Penetrating the illusion of our seperateness: Buddhist meditation and implicit racial prejudice

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Abstract

While there has been an apparent reduction in explicit, conscious racism, implicit or less-than-conscious biases (as revealed by measures such as the Implicit Association Test, or IAT) nonetheless continue to present in most individuals, and have been linked to a host of discriminatory, real-world behaviors. However, very few studies have explored whether or not any reduction in bias is accompanied by a decrease in other associated, negative cognitive outcomes, such as own-race bias (ORB) in cross-racial face recognition. Furthermore, very little research on implicit bias has been conducted in a South African context. The current study investigated whether listening to a guided meditation audio, featuring elements of both lovingkindness and mindfulness meditation, resulted in a reduction in implicit racial bias (as measured by the IAT) and ORB, respectively. Participants were a diverse group of South African university students. Those assigned to the experimental group (n = 17) were administered the meditation intervention once a day over a period of five consecutive days, with IAT and face recognition data obtained for both the control (n = 18) and the experimental groups on the first, third, and fifth day. Mixed designs ANOVAs found that the intervention resulted in a significant increase in participants' sensitivity levels (the ability to distinguish between previously seen, and previously unseen faces) for same-race faces (p = .037, baseline to third day; p = .021 baseline to fifth day). Furthermore, while no statistically significant changes were found in terms of participants' implicit bias, subsequently partitioning the data by racial group revealed very different patterns for Black and White participants: specifically, Black experimental group participants exhibited a substantial reduction in implicit bias, while White participants' IAT scores remained relatively constant by comparison. These intriguing findings highlight the need for further research into the phenomenon of implicit racial bias in the context of South Africa, as well as contributing novel findings to the area of cross-race face recognition.

Introduction

While national surveys in the USA and other nations have revealed an ostensible shift in racist attitudes over the last decade (Crandall, Eshleman, & O'Brien, 2002), racial inequality and discrimination continue (Tinkler, 2012). Specifically, the use of unobtrusive measures, such as the Implicit Association Test (IAT) has revealed that, while explicit, consciously-held attitudes may have shifted, their more automatic, implicit counterparts remain largely untransformed (Ziegert & Hanges, 2005).

Implicit Versus Explicit Attitudes

Recent research has shown that the correlation between implicit and explicit attitudes is quite variable (Dasgupta, 2004), and generally the two are only weakly correlated (Kang, Gray & Dovidio, 2014; Nosek & Riskind, 2011). Given their automatic nature, it should be possible for people to harbour implicit bias without any intention, or knowledge thereof (Jost et al., 2009; Wheeler & Fiske, 2005). Indeed, research has found that an individual's implicit attitudes may directly conflict with their consciously-held stance with regards to racism (Kelly, Faucher, & Machery, 2010; Fiske, 2002). Disturbingly, this phenomenon of 'unintentional' racism (Zack, 1998; 2003) has proven to be extraordinarily widespread, with implicit bias evinced "across hundreds of studies and millions of participants" (Nosek & Riskind, 2011, p.5), many of whom are avowed egalitarians (Rudman, Ashmore & Gary, 2001).

Influence on Behavior

The fact that such bias is subtle and implicit as opposed to blatant and hostile provides little comfort – for, as decades of social psychological research have shown, much human behavior is grounded in such mindless' processing (Kang, Gruber & Gray, 2013). Indeed, numerous studies have found that the influence of implicit attitudes on subtle, non-verbal behaviors may contribute to hostile interracial interactions (Dasgupta, 2004; Fiske, 2002). For example, participants' levels of implicit racism have been shown to better predict the quality of an interracial interaction than did their scores on a measure of explicit racism (Jost et al., 2009).

Contributing to Institutional Patterns of Discrimination

Significantly, the influence of implicit bias may not be limited to subtle cues occurring during interpersonal interactions: indeed, it may contribute to the maintenance of institutional patterns of discrimination. According to systems-justification theory, individuals' intergroup attitudes may reflect, and thus legitimize, existing social hierarchies (Jost & Banaji, 1994). Lending credence to this idea is the fact that high-status groups consistently show stronger implicit in-group bias (Baron & Banaji, 2006) while disadvantaged groups tend to evince implicit out-group favouritism (Dasgupta, 2004). Such findings are all the more troubling in the light of growing evidence that implicit attitudes *do* influence deliberative behaviors (Rudman, 2004). For instance, a recent meta-analysis investigating the IAT's predictive validity found that the test predicted race-relevant behavior significantly more accurately than self-reported attitudes (Greenwald, Poehlman, Uhlmann, & Banaji, 2009).

