.0</td>
<td>.01 – .99</td>
<td>0.42</td>
<td>0.18</td>
<td>-1.25</td>
<td>0.35</td>
</tr>
<tr>
<td>SSRT</td>
<td>511</td>
<td>270</td>
<td>489</td>
<td>50 – 1250</td>
<td>120 – 1175</td>
<td>0.90</td>
<td>0.19</td>
<td>0.25</td>
<td>0.38</td>
</tr>
<tr>
<td>CoBRAS</td>
<td>67</td>
<td>13.4</td>
<td>70</td>
<td>20 – 120</td>
<td>23 – 100</td>
<td>-1.40</td>
<td>0.18</td>
<td>2.62</td>
<td>0.35</td>
</tr>
<tr>
<td>BR</td>
<td>19.1</td>
<td>5.06</td>
<td>20</td>
<td>6 – 36</td>
<td>6 – 33</td>
<td>-1.03</td>
<td>0.18</td>
<td>1.27</td>
<td>0.35</td>
</tr>
<tr>
<td>ID</td>
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<td>6.03</td>
<td>30</td>
<td>7 – 42</td>
<td>10 – 37</td>
<td>-1.26</td>
<td>0.18</td>
<td>1.16</td>
<td>0.35</td>
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<tr>
<td>RP</td>
<td>19.7</td>
<td>6.44</td>
<td>19</td>
<td>7 – 42</td>
<td>7 – 39</td>
<td>0.87</td>
<td>0.18</td>
<td>0.87</td>
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</tr>
<tr>
<td>SEE</td>
<td>94.4</td>
<td>13.7</td>
<td>89</td>
<td>31 – 185</td>
<td>42 – 137</td>
<td>0.85</td>
<td>0.18</td>
<td>1.52</td>
<td>0.35</td>
</tr>
<tr>
<td>ACD</td>
<td>16.7</td>
<td>6.76</td>
<td>14</td>
<td>5 – 30</td>
<td>5 – 30</td>
<td>0.52</td>
<td>0.18</td>
<td>-0.95</td>
<td>0.35</td>
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<td>EPT</td>
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<td>4.32</td>
<td>4.32</td>
<td>7 – 42</td>
<td>10 – 36</td>
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<td>8.24</td>
<td>52</td>
<td>15 – 90</td>
<td>18 – 72</td>
<td>-0.76</td>
<td>0.18</td>
<td>2.57</td>
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<td>EA</td>
<td>12.8</td>
<td>3.13</td>
<td>15</td>
<td>4 – 24</td>
<td>4 – 24</td>
<td>-1.23</td>
<td>0.18</td>
<td>1.96</td>
<td>0.35</td>
</tr>
</tbody>
</table>

Note. Descriptive statistics for all continuous variables.


* p < .05. ** p < .01. *** p < .001.

Independent sample t test showed that across Marital Status, married and single participants had significantly different means for SEE, specifically Acceptance of Cultural Differences, $t[46.1] = 5.32, p < .001; d = 1.05$, and for CoBRAS specifically for Blatant Racial Issues, $t[37.1] = -2.83, p = .007; d = -0.63$, and Institutional Discrimination, $t[186] = -3.716, p < .001; d = -0.79$. Single participants were significantly more accepting of cultural differences ($M = 21.79, SD = 6.72$) than participants who were married or dating ($M = 15.11, SD = 5.99$). Individuals that were single also had lower scores of unawareness of Blatant Racial Issues ($M = 16.15, SD = 7.44$) and Institutional
## Table 3

**Demographic Characteristics ($N = 187$)**

<table>
<thead>
<tr>
<th>Demographics</th>
<th>$n$</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
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<td></td>
</tr>
<tr>
<td>Female</td>
<td>82</td>
<td>43.9</td>
</tr>
<tr>
<td>Male</td>
<td>104</td>
<td>55.6</td>
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<tr>
<td>Non-binary</td>
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<td>0.5</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
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<td></td>
</tr>
<tr>
<td>Single</td>
<td>29</td>
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<tr>
<td>Married/partnered</td>
<td>144</td>
<td>77</td>
</tr>
<tr>
<td>Divorced/widowed</td>
<td>8</td>
<td>4.3</td>
</tr>
<tr>
<td>Dating</td>
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<td>2.7</td>
</tr>
<tr>
<td><strong>Educational level</strong></td>
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<td>High school diploma</td>
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<td>Some college</td>
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<td>Associate’s degree</td>
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<td>3.7</td>
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<td>Bachelor’s degree</td>
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<td>Master’s degree</td>
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<td>30.5</td>
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<td><strong>Religion</strong></td>
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<td>Catholic</td>
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<tr>
<td>Christianity</td>
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<td>Hinduism</td>
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<td>2.1</td>
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<td>Spiritualism</td>
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<td>Agnostic</td>
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<td><strong>Political affiliation</strong></td>
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<td>Democratic</td>
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<td>12.3</td>
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<tr>
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*Subjective Economic Status*
Discrimination ($M = 24.35, SD = 7.50$) subscales compared to participants that were in a relationship ($M = 19.87, SD = 3.80$; $M = 29.37, SD = 4.87$). In preparation for the ANOVA, Education was collapsed into three groups: (a) master’s degree, (b) bachelor’s degree and (c) associate degree, some college, vocational training, high school diploma and some high school. No participants reported having a degree higher than a Masters. Scores significantly differed across education level for Acceptance of Cultural Differences, $F[2, 77] = 44.53, p < .001$, Empathic Perspective-Taking, $F[2, 68] = 4.20, p < .019$, Blatant Racial Issues, $F[2, 62] = 4.63, p < .013$, and Institutional Discrimination, $F[2, 66] = 17.02, p < .001$. Individuals with a master’s and bachelor’s degree were less accepting and empathetic towards cultural difference compared to those without a higher-level degree. Interestingly, institutional discrimination scores increased with level of degree, meaning individuals without a higher-level degree had the lowest scores of unawareness of Institutional Discrimination (meaning the greatest “awareness of the implications institutional discrimination” Neville et al., 2000, p. 63) compared to those with a Master’s or Bachelor’s. No significant differences were found for sexual orientation or gender across all the outcomes.

Individuals in the Other religious groups ($M = 13.72, SD = 7.57$) had less unawareness of Blatant Racial Issues compared to Catholics ($M = 20.33, SD = 3.25$) and Christians ($M = 20.47, SD = 3$). Similarly, individuals who identified as Catholic and Christian also had higher scores for Institutional Discrimination and Racial Privilege compared to the other religious groups. Although religion had significant relations with racial bias, the cell size of the religious groups would decrease robustness due to heterogeneity of variance (Howell, 2012). In other words, the variance of the small cell does not equal the population’s variance and thus, religion was not included in any of the multiple regression models.