In fact, it has been theorized that the presence of *implicit* bias might explain ongoing racial discrimination in the marketplace (Baron & Banaji, 2006; Fiske, 2002; Lai et al., 2014; Tinkler, 2012). For example, unconscious bias has been associated with more interview opportunities being afforded to in-group job candidates, relative to equally qualified out-group candidates (Nosek & Riskind, 2011), as well other forms of economic discrimination, such as slashing the budgets of organizations for disadvantaged groups (Jost et al., 2009). Implicit bias has also been implicated in institutional disparities in healthcare (Lillis & Hayes, 2007; Nosek & Riskind, 2011). For instance, one study found that doctors recommended thrombolysis (a low-cost, highly effective treatment for myocardial infarction) more often to White patients, even in the perceived absence of the condition. Furthermore, they were considerably *less* likely to advocate for the treatment's use to Black patients, even when they thought that the patient in question was ill (Green et al., 2007). The influence of implicit bias has further been shown to extend to the criminal justice system (Lillis & Hayes, 2007; Rudman et al., 2001). For example, one study found that the prototypicality of African-American, death-eligible convicts' facial features were associated with an increased probability of their receiving the death penalty (Eberhardt, Davies, Purdie-Vaughns & Johnson, 2006).

Existing Interventions

Despite their unconscious nature, the relationship between implicit bias and subsequent discrimination may nevertheless be moderated by factors such as awareness, and motivation to control prejudice (Fiske, 2002; Hunsinger, Livingston & Isbell, 2012; Hutcherson, Seppala, & Gross, 2008). However, successful efforts to moderate the impact of bias typically require some skill and resources (Blair, 2002). For example, the highly intuitive strategy of suppression (i.e. "colourblindness") may actually result in the rebound of the forbidden biases (Fiske, 2002; Hutcherson et al., 2008; Kelly et al., 2010). Overall, most successful strategies tend to involve the promotion of counterstereotypes (Blair, 2002) – however, even this has been shown o backfire in some situations (Kang et al., 2014). Furthermore, interventions increasing negativity towards the more dominant group as a means of reducing relative preferences may not be desirable for application (Lai et al., 2014).

A Buddhist Perspective

Given its emphasis on the dissolution of the categories of self and other, it is interesting that practices rooted in Buddhist philosophy, such as lovingkindness and mindfulness, have garnered little interest in the area of implicit bias. In the last decade or so, Buddhist meditation has been increasingly harnessed in the West in the name of personal wellbeing (Kang et al., 2014; Shonin, Van Gordon & Griffiths, 2014), however, from a Buddhist perspective, practices such as mindfulness and lovingkindness encompass not only the cognitive and emotional, but also the ethical and the social. For example, traditional accounts of lovingkindness hold it to be an essential tool for inter-individual harmony (Stell & Parsides, 2015), while mindfulness is viewed as a key means of deconstructing the illusion of a separate self (Brito, 2013). Indeed, the experience *the self in other*, and *the other in self* – a sense of common humanity entirely at odds to the logic of social bias – is central to traditional Buddhist meditation (Shonin et al., 2014).

Catering to both Cognitive and Affective Aspects of Bias

Crucially, different forms of Buddhist meditative practice may tackle both the cognitive and affective sides of implicit prejudice. This is of great importance in light of recent evidence that affective processes play a critical role in social evaluations. For example, one face recognition study found that positive emotions such as joy eliminated the notorious own-race bias (ORB) effect (Johnson & Frederickson, 2005), whereby people are better at recognizing and distinguishing between the faces of people from their own racial group, as opposed to those belonging to individuals of other races (Ferguson, Rhodes & Lee, 2001; Horry, Wright & Tredoux, 2010; Wright, Boyd & Tredoux, 2003) – an effect that has recently been linked to implicit bias (Lebrecht, Pierce, Tarr & Tanaka, 2009). By contrast, emotions such as anger and fear have consistently been found to underlie prejudice (Kang et al., 2014; Kelly et al., 2013). Given mindfulness's emphasis on equanimity and decreased emotional reactivity (Kang et al., 2013), in contrast with lovingkindness's focus on the cultivation of nurturant love and empathy (Hunsinger et al., 2012; Hutcherson et al., 2008; Parks, Birtel & Crisp, 2014; Stell & Parsides, 2015), it is possible that the two forms of meditation influence the cognitive and affective aspects of implicit bias respectively (Kang et al., 2014). However, they may also overlap – for example, mindfulness has been associated with an increase in positive emotions (Kang et al., 2013), while lovingkindness meditation has been implicated in increased cognitive control (Kang et al., 2014), and decreased automatic processing (Stell & Parsides, 2015). Such results lend new meaning to the Buddhist metaphor that "mindfulness is a bird, with one wing of awareness and the other wing of compassion. Without both… the bird cannot fly" (Kraus & Sears, 2009, p. 170).

Own-Race Bias

Few studies have investigated the effect of Buddhist meditations on implicit bias, and there remain several important gaps in the literature: for instance, no studies to date have addressed whether or not the effects of a particular intervention such as meditation might carry over to related, equally detrimental cognitive phenomena, such as own-race bias (ORB) in face recognition. While this effect is prevalent among all races, it – like implicit bias – is typically more pronounced in white individuals viewing members of other races (Doyle, 2001; Johnson & Frederickson, 2005; Wright et al., 2003). Furthermore, in situations of high intergroup contact, it is not unheard of for black participants to be more adept at recognizing white faces than those belonging to individuals of their own racial group (Wright et al., 2003). As is the case with implicit bias, ORB has significant social implications, especially in the area of eyewitness identification and testimony (Doyle, 2001; Johnson & Frederickson, 2005; Wright et al., 2005), with suspect misidentifications constituting one of the chief causes of wrongful convictions in the legal system (Horry et al., 2010). For instance, one American study found that 36% of such convictions were a result of white eyewitnesses' incorrectly identifying black suspects (Dwyer, Neufeld, & Scheck, 2000).

Importantly, the finding that positive affect ameliorates ORB could prove a potential mechanism whereby Buddhist meditation may contribute to reducing ORB. It has been hypothesized, for instance, that induced positive emotions might prompt the use of broader social categories (Johnson & Frederickson, 2001). In the area of Buddhist meditation, not only is positive affect a robust byproduct of both mindfulness and lovingkindness meditation, the resulting self-expansion – whereby the other is incorporated into one's sense of self – echoes the kind of selflessness that is a cornerstone of Buddhist meditative practices (Shonin et al., 2014). Furthermore, such radical decentering of the self might undermine another mechanism contributing to ORB: namely, the tendency for individuals to process other-race faces using an inferential approach from same-race faces (Ferguson et al., 2001). Finally, the well-supported empirical finding that meditation enhances cognitive processing might, in turn, contribute to greater sensitivity in the area of recognizing and distinguishing between faces of different races, as well as diminishing the response bias that is responsible for the high false alarm rates typically characterizing ORB, especially among white participants (Doyle, 2001).

The context of South Africa

Another important limitation of the existing knowledge base concerning implicit bias is that very few studies have been conducted in Africa, and almost none in South Africa. This is somewhat surprising, given South Africa's incredibly turbulent racial past, as well as the fact that racial disparities continue to shape the country's landscape. Exploring implicit racial bias in the context of South Afrca is rendered all the more pressing by the fact that there are several meaningful differences between it, and the nation where most implicit bias research is conducted – namely the United States. For instance, in the latter, white people represent a substantial majority of the population; by contrast, in South Africa, white people constitute a small, if insular, minority. It would be both interesting and relevant to explore whether or not implicit bias scores in South Africa imitate international findings, whereby white participants exhibit strong in-group favouritism and out-group bias (Baron & Banaji, 2006), while other racial groups evince less in-group favouritism, and even moderate levels of pro-white bias (Dasgupta, 2004). The applicability of interventions designed to reduce implicit bias in contexts other than the United States also deserves investigation, especially given the strong theoretical basis of the assumption that such bias might be widespread in countries such as South Africa.