Interesting differences were found across political affiliation and racial bias. Political affiliation significantly influenced scores across Empathic Perspective-Taking, $t[56.2] = -2.072, p = .044; d = -0.43$, Empathetic Awareness, $t[40.3] = 2.49, p < .017; d = 0.53$, Blatant Racial Issues, $t[51] = -3.11, p = .003; d = -0.59$, and Racial Privilege, $t[41.5] = -4.20, p < .001; d = -0.88$. Democrats ($M = 20.50, SD = 3.98$) had lower scores in Empathic Perspective-Taking compared to Republicans ($M = 22.47, SD = 5.19$). In contrast, Democrats ($M = 4.76, SD = 0.96$) had more Empathic Awareness compared to Republicans ($M = 4.09, SD = 1.48$). Republicans had higher scores on unawareness of Blatant Racial Issues ($M = 21.47, SD = 4.62$) and Racial Privilege ($M = 24.32, SD = 7.58$) compared to Democrats ($M = 18.71, SD = 4.69; M = 18.53, SD = 5.39$).

A correlation matrix for the main study variables is shown in Table 4. AUC for both delayed amounts was not significantly correlated with any of the other main variables. Within the CoBRAS measure, SSRT was significantly positively correlated
Table 4

Spearman Rho Correlations Between Study Variables

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<th>3</th>
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<td>.70***</td>
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<td>.27***</td>
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<td>.39***</td>
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Note. M and SD are used to represent mean and standard deviation, respectively.

* Area Under Curve


* p < .05. ** p < .01. *** p < .001.
with unawareness of Blatant Racial Issues \( (r = .22, p = .006) \) and Institutional Discrimination \( (r = .34, p < .001) \). This indicates that individuals that take longer to inhibit their response also had higher degrees of unawareness of Blatant Racial Issues and Institutional Discrimination than those with shorter SSRTs. In addition, SSRT was significantly negatively correlated with Acceptance of Cultural Differences \( (r = -.52, p < .001) \) and Empathic Perspective-Taking \( (r = -.26, p < .001) \). Thus, participants that took longer to inhibit their response also had lower degrees of Acceptance of Cultural Differences and Empathic Perspective-Taking.

**Multiple Regression Analysis**

The relations between delay discounting (i.e., AUC), behavior inhibition (i.e., SSRT), and racial bias (i.e., CoBRAS and SEE) were examined in 187 participants (see Table 3 for sample demographics), using a multiple regression analysis. There were various multiple regressions that were conducted to analyze the data. The fit of each model was assessed with Akaike Information Criterion (AIC), which is a common method used to compare the adequacy of multiple models (Akaike, 1973). AIC measures Kullback-Libeler divergence which is the difference between the tested model and the “true model.” In this section two main dimensions of the linear regressions were reported for each outcome: (a) the initial linear model with only two main predictors (i.e., AUC and SSRT) and (b) the overall linear model that controls for covariation and had the lowest AIC (i.e., difference from true model). First, the models for the total scores for each racial bias measure (i.e., CoBRAS and SEE) are discussed. Second, the models for
each of the subscales within the racial bias measures are analyzed. As a reference all model outcomes include a Cohen’s $d$ effect size.

**CoBRAS Total Scores**

The two linear regression models for the CoBRAS total scores contained conflicting results. The CoBRAS total scores model was statistically significant, $R^2 = .06$, $F[2, 148] = 4.71, p = .010; d = 0.51; AIC = 1228$. AUC $1,000$ was not a significant predictor ($\beta = -1.62$, $b = -0.05$, $SE = 3.32$, $p = .510$) for CoBRAS total scores. However, SSRT ($\beta = 0.01$, $b = 0.24$, $SE = 0.004$, $p = .003$), was a significant predictor of CoBRAS total scores in the initial model, meaning that individuals with longer SSRTs (i.e., lower behavioral inhibition) also had higher total CoBRAS scores (i.e., greater racial bias) compared to those with shorter SSRTs. More specifically, for every standard deviation increase in SSRT ($SD = 274$ ms) there was a 0.24 increase in CoBRAS total score.

When covariates—marital status and political affiliation—were added to the overall model predicting CoBRAS total score, the overall model was highly significant, $R^2 = .39$ $F[4, 128] = 20.4, p < .001; d = 1.60; AIC = 998$. However, SSRT ($\beta = 5.15e-4$, $b = 0.01$, $SE = 0.003$, $p = .079$) and AUC $1,000$ ($\beta = -5.39$, $b = -0.15$, $SE = 2.57$, $p = .082$) were not significant predictors of CoBRAS total scores. Instead, political affiliation ($\beta = 9.06$, $b = 0.73$, $SE = 2.51$, $p < .001$) and marital status ($\beta = 8.79$, $b = 0.70$ $SE = 2.50$, $p < .001$) were significant covariates for total CoBRAS scores. Participants affiliated with the Republican party had higher scores of racial colorblindness compared to Democrats. Married participants scored higher in racial colorblindness compared to single participants.
SEE Total Scores

The models for the SEE total scores had similar results in the predictive value of SSRT. The initial SEE total score model, with AUC and SSRT as predictors, was significant, $R^2 = .169, F[2, 148] = 15.1, p < .001; d = 0.90; AIC = 1197$. However, AUC $\$1,000 (\beta = -0.70, b = -0.02, SE = 2.99, p = .595)$ did not predict SEE total scores. Interestingly, SSRT ($\beta = -0.02, b = -0.39, SE = 0.004, p < .001$) was a significant predictor of SEE total scores. For every standard deviation increase of SSRT, there was a 0.41 decrease in SEE. In the overall model for SEE total scores, subjective economic status, age, and education were included as covariates The overall model was significant, $R^2 = .29, F[6, 144] = 10.6, p < .001; d = 1.28; AIC = 1178$. AUC $\$1,000 (\beta = -0.16, b = -0.004, SE = 2.77, p = .955)$ did not predict SEE total scores. SSRT continued to significantly predict SEE scores ($\beta = -0.01, b = -0.21, SE = 0.004, p = .006$), meaning that individuals that took longer to inhibit their responses had lower ethnocultural empathy compared to those that could inhibit their responses faster. Age ($\beta = 0.17, b = 0.15, SE = 0.08, p = .042$) and education were the only other significant covariates in the overall model. Older individuals had a greater likelihood of scoring high on ethnocultural empathy compared to younger individuals. Participants with bachelor’s ($\beta = -9.55, b = -0.74, SE = 3.35, p = .003$) and/or master’s degrees ($\beta = -10.44, b = -0.77, SE = 3.33, p = .002$) were more likely to have lower ethnocultural empathy compared to individuals without those degrees. Subjective economic status ($\beta = -0.85, b = -0.14, SE = 0.47, p = .118$) was not a significant covariate.
CoBRAS Subscale Scores