In conclusion, given that implicit racial bias remains relatively unexplored in South Africa, research is warranted both into its pervasiveness, and the effectiveness of any interventions that might combat it. The possibility that any such effect might carry over into the area of ORB also warrants merits exploration, as we aim to increase our knowledge of how such detrimental phenomena might be related, and how they might be ameliorated.

Aims and Hypotheses

This study aimed to contribute to implicit bias research by investigating an intervention aimed at its reduction, in the context of South Africa**.** More precisely, it explored the effects of a combination of Buddhist meditative practices (specifically lovingkindness, and mindfulness meditation) on implicit racial bias, as well as investigating whether or not these effects carried over to the ORB effect in cross-racial face recognition. Given the dearth of research on implicit racial bias in South Africa, together with recent findings concerning cross-race face recognition, and the effects of meditation on implicit bias, the following hypotheses were derived:

H_1– Implicit racial bias: The intervention (a combination of mindfulness and lovingkindness meditation) will result in a significant reduction in participants' implicit bias compared to the control group.

H_2 – ORB: The intervention will result in a reduction of participants' response bias in general, as well reduce participants response bias for Other-Race (OR) faces relative to same-race (SR) faces – as such, the overall difference between participants' response bias for OR and SR faces will decrease, as a function of the intervention.

H_3 – ORB: The intervention will result in an increase in participants' overall levels of sensitivity, as well as enhancing participants' sensitivity for OR faces relative to SR faces – as a result, the overall difference between participants' levels of sensitivity between OR and SR faces will decrease, as a function of the intervention.

H_4 – ORB and implicit bias within race groups: The intervention will have different effects on participants' implicit bias and ORB, depending on the racial group with which they identify.

Method

Design and setting

The experimental design chosen for this study was a randomized controlled trial. Participants (*n* = 35) were randomly allocated to either the experimental or control group. The intervention consisted of listening to a 12-minute guided meditation (administered via headphones) once a day, for five consecutive days. For the experimental group, data was collected at three points: pre-meditation (baseline); once on the third day of meditation; and immediately post-meditation on the fifth day.

Data collection for the control group proceeded as for the experimental group, with the same time lapse between each measurement session.

This research was conducted at the University of Cape Town. The intervention was administered, and data collected, at the Applied Cognitive and Experimental Neuropsychology Team (ACSENT) and Gender, Social, Critical (GCS) Labs, in the Department of Psychology.

Participants

Sample characteristics. The sample for this study consisted of 35 students completing undergraduate courses in psychology at the University of Cape Town, of which 15 (42.86%) were white, 16 (45.71%) were black, two (5.71%) were Indian , one (2.86%) was coloured, and one (2.94%) of mixed racial identity. The majority (N = 25, 71.43%) of the sample was female. Most students fell between the ages of 18 and 23 (M = 21.46, SD = 3.27), with two students in their early 30's.

Power analysis. A power analysis suggested that the minimum sample size be set at n = 30 (15 per group) to achieve a power of .8, given a medium effect size (Cohen's d = 0.50) and an alpha of .05 (Erdfelder et al. 1996). This effect size was chosen after consulting the literature in the area of meditation and implicit bias (Stell & Farsides, 2015).

Sampling procedure. Students were recruited via the Student Research Participation Program (SRPP), which awards undergraduate students points that contribute to the Duly Performed requirements for PSY courses. The first group of participants recruited were offered 6 SRPP points as compensation for their participation – however, as a result of complications arising towards the academic year, and the subsequent postponement of the remaining data collection to January, it was decided that financial compensation would be included as an alternative to the 6 SRPP points, in order to maximize recruitment. In total, 15 participants (n = 7 and n = 8 in the experimental and control groups, respectively) opted for financial compensation, while the rest opted for SRPP points.

Inclusion and exclusion criteria. This study had two inclusion criteria. Firstly, participants should not meditate more than 30 min per week (Stell & Farsides, 2015), and secondly they should not have had any prior experience with the IAT, as previous practice has been shown to attenuate the test's reliability (Fiedler & Bluemke, 2005; Nosek, Greenwald & Banaji, 2007a).