Multiple linear regressions were also conducted for each of the CoBRAS subscales, Blatant Racial Issues, Institutional Discrimination, and Racial Privilege. The initial model for Blatant Racial Issues was significant, $R^2 = .07$, $F[2, 142] = 5.68$, $p = .004$; $d = 0.56$; $AIC = 930$. The results indicated that SSRT ($\beta = 0.005$, $b = 0.28$, $SE = 0.002$, $p = .001$) was a significant predictor of Blatant Racial Issues. Individuals that had longer SSRTs were more likely to score higher on unawareness of Blatant Racial Issues. However, AUC $\$1,000$ ($\beta = -0.06$, $b = -0.004$, $SE = 2.23$, $p = .363$) was not a significant predictor for Blatant Racial Issues. The overall linear regression on Blatant Racial Issues had SSRT set as a predictor and age, education, and political affiliation set as covariates. The overall model, $R^2 = .24$, $F[6, 138] = 7.05$, $p < .001$; $d = 1.12$; $AIC = 851$, was significant and SSRT ($\beta = 0.003$, $b = 0.17$, $SE = 0.001$, $p = .041$) predicted unawareness of Blatant Racial Issues, meaning individuals that took longer to inhibit their response also had higher scores of unawareness to Blatant Racial Issues compared to those that took less time. AUC $\$1,000$ ($\beta = -2.23$, $b = -0.06$, $SE = 2.02$, $p = .271$) was not a significant predictor of Blatant Racial Issues. Education and political affiliation were significant covariates for Blatant Racial Issues. Individuals with master’s ($\beta = 5.48$, $b = 1.13$, $SE = 1.31$, $p < .001$) and bachelor’s ($\beta = -3.97$, $b = 0.75$, $SE = 1.29$, $p = .003$) degrees had significantly higher scores of unawareness of Blatant Racial Issues than those without said degrees. Also, Democrats ($\beta = 3.70$ $b = 0.76$, $SE = 1.01$, $p < .001$) had significantly lower scores of unawareness of Blatant Racial Issues compared to Republicans.
The initial model for Institutional Discrimination was significant, $R^2 = .19$, $F[2, 154] = 11.7, p < .001; d = 0.97; AIC = 1004$. The results indicated that SSRT ($\beta = 0.01, b = 0.41, SE = 0.001, p < .001$) was a significant predictor of Institutional Discrimination such that individuals that had longer SSRTs were more likely to score higher in unawareness to Institutional Discrimination. However, AUC $1,000$ ($\beta = -0.96 b = -0.03, SE = 1.36, p = .472$) was not a significant predictor for Institutional Discrimination. The overall model for Institutional Discrimination had AUC and SSRT as predictors and age, education, marital status, subjective economic status, and political affiliation as covariates. The overall model for Institutional Discrimination was significant, $R^2 = .38$, $F[7, 130] = 8.92, p < .001; d = 1.56; AIC = 836$. AUC $1,000$ ($\beta = -1.01, b = 0.06, SE = 1.24, p = .419$) was not significant. SSRT ($\beta = .004, b = 0.20, SE = 0.002, p = .018$) was a significant predictor; those that took longer to inhibit their response had higher unawareness of Institutional Discrimination than those that took less time. Marital status, education, political affiliation, and age were all significant covariates. Married individuals ($\beta = 4.08, b = 0.87, SE = 1.33, p = .003$) had significantly higher scores of unawareness of Institutional Discrimination compared to individuals that were single. Individuals with master’s degrees had significantly higher scores of Institutional Discrimination compared to individuals with a bachelor’s degree ($\beta = -1.90, b = -0.28, SE = 0.87, p = .034$) and individuals that did not have master’s or bachelor’s degrees ($\beta = 4.29, b = -0.63, SE = 1.70, p = .013$). Democrats had significantly lower scores of unawareness of Institutional Discrimination compared to Republicans ($\beta = 2.38, b = 0.51, SE = 1.11, p = .035$). Last, older participants were more likely to score higher in
unawareness of Institutional Discrimination compared to their younger counterparts ($\beta = -0.08$, $b = -0.08$, $SE = 0.03$, $p = .014$). The only covariate that was not significant in this model was subjective economic status ($\beta = 0.27$, $b = 0.27$, $SE = 0.20$, $p = .191$).

The last initial model of CoBRAS subscale was Racial Privilege, and it was not significant, $R^2 = .01$, $F[3, 154] = 0.67$, $p = .571$; $d = .201$; $AIC = 1050$. In the overall model political affiliation was set as a covariate. The overall model was significant $R^2 = .13$, $F[4, 140] = 5.25$, $p < .001$; $d = 0.97$; $AIC = 941$. AUC $\beta = 1.20$, $b = -0.02$, $SE = 2.75$, $p = .665$) was not a significant predictor. SSRT ($\beta = -1.87e-5$, $b = -0.008$, $SE = 0.002$, $p = .932$) was also not a significant predictor of Racial Privilege. Political affiliation was a significant covariate. Democrats had significantly more awareness of Racial Privilege compared to Republicans ($\beta = 5.04$, $b = 0.98$, $SE = 1.30$, $p < .001$).

**SEE Subscale Scores**

The initial model for Acceptance of Cultural Differences was significant, $R^2 = .26$, $F[2, 155] = 27.1$, $p < .001$; $d = 1.19$; $AIC = 1019$. AUC $\beta = 0.13$, $b = 0.01$, $SE = 2.62$, $p = .227$) did not significantly predict Acceptance of Cultural Differences. SSRT ($\beta = -0.01$, $b = -0.51$, $SE = .001$, $p < .002$) significantly predicted Acceptance of Cultural Difference meaning that individuals that took longer to stop their response had lower scores compared to individuals that inhibited their response faster. Specifically, for every standard deviation increase in SSRT, there was a 0.50 decrease in Acceptance of Cultural Differences. In the overall model for Acceptance of Cultural Differences, SSRT and AUC were set as predictors and education and marital status as covariates, $R^2 = .38$, $F[5, 144] = 14.9$, $p < .001$; $d = 1.57$; $AIC = 942$. Like the initial model, SSRT ($\beta = -0.007$, $b = -0.007$, $SE = 0.001$, $p < .002$) significantly predicted Acceptance of Cultural Difference.
$b = -0.30, \ SE = .001, p < .001$) significantly predicted Acceptance of Cultural Difference. AUC $1,000 (\ \beta = 0.61, \ b = -0.03, \ SE = 2.48, \ p = .500)$ did not significantly predict Acceptance of Cultural Differences. Marital status and education were significant covariates. Single ($\beta = -3.61, \ b = -0.55, \ SE = 1.43, \ p = .012$) individuals had significantly higher scores on Acceptance of Cultural Differences compared to individuals who were married. Also, individuals with a master’s ($\beta = 6.17, \ b = -0.91, \ SE = 1.80, \ p < .001$) or a bachelor’s degree ($\beta = 5.08, \ b = -0.74, \ SE = 1.72, \ p = .004$) had significantly lower scores of Acceptance of Cultural Differences compared to those without degrees.

The initial model for Empathic Perspective Taking with AUC and SSRT as predictors was significant, $R^2 = .07, F[2, 155] = 6.42, p < .001; d = 0.54; AIC = 903$. AUC $1,000 (\ \beta = 0.17, \ b = -0.01, \ SE = 1.83, \ p = .927)$ was not a significant predictor. However, SSRT ($\beta = -0.004, \ b = -0.28, \ SE = .001, \ p < .001$) was a significant predictor for Empathic Perspective Taking, as individuals with longer SSRTs had lower scores compared to those with shorter SSRTs. The overall model for Empathic Perspective Taking included SSRT and AUC as predictors and political affiliation, age, and subjective economic status as covariates, $R^2 = .11, F[5, 140] = 4.31, p = .003; d = 0.70; AIC = 845$. Similar to previous models, AUC $1,000 was not a significant predictor, $\beta = -0.81 \ b = -0.07, \ SE = 1.03, \ p = .631$. SSRT ($\beta = -0.003, \ b = -0.20, \ SE = .001, \ p = .016$) was a significant predictor, meaning that individuals that had longer SSRTs scored lower on Empathic Perspective Taking compared to those that had shorter SSRTs. Political affiliation ($\beta = 2.31, \ b = -.54, \ SE = 0.94, \ p = .015$) was also a significant predictor; Democrats had significantly higher scores of Empathic Perspective Taking compared to
Republicans. Subjective economic status ($\beta = -0.11$, $b = -0.06$, $SE = 0.16$, $p = 0.475$) and age ($\beta = 0.05$, $b = 0.15$, $SE = 0.02$, $p = 0.075$) were not significant predictors.

The SEE subscales Empathic Feeling and Expressions and Empathic Awareness were not significantly correlated with SSRT and AUC. The initial model for Empathic Feeling and Expression, $R^2 = 0.008$, $F[3, 154] = 0.46$, $p = 0.709$; $d = 0.21$; $AIC = 1130$, was not significant. However, the overall model, $R^2 = 0.08$, $F[5, 152] = 2.67$, $p = 0.024$; $d = 0.59$; $AIC = 1101$ that included age and subjective economic status as covariates was significant. Age ($\beta = 0.12$, $b = 0.18$, $SE = 0.05$, $p = 0.016$) and subjective economic status ($\beta = -0.61$, $b = -0.12$, $SE = 0.29$, $p = 0.034$) were both significant covariates. Older individuals had higher scores in Empathic Feeling and Expression compared to younger participants. Individuals with higher subjective economic status had lower scores of Empathic Feeling and Expression compared to those with lower economic status. Both the initial model, $R^2 = 0.002$, $F[3, 154] = 0.121$, $p = 0.948$; $d = 0.09$; $AIC = 493$, and the overall model, $R^2 = 0.02$, $F[4, 140] = 0.86$, $p = 0.488$; $d = 0.29$, for Empathic Awareness were not significant.

Post Hoc Analysis

To examine whether the unsystematic AUC data masked significant results, a post hoc analysis was conducted only using data that met Johnson and Bickel’s (2008) systematic data criteria for the delayed amount of $1,000. AUC and SSRT were significantly negatively correlated, $r = -0.29$, $p = 0.020$; that is, individuals who took longer to inhibit their responses had smaller AUCs, which means they discounted the delayed
reward more steeply, than those with better behavioral inhibition. None of the SEE scales were significantly correlated with AUC nor were they significant predictors of AUC. However, AUC was significantly correlated with Unawareness of Institutional Discrimination, \( r = -.27, p = .027 \); that is, participants who had high AUCs were more aware of Institutional Discrimination compared to those with lower AUC. SSRT significantly predicted the same subscales in the SEE and CoBRAS as previously reported.
CHAPTER V
DISCUSSION

Results of this study supported the hypothesis that participants who took longer to inhibit their response would score higher in colorblindness and lower in ethnocultural empathy relative to those that inhibited their responses more quickly. The hypothesis that steep delay-discounting would predict racial bias was generally not supported. Findings provide insight on the potential relation between impulsivity and racial bias. Although response inhibition and delay discounting did not predict total CoBRAS scores when covariates were included, there were some significant relations across subscales. As expected, response inhibition significantly predicted unawareness of Blatant Racial Issues and Institutional Discrimination, meaning individuals who took longer to stop their response had higher scores of unawareness of Blatant Racial Issues and Institutional Discrimination. The ability to inhibit one’s response was a significant predictor for overall scores of ethnocultural empathy (i.e., SEE). Within the SEE subscales, response inhibition significantly predicted Empathetic Perspective-Taking and Acceptance of Cultural Difference in the overall models, meaning that individuals that took longer to stop their response had lower scores in both subscales. Although the results did not completely support the hypothesis, there was a significant relation between response inhibition and dimensions of colorblindness and ethnocultural empathy. Results of this study also show discriminative validity across the two facets of impulsivity (i.e., delay discounting and response inhibition), given that delay discounting was only significantly related to Institutional Discrimination. Only systematic delay discounting was
significantly correlated with unawareness of Institutional Discrimination. Response inhibition was related to subscales in both racial bias measures.

**Response Inhibition**

Individuals with adept response inhibition held less racial bias compared to those with poor response inhibition. Participants with poor response inhibition held stronger colorblind bias, meaning that those participants either ignore or are unaware of the experiences of racialized minorities. This bias results in higher scores of unawareness of blatant racial issues, as well as institutional racism, in CoBRAS.