Measures

Demographics. The race, gender and age of each participant was recorded

Implicit Association Test (IAT). The IAT was used to assess implicit bias, and measures associations between social categories (e.g. black and white people) and categorical attributes (e.g. good or bad words; Nosek et al., 2007b). During the test, images depicting the faces of individuals from the each racial group appear in the middle of a computer screen, and participants are required to sort them into categories, according to labels appearing in either corner at the top of the screen. For example, if an image of a black person's face appears, the participant must sort the face according to which corner of the screen the word "black" is located, by pressing either the 'e' key (in the case of "black" being in the top left corner) or the 'i' key (in the case of "black" being in the top right corner). Similarly, if a word with 'good' connotations, such as the word "pleasant", is presented, the participant must sort the word according to the corner of the screen in which the category "good" appears. In the IAT used for this experiment, eight exemplars from each racial category, together with 16 words (with an equal number of 'good' and 'bad' connotations, respectively) were presented in a random order throughout the various trials.

The primary data for the experiment is yielded during trials in which certain social categories and attributes are *paired* and therefore share a response key e.g. when the words "good *or* black people" are positioned in one corner of the screen, and the words "bad *or* white people", in the other. Implicit bias is believed to be present when participants' speed increases during *compatible* trials (i.e. when the concepts "black people" and "bad", and "white people" and "good", are paired) in comparison to their speed during *incompatible* trials (i.e. when "black people" and "good", and "white people" and "bad", are paired). Importantly, while it might be assumed that the designations of 'compatible' and 'incompatible' for particular pairings is *directional* – that is, a pairing that is compatible for a white participant will be incompatible for a black participant, and vice versa – it is often the case that participants of colour tend towards outgroup favouritism and ingroup bias (Dasgupta, 2004). As such, during data analysis, the pairing for compatible and incompatible trials respectively is generally held constant, regardless of participants' race.

In general, the IAT exhibits higher levels of reliability compared to other latency-based measures of implicit attitudes, and demonstrates acceptable levels of internal or inter-item consistency (Cunningham, Preacher & Banaji, 2001) with split-half correlations for the measure ranging from .7 to .9 (Nosek et al., 2007a). The IAT also tends to be stable across time, thereby exhibiting satisfactory test-retest reliability (median r = .56), although to date few studies have investigated retest intervals of over a month (Nosel et al., 2007a).

Establishing the IAT's *convergent* and *divergent validity* is of particular importance, given that it purports to measure attitudes that are related to, but nevertheless distinct from, explicit social cognition (Nosek et al., 2007b). Several studies have shown that the IAT relates to corresponding self-reported attitudes, while nonetheless remaining distinct from explicit measures (Cunningham et al., 2001; Nosek et al., 2007a), implying that the IAT measures a distinct attitude construct. In terms of the IAT's convergent validity, while some studies have found that implicit measures are not significantly correlated with each other, this may be due to their relatively weak reliability in contrast to other psychological measures (Nosek et al., 2007a). Importantly, however, when such unreliability is controlled for, the correlations between the IAT and other implicit measures improve (e.g. Cunningham et al., 2001).

Finally, in the area of predictive validity, a recent meta-analysis found that, in the case of discrimination towards a particular social group, while both the IAT and self-report measures predict behavior, the latter outperformed the former in terms of its predictive capability (Greenwald et al., 2007).

Own-race bias. This study utilized a traditional face recognition paradigm to test for participants' own-race bias. Two sets of images were used, with the first set appearing during the encoding stage of the study, and the second (consisting of a subset of images from the first set as well as new images) presented during the recognition stage. During the encoding stage, 30 frontal images of the faces of young black and white men with neutral expressions appeared in a random order on a computer screen, each for 3 seconds, followed by an interval of 1.5 seconds. Participants were instructed to memorize each face as it appeared on the screen. Following this encoding phase, participants completed a five-minute, non-verbal distractor task, after which the testing (recognition) phase began. During this stage of the experiment, the original 30 images, together with an equal number of distractor faces, were presented, again in a random order, and the participants required to indicate whether the face was "old" or "new". This phase of the testing procedure was response-terminated. Hits rates, together with the false alarm (FA) rates, were recorded.