Self-regulation of behavior is necessary to address preexisting automatic stereotypes that drive racial bias (Mathur et al., 2014; Monteith et al., 2002). Monteith et al. found that individuals that had low prejudice also engaged in behavior inhibition after being informed of their own negative arousal towards Black faces. That is, individuals showed a pause in responding to the task when they had received feedback on their negative state of arousal. The brief pause is thought to be a result of the behavior inhibition system (BIS; Fowles, 1980). BIS is a neuropsychological system that regulates responses to cues (e.g., stereotype to skin color) that can lead to punishment or a non-rewarding consequence. It is likely that participants with more proficient response inhibition scored lower on racial bias measures than participants with lower response inhibition because they were better able to recognize and interrupt automatic racial biases. Thus, it may be that the BIS is an integral part of the process of addressing an individual’s racial biases, as it links the racially prejudiced behavior to an adverse
consequence (e.g., negative feedback regarding behavior; Monteith et al., 2002). Individuals who have experienced negative consequences for their racially prejudiced behavior develop the response to consequence relation (i.e., BIS). As the present study shows it is also possible that people who have stronger response inhibition in general may also have an advantage of controlling or reflecting on their own biases.

With the support of these findings, interventions and training used to reduce racial bias should consider the effects of improving response inhibition. Prejudice reduction strategies conducted in university setting such as Face-to-Face Intergroup Contact (Lowe, 2021), Interpersonal Conversations (Broockman & Kalla, 2016), and Social Media Sanctioning (Munger, 2017) have been shown to effectively reduce prejudice and bias (see meta-analysis by Paluck et al., 2020). All these interventions set the occasion for individuals to engage in a biased or prejudiced behavior and then receive feedback or information as to why their behavior was biased. This contingency is the exact paradigm needed to develop BIS for automatic biases. Alternatively, there are cognitive trainings designed to improve inhibitory control through regular practice on tasks that require inhibitory control (Allom et al., 2016). The go/no-go training paradigm has been shown to improve response inhibition and reduce instances of engaging in a maladaptive behavior (e.g., consumption of alcohol; Houben et al., 2011). Thus, researchers should consider the combination of prejudice reduction strategies and inhibition improvement training to interrupt automatic bias and reduce racially biased behavior.
Delay Discounting

The overall findings do not support a relation between delay discounting and racial bias. One potential explanation is how the monetary rewards were used in the delay discounting task in the present study. Perhaps if the delay discounting task measured decision making based on the strength of an interpersonal relationship, rather than delay, it would be related to racial bias. The closest measure to this is social discounting, which measures how much money an individual is willing to forgo for people at different levels of social distance (Jones & Rachlin, 2009), for example, the amount of money an individual is willing to forgo to give it to their number 1 person (e.g., mom) compared to number 10 or 100. Social discounting is a function of the relation between the individuals and other group members and examines social distance instead of delays. Saini and Vance (2020) advocate for the use of social discounting to examine ethical self-control, which is deciding between acting on individual operant contingencies or engaging with group cultural contingencies (Tourinho, 2013). A group that reinforces negative racial biases may require group members to avoid multicultural experiences that could be an individual preference (e.g., art, movies, fashion, music created by or are about racial minorities). For example, an individual who lives in a conservative neighborhood and has friends who identify with radical conservative organizations may encounter punishment from their social group for indulging in salsa or hip-hop (i.e., known BIPOC music). Future research might consider using social discounting measures to examine racial constructs such as ethical self-control.

A limitation of data quality for the delay discounting task was that more than half
the sample did not pass both of Johnson and Bickel’s (2008) criteria for both monetary amounts. Due to the restricted control experimenters have over participants recruited from crowdsourcing websites (e.g., Amazon Mechanical Turk), Craft et al. (2022) advises researchers to become comfortable with the removal of a larger portion of data. Craft et al. (2022) compared poor-quality data from Craft et al. (2021) to random computer-generated delay discounting data and found the two data sets were not significantly different, thus justifying the use of the Johnson and Bickel criteria. Another reason why so much of the delay discounting data were not systematic may be due to the current economic climate. Inflation can lead to higher rates of discounting (Critchfield & Kollins, 2001; Matta et al., 2012; Rachlin et al., 1991; Ruggeri et al., 2022) and data collection for the present study occurred in September 2022 when inflation was up by 8% (Bureau of Labor Statistics, n.d.). Inflation can cause higher rates of discounting, which could lead to restriction of range and reduce the ability to detect significant relations between variables.

The present study did not find significant correlations between delay discounting and bias, but prior research has demonstrated that other forms of bias have been reduced (i.e., present bias) through interventions designed to reduce delay discounting. Specifically, episodic future thinking is used to reduce delay discounting (i.e., a form of temporal bias; Rosenbaum et al., 2022; Rung & Madden, 2019). Temporal bias refers to people’s tendency to perceive events in the distant future as more abstract and present or near future events as less abstract and more tangible. Researchers conducted a study with academics and found that decisions about distant future events were more likely to induce
discrimination against racial minorities and women compared to decision on events in the near future (Milkman et al., 2012). In Milkman et al., more than 6,000 professors were sent an email from a prospective doctoral student (names signaled gender and race) requesting a meeting that day or in one week. Emails with White male names were 26% more likely than those with names of women and racial minorities to gain access to faculty when requests for a meeting were in one week. The bias against women and minorities were not present when meetings were requested the same day the email was sent. These findings may demonstrate a potential link between temporal contingencies or constraints that may affect the expression of racial bias.

**Education and Age**

Some of the findings require further discussion. For example, level of education was positively correlated with racial colorblindness, specifically unawareness of Blatant Racism and Institutional Discrimination. That is individuals with higher degrees (i.e., master’s and bachelor’s degree) were less aware of Blatant Racial Issues and Institutional Discrimination compared to individuals with less education (i.e., Associates, high school diploma, trade school). The directionality of relation for racial colorblindness is mixed; some have reported higher education being negatively (C. Hughes et al., 2016), positively correlated (Peters et al., 2016), or having no relation (Ludwig et al., 2022) with racial colorblindness. The positive relationship between education and racial bias in the present study could be accounted for by power evasion, an underlying framework of colorblindness (Bonilla-Silvia, 2006). Power evasion is the denial and downplay of
institutional racism. Adopting this ideology benefits White people because it masks the economic and societal advantages they enjoy (Yi et al., 2010). Thus, for the present findings it would make sense that Whites that have attained higher levels of education would avoid the possibility that their accomplishments were not just achieved by their own merit, but also the advantages they are afforded for being White in a White dominated society.