Procedure

During the initial testing period in August 2016, the control group underwent the first round of testing in order to avoid contamination. During this preliminary period, participants were invited to the GCS lab, and completed the IAT, followed by the cross-racial face recognition test (baseline measure). Two days later the same participants were recalled, and underwent the same procedure. This was repeated, once more, two days later.

In the following week, participants in the experimental group were invited to the GCS lab. As with the control group, baseline measures of implicit bias (the IAT) together with own-race bias (cross-racial face recognition test) were obtained, following which participants listened to a 12-minute audio-taped meditation combining aspects of both lovingkindness, and mindfulness meditation. These participants returned for four more meditation sessions, each 12 minutes long, and taking place over the subsequent four days. As with the control group, participants receiving the intervention completed another IAT and cross-racial face recognition test two days after the first measurement took place, and again two days later, straight after the final meditation session.

During the second round of testing (which took place in January 2017), time restraints necessitated the testing of experimental participants at the same time as control group participants – however, in order to avoid contamination, participants were tested in different labs (experimental participants in the GCS lab, and control group participants in the ACSENT lab). As with the initial round of testing, control group participants were tested on the first, third, and fifth day of the testing week, while participants in the experimental group came in for each of the five days, listened to the meditation audio each day, and were tested (like the control group) on the first, third and fifth day, respectively.

Data analysis

The software package SPSS (Version 23) was used to analyse the data gathered in this study. For each test, a significance level of .05 was used. Prior to each test, descriptive statistics for each of the key outcome variables were derived and analysed, in order to determine whether or not the assumptions underlying inferential statistical tests were violated. Scores which lay more than three standard deviations away from the mean were defined as outliers, and subsequently deleted.

Hypothesis 1. The outcome variable for implicit bias, *D*, was computed by dividing the difference in response latency between compatible and incompatible trials by the 'inclusive' standard deviation of the response latencies in both sets of trials (Lane, Banaji, Nosek & Greenwald, 2007). As such, *D* functions as a single score of the associations evinced by participants with regards to the two different response categories – in this study, black faces and white faces.

In order to test whether or not the intervention resulted in a significant reduction of participants implicit bias, *D* scores were analyzed using a 2 x 3 mixed design ANOVA (Group [Experimental versus Controls] x Time [Baseline vs During-intervention vs Post-intervention]).

Hypothesis 2. The outcome variable for participants' degree of response bias, their *Criterion (*β) score, is the value of a particular decision-variable which, if achieved, will prompt the participant to give a 'yes' response during the testing phase (Stanislaw & Todorov, 1999). In face recognition experiments, the decision variable in question is the familiarity associated with the face; as such, the Criterion is the degree of familiarity, unique to each participant, that is sufficiently high enough for the participant in question to respond 'yes' to the question of whether or not they have been exposed to the face previously. As a rule, higher, or more conservative, criterion values indicate a bias towards responding 'no', whereas lower, more liberal values indicate a bias towards responding 'yes'. Participants' response bias scores were calculated for both Same-Race (SR) and Other-Race (OR) faces. In total, four β scores – two experimental, and two control – were identified as outliers, and subsequently deleted. Furthermore, an additional five β were overly inflated due to 100% hits, or 0% false alarms, and also excluded from the analysis. Finally, in order to compare participants' levels of response bias between SR and OR faces, the difference between the two sets of β scores were also derived.

As with the IAT data, 2 x 3 mixed design ANOVAs (Group [Experimental versus Controls] x Time [Baseline vs During-intervention vs Post-intervention]) were used to explore whether or not the intervention resulted in an increase in response bias for SR faces, and OR faces respectively. Subsequently, a third ANOVA was applied to the differenceS between the SR and OR β scores, in order to determine whether or not these decreased as a function of the intervention.

Hypothesis 3. The outcome variable for participants' levels of sensitivity, their d-prime (*d'*) score, is a measure of participants' ability to distinguish between signal and noise (or faces that have been seen before, versus those that have not) during the testing phase of the study. Represented graphically, *d'* scores are a measure of the distance between the probability distributions for signal and noise respectively, with the decision variable in question (in this case, the degree of familiarity participants' associate with a particular face) plotted on the x-axis. A significant degree of overlap, or lower *d'* score, indicates a lack of perceptual sensitivity on the part of the participant, whereby signals (or previously seen faces) are barely distinguished from noise (or unseen faces). On the other hand, little or no degree of overlap between the noise and signal distributions, or a higher *d'* score, indicates greater levels of sensitivity, or the ability to distinguish between signals and noise. As with the Criterion scores, in order to explore the differences between SR and OR faces, *d'* scores for both categories were calculated, after which the differences between the two sets of scores was computed. Overall, three *d'* scores (two control, and one experimental) were identified, and removed prior to the any statiscal analyses.

In order to determine whether or not participants' sensitivity levels increased as function of the intervention, 2 x 3 mixed design ANOVAs (Group [Experimental versus Controls] x Time [Baseline vs During-intervention vs Post-intervention] were applied to their OR and SR *d'* scores, respectively; furthermore, as with the β scores, a third 2 x 3 mixed design ANOVA (Group [Experimental versus Controls] x Time [Baseline vs During-intervention vs Post-intervention]) was used to analyse the differences between the OR and SR scores, in order to determine whether or not these decreased due to the intervention.

Hypothesis 4. In order to determine whether or not the intervention affectd participants differently depending on their racial group, the original data set was divided into two subsets. Given the small number of participants of colour who fell outside of the demographic category of 'black', it was decided that the former's scores would be combined with those of the latter, thereby forming the superordinate category of 'Black', in the Biko sense of the word, while the second subset of data consisted of the scores of the White participants.

Following this division, the same procedures elaborated for hypotheses 1 – 3 were applied separately to each racial group's data.

Results

Participants' Demographic Characteristics

Table 1 summarizes the demographic characteristics of the sample. Chi-square analyses indicated that the racial composition of each group did not significantly differ (χ^2 [1, N = 35] = 1.37, p =.315, V = .19) nor did the group's relative composition in terms of gender (χ^2[1, N = 35] = 1.13, p = .443, V = .18).

Table 1

Demographic Characteristics of Participants in the Experimental and Control Groups

Sample Characteristics	Experimental n = 17	Control n = 18	χ^2	p	V
Race			1.37	.315	0.19
Black	8 (47.06%)	12 (66.67%)			
White	9 (52.64%)	6 (33.33%)			
Gender			1.13	.443	0.18
Male	3 (17.65%)	6 (33.33%)			
Female	14 (82.35%)	12 (66.67%)			

Note. Absolute numbers are presented with proportions in parentheses.

Hypothesis 1: Implicit Bias

Table 2

Descriptive Statistics: Implicit bias (D Scores) of Participants in the Experimental and Control Group

	Experimental n = 16[a]		Control n = 17[a]	
Variable	M	SD	M	SD
Time				
Measurement 1	0.49	0.40	0.49	0.55
Measurement 2	0.38	0.46	0.14	0.54
Measurement 3	0.38	0.49	0.32	0.60
Overall	0.41	0.45	0.32	0.56

Note. [a] Data from one participant from the control group and one participant from the experimental group was invalid, and so excluded pairwise.

As summarized in Table 2, the *D* scores of participants in the experimental group evinced a moderate decrease overall (*M* = 0.41), with the change occuring between baseline (measurement 1; *M* = 0.49) and the third meditation session (measurement 2; *M* = 0.38). By contrast, in the control group, *D* scores fluctuated dramatically, while evincing a decrease overall (*M* = .32). Across the meditation sessions, the experimental group yielded higher *D* scores than the experimental goup.

A mixed designs ANOVA found both the main effect of Group, *F*(1,31) = .45, *p* = .506, η_p^2 = .01, and the interaction effect of Group x Time, *F*(2,62) = .93, *p* =.400, η_p^2 = .03 to be non-significant. However, a significant main effect of Time was found, *F*(2,62) = 3.31, *p* = .043, η_p^2 = .097, with subsequent planned contrasts revealing a significant difference between the *D* scores of session 1 and session 2, *t*(33) = 2.81, *p* = .008, *d* = .46; however, no significant differences were found between sessions 2 and 3, *t*(32) = -1.13, *p* = .267, *d* = .18, or sessions 1 and 3, *t*(33) = -1.37, *p* = .179, *d* .27.

Hypothesis 2: Face Recognition – Response Bias

Table 3

*Descriptive Statistics: Response