In the published literature the relation between education and racial bias is mixed. In one study education was not a significant factor in White implicit racial bias (using the implicit attitudes test; Gonsalkorale et al., 2009). Kuppen and Spears (2014), however, found that more highly educated White people were significantly more likely to be aversive racists, meaning that they would score high on automatic implicit bias but low on deliberate explicit bias. In the present study participants with higher education had high levels of implicit colorblind attitudes. Wodtke (2018) reports that although education can contribute to a change in the understanding of racial structures, it may not have a meaningful effect across racial attitudes.

In the present study, age and SSRT were negatively correlated. This finding does not align with many previous findings that report a positive correlation between SSRT and age (e.g., Kleerekoper et al., 2016; Van de Laar et al., 2011). For instance, Coxon et al. (2012) found that older adults needed more time to inhibit their responses, which was attributed to neurological decline. In the study they had adequate group sizes for younger and older adults ranging from 20 to 81 years of age. The present study was not designed to examine differences in SSRT across age; therefore, the present findings may not be
representative of the population variance across age.

Effect Sizes

It is worth noting the differences in the magnitude of the effect sizes across models. Cohen’s $d$ is categorized into three levels, small ($d = 0.20$), medium ($d = 0.50$), and large ($d \geq 0.80$). In the models where only AUC and SSRT were included, the effect sizes were notable. Specifically, the CoBRAS total model had a medium effect size in the initial model and the SEE total initial model had a large effect size. Both models were driven by SSRT and not AUC. When covariates were added, the effect sizes were both large (CoBRAS $d = 1.60$; SEE $d = 1.28$) signaling the importance of contextual variables in predicting CoBRAS and SEE. However, it is also important to note the original effect sizes are also meaningful. This pattern of effect sizes was also observed in the subscale analyses.

Of the COBRAS’ three subscales, two showed medium (Unawareness of Blatant Racial Issues) and large (Unawareness of Institutional Discrimination) effect sizes in the initial model. When covariates were added, both effect sizes increased to large (Unawareness of Blatant Racial Issues, $d = 1.12$; Unawareness of Institutional Discrimination $d = 1.56$) These effect sizes suggest that SSRT is a practically significant predictor for Unawareness of Blatant Racial Issues and Institutional Discrimination. In the post hoc analysis delay discounting was correlated with Institutional Discrimination ($d = 0.56$) with a medium effect size. Therefore, delay discounting may be a practical significant predictor for Unawareness of Institutional Discrimination.
Of the SEE subscales, two out of four initial models had medium (Empathic Perspective Taking) and large (Acceptance of Cultural Differences) effect sizes. In both overall models (i.e., with covariates) the effect size increased (Empathic Perspective Taking, $d = .70$; Acceptance of Cultural Differences, $d = 1.57$). These effect sizes indicate the potential that SSRT is a practically significant predictor of Empathic Perspective Taking and Acceptance of Cultural Differences. Given the magnitude of effects for SSRT, future research should consider examining the directionality of causality for response inhibition and ethnocultural empathy.

**Limitations**

The present study had multiple limitations. The sample of the present study was recruited from Amazon Mechanical Turk. Researchers have been reporting since 2018 that Amazon Mturk data quality has declined due to international users on virtual servers set to U.S. locations (Kennedy et al., 2020) and/or the use of automated response methods (i.e., “bots”; Dreyfuss et al., 2018; Stokel-Walker, 2018). Therefore, some of the present findings may not reflect the general relation between racial bias and impulsivity. It may be that less robust relations may have been obscured by the noise in the data. In addition, because our sample only included White participants, the results may not generalize to other races. Another limitation was unequal cell size for demographic variables: the difference across certain demographic variables such as religion, marital status, and political affiliation may not be fully representative of the variability across those populations. Lastly, the total for CoBRAS and the SEE Empathic Perspective taking
score did not meet linearity assumptions, and when the variables were transformed it did not improve skewness and kurtosis.\(^1\)

Conclusion

In the present study the association between impulsivity and racial bias was examined. There was a significant relation between response inhibition and two dimension of racial bias, colorblindness and ethnocultural empathy. Future experimental studies should compare racial-bias outcomes following interventions that significantly improve response inhibition. If an experimental (causal) relation can be demonstrated, then this would support the incorporation of these interventions into effective programs that teach cultural competence and multiculturalism.

\(^1\)Consultation with Sarah Schwartz from Utah State University’s Psychology Statistics Studio advised to proceed with the multiple regression analysis despite the violation of the normality assumption.
REFERENCES


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APPENDICES
Appendix A

Informed Consent
Factors that influence decision making

Introduction

You are invited to participate in a research study conducted by Amy Odum, a professor in the Psychology Department at Utah State University. The purpose of this research is to understand the factors that are related to decision-making and inhibition which may include how questions are framed, the outcomes of decisions, and ethnicity/race. Your participation is entirely voluntary. This form includes detailed information on the research to help you decide whether to participate. Please read it carefully and ask any questions you have before you agree to participate.

Procedures

Your participation will involve completing several computer-based tasks. Each task will take 10-30 minutes, and you will be allowed to take short breaks between tasks. The entire study will take no longer than 60 minutes. For some tasks, we will present you with a series of choice questions. Generally, these questions will ask which of two hypothetical outcomes you would prefer. For example, a question may ask, “would you rather have $10 right now, or $45 in two weeks?” You may be asked to answer questions about money, and behavioral outcomes. We will also present you with a task where you are asked to quickly sort images and words into categories. We will also ask you to complete two Likert scale surveys on social attitudes. In this study you will complete a task that requires you to respond or withhold a response based on an auditory signal. Finally, you will answer some questions about personal information, such as your age, ethnicity, finances, and gender. Your responses will be kept completely anonymous and confidential and will only be used for the purposes of this study. We anticipate that 145 people will participate in this research study.

Risks

This is a minimal risk research study. That means that the risks of participating are no more likely or serious than those you encounter in everyday activities. The foreseeable risks or discomforts include possible loss of confidentiality. In order to minimize those risks and discomforts, the researchers will never connect the participants’ names with their data. Participants’ names will only appear on this informed consent form and in a record of who has participated, which is necessary to award compensation on Amazon Mechanical Turk. Electronic data files obtained from the computer tasks will be kept on a password-protected computer. Some participants may experience discomfort during the word association task that includes pictures of people. To minimize the risk of discomfort associated with answering personal questions, participants will never be required to answer any of the questions if they choose not to do so. If you have a bad research-related experience, please contact the principal investigator of this study right away at (435) 797-5578 or amy.odum@usu.edu.

Benefits

Although you will not directly benefit from this study, it has been designed to learn more about decision-making processes. We cannot guarantee that you will directly benefit from this study, but it has been designed to contribute to the future development of interventions to help people make more adaptive decisions.

Confidentiality
The researchers will make every effort to ensure that the information you provide as part of this study remains confidential. Your identity will not be revealed in any publications, presentations, or reports resulting from this research study. We will collect your information through your responses to computer-based questionnaires. These data will be securely stored on a password-protected computer, cloud-based storage, and/or in a locked filing cabinet in a locked room. This form will be kept for three years after the study is complete, and then it will be destroyed. It is unlikely, but possible, that others (Utah State University or state or federal officials) may require us to share the information you give us from the study to ensure that the research was conducted safely and appropriately. We will only share your information if law or policy requires us to do so.

**Voluntary Participation & Withdrawal**

Your participation in this research is completely voluntary. If you agree to participate now and change your mind later, you may withdraw at any time by closing your browser. We will not collect identifying information that will be associated with responses to the Qualtrics survey and computer-based activities. You may withdraw at any time during the study.

**Compensation**

For your participation in this research study, you will be compensated $7.00 from Amazon Mechanical Turk. You will receive these credits or compensation as long as you have completed any part of the study. You will not lose your credit or compensation if you choose to withdraw after beginning the study.

**IRB Review**

The Institutional Review Board (IRB) for the protection of human research participants at Utah State University has reviewed and approved this study. If you have questions about the research study itself, please contact the Principal Investigator at (435) 797-5578 or amy.odum@usu.edu. If you have questions about your rights or would simply like to speak with someone other than the research team about questions or concerns, please contact the IRB Director at (435) 797-0567 or irb@usu.edu.

Dr. Amy Odum  
Principal Investigator  
(435) 797-5578; amy.odum@usu.edu

Diana Perez  
Student Investigator  
Diana.perez@usu.edu

By signing below, you agree to participate in this study. You indicate that you understand the risks and benefits of participation, and that you know what you will be asked to do. You also agree that you have asked any questions you might have, and are clear on how to stop your participation in the study if you choose to do so. Please be sure to retain a copy of this form for your records.
Appendix B

Screening Survey
Screening Survey

1. What is your age in years?
   - Please specify: ________________
   - I prefer not to answer

2. Which categories describe you? Select all that apply to you:
   - American Indian or Alaska Native—For example, Navajo Nation, Blackfeet Tribe, Mayan, Aztec, Native Village of Barrow Inupiat Traditional Government, Nome Eskimo Community
   - Asian American—For example, Chinese, Filipino, Asian Indian, Vietnamese, Korean, Japanese
   - Black or African American—For example, Jamaican, Haitian, Nigerian, Ethiopian, Somalian
   - Hispanic, Latino or Spanish Origin—For example, Mexican or Mexican American, Puerto Rican, Cuban, Salvadoran, Dominican, Columbian
   - Middle Eastern or North African—For example, Lebanese, Iranian, Egyptian, Syrian, Moroccan, Algerian
   - Native Hawaiian or Other Pacific Islander—For example, Native Hawaiian, Samoan, Chamorro, Tongan, Fijian, Marshallese
   - White—For example, German, Irish, English, Italian, Polish, French
   - Another race, ethnicity, or origin, please specify: ________________
   - I prefer not to answer
Appendix C

Demographics Survey
Demographics Survey

1. How do you currently describe your gender identity?
   - Please specify (e.g., male, female, non-binary): ___________________
   - I prefer not to answer

2. Which categories describe you? Select all that apply to you:
   - Some high school
   - High school diploma or equivalent
   - Vocational training
   - Some college
   - Associate’s degree (e.g., AA, AE, AFA, AS, ASN)
   - Bachelor’s degree (e.g., BA, BBA BFA, BS)
   - Some post undergraduate work
   - Master’s degree (e.g., MA, MBA, MFA, MS, MSW)
   - Specialist degree (e.g., EdS)
   - Applied or professional doctorate degree (e.g., MD, DDC, DDS, JD, PharmD)
   - Doctorate degree (e.g., EdD, PhD)
   - Other, please specify: __________________

3. What is your religious affiliation?
   - Catholic
   - Christianity
   - The Church of Jesus Christ of Latter-day Saints
   - Islam
   - Hinduism
   - Buddhism
   - Atheist
   - Agnostic
   - Other, please specify: ____________

4. What is your political affiliation?
   - Democrat
   - Republican
   - Green Party
   - Libertarian
   - Independent
   - No affiliation
   - Other, please specify: ____________
5. Do you consider yourself to be:
   ❑ Heterosexual or straight
   ❑ Gay or lesbian
   ❑ Bisexual
   ❑ Fluid
   ❑ Pansexual
   ❑ Queer
   ❑ Demisexual
   ❑ Questioning
   ❑ Asexual
   ❑ Other, please specify: _______________________
   ❑ prefer not to answer

6. **Instructions:** Think of this ladder as representing where people stand in the **United States.** At the **top** of the ladder are the people who are the best off – those who have the most money, the most education, and the most respected jobs. At the **bottom** are the people who are the worst off – those who have the least money, least education, the least respected jobs, or no job. The higher up you are on this ladder, the closer you are to the people at the very top; the lower you are, the closer you are to the people at the very bottom.

   **Where would you place yourself on this ladder?**
   Please place a large “X” on the rung where you think you stand at this time in your life relative to other people in the United States.
Appendix D

Stop Signal Task
Below are some definitions to help the reader understand the component and processes of the Stop Signal Task.

Stop Signal Task measures the amount of time it takes to stop a prepotent response.

Stop signal: a red arrow to instruct suppression of responses

Go signal: lack outlines White error to instruct which left or right error key to press.

Stop Signal Delay (SSD): is the variable amount of time between the presentation of the go stimulus until the initial presentation of the stop stimulus.

Stop Signal Reaction Time (SSRT): the amount of time it takes to complete the stop process, as in the amount of time it takes to inhibit a response.

\[ p(\text{respond}|\text{signal}) \]: the probability of the responding during a stop trial (i.e., with the presentation of the stop signal)

Figure D1


Note. The independent race model is used to conceptualize response inhibition in the stop signal task (Verbruggen et al., 2019). The model characterizes an independent race between the ‘go runner’ initiated by the presentation of the go signal and the ‘stop runner’ initiated by the presentation of the stop signal. Response inhibition is successful when the ‘stop runner’ finishes before the ‘go runner’ and no response is emitted (i.e., successful stop trial.” The failure of response inhibition is when the ‘go runner’ finishes before the ‘stop runner’ and a response is emitted (i.e., unsuccessful stop trial). The model compares the responses latencies (RT) on go trials, RT of unsuccessful stop trials, and the probability of responding in stop trials [i.e., \( p(\text{response}|\text{signal}) \)] as a function of the stop signal delay (SSD). The independent race model allows for the estimation of the stop signal response time (i.e., SSRT), the time needed to inhibit a response.
Appendix E

Scale of Ethnocultural Empathy
Scale of Ethnocultural Empathy

<table>
<thead>
<tr>
<th>Strongly disagree that it describes me</th>
<th>Disagree that it describes me</th>
<th>Somewhat disagree that it describes me</th>
<th>Somewhat agree that it describes me</th>
<th>Agree that it describes me</th>
<th>Strongly agree that it describes me</th>
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<tbody>
<tr>
<td>1</td>
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<td>3</td>
<td>4</td>
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<td>6</td>
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</table>

1. I feel annoyed when people do not speak standard English.
2. I don’t know a lot of information about important social and political events of racial and ethnic groups other than my own.
3. I am touched by movies or books about discrimination issues faced by racial or ethnic groups other than my own.
4. I know what it feels like to be the only person of a certain race or ethnicity in a group of people.
5. I get impatient when communicating with people from other racial or ethnic backgrounds, regardless of how well they speak English.
6. I can relate to the frustration that some people feel about having fewer opportunities due to their racial or ethnic backgrounds.
7. I am aware of institutional barriers (e.g., restricted opportunities for job promotion) that discriminate against racial or ethnic groups other than my own.
8. I don’t understand why people of different racial or ethnic backgrounds enjoy wearing traditional clothing.
9. I seek opportunities to speak with individuals of other racial or ethnic backgrounds about their experiences.
10. I feel irritated when people of different racial or ethnic backgrounds speak their language around me.
11. When I know my friends are treated unfairly because of their racial or ethnic backgrounds, I speak up for them.
12. I share the anger of those who face injustice because of their racial and ethnic backgrounds.
13. When I interact with people from other racial or ethnic backgrounds, I show my appreciation of their cultural norms.
14. I feel supportive of people of other racial and ethnic groups, if I think they are being taken advantage of.
15. I get disturbed when other people experience misfortunes due to their racial or ethnic backgrounds.
16. I rarely think about the impact of a racist or ethnic joke on the feelings of people who are targeted.
<table>
<thead>
<tr>
<th>Strongly disagree that it describes me</th>
<th>Disagree that it describes me</th>
<th>Somewhat disagree that it describes me</th>
<th>Somewhat agree that it describes me</th>
<th>Agree that it describes me</th>
<th>Strongly agree that it describes me</th>
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</table>

17. I am not likely to participate in events that promote equal rights for people of all racial and ethnic backgrounds.
18. I express my concern about discrimination to people from other racial or ethnic groups.
19. It is easy for me to understand what it would feel like to be a person of another racial or ethnic background other than my own.
20. I can see how other racial or ethnic groups are systematically oppressed in our society.
21. I don’t care if people make racist statements against other racial or ethnic groups.
22. When I see people who come from a different racial or ethnic background succeed in the public arena, I share their pride.
23. When other people struggle with racial or ethnic oppression, I share their frustration.
24. I recognize that the media often portrays people based on racial or ethnic stereotypes.
25. I am aware of how society differentially treats racial or ethnic groups other than my own.
26. I share the anger of people who are victims of hate crimes (e.g., intentional violence because of race or ethnicity).
27. I do not understand why people want to keep their indigenous racial or ethnic cultural traditions instead of trying to fit into the mainstream.
28. It is difficult for me to put myself in the shoes of someone who is racially and/or ethnically different from me.
29. I feel uncomfortable when I am around a significant number of people who are racially/ethnically different than me.
30. When I hear people make racist jokes, I tell them I am offended even though they are not referring to my racial or ethnic group.
31. It is difficult for me to relate to stories in which people talk about racial or ethnic discrimination they experience in their day to day lives.
Appendix F

Color-Blind Racial Attitudes Scale
Color-Blind Racial Attitudes Scale

Please respond to the following questions by indicating next to each item, to what extent you agree with each statement.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
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</tbody>
</table>

___1. White people in the U.S. have certain advantages because of the color of their skin.

___2. Race is very important in determining who is successful and who is not.

___3. Race plays an important role in who gets sent to prison.

___4. Race plays a major role in the type of social services (such as type of health care or day care) that people receive in the U.S.

___5. Racial and ethnic minorities do not have the same opportunities as White people in the U.S.

___6. Everyone who works hard, no matter what race they are, has an equal chance to become rich.

___7. White people are more to blame for racial discrimination than racial and ethnic minorities.

___8. Social policies, such as affirmative action, discriminate unfairly against White people.

___9. White people in the U.S. are discriminated against because of the color of their skin.

___10. English should be the only official language in the U.S.

___11. Due to racial discrimination, programs such as affirmative action are necessary to help create equality.

___12. Racial and ethnic minorities in the U.S. have certain advantages because of the color of their skin.

___13. It is important that people begin to think of themselves as American and not African American, Mexican American or Italian American.

___14. Immigrants should try to fit into the culture and values of the U.S.

___15. Racial problems in the U.S. are rare, isolated situations.

___16. Talking about racial issues causes unnecessary tension.

___17. Racism is a major problem in the U.S.

___18. It is important for public schools to teach about the history and contributions of racial and ethnic minorities.

___19. It is important for political leaders to talk about racism to help work through or solve society’s problems.

___20. Racism may have been a problem in the past, it is not an important problem today.
Appendix G

Open-Ended Feedback Questionnaire
Open Ended Feedback Questionnaire

1. What do you think about the task you just completed?

2. What do you think about the study as a whole?

3. Did you experience any technical difficulties while completing this experiment?
   Please be specific.

4. How realistic were the questions in this experiment?

5. Was it difficult to answer questions in this experiment? Why or why not?
Appendix H

Additional Figures
Figure H1

*Area Under the Curves (AUC) for Full Sample Delay Discounting Curves*

![Graph showing AUC for delayed amounts of $100 and $1,000 for all participants.]

*Note.* Area under the curve (AUC) for delayed amounts of $100 and $1,000 for all participants.

Figure H2

*Full Sample of Delay Discounting Median Log Indifference Points*

![Graph showing median log indifference points across delays for the delayed amounts of $100 and $1,000 for all participants.]

*Note.* Logged indifference points across delays for the delayed amounts of $100 and $1,000 for all participants.
Figure H3

Restricted Sample Delay Discounting Median Log Indifference Points

*Note.* Logged indifference points across delays for the delayed amounts of $100 and $1,000 for participants who passed the Johnson and Bickel (2008) criteria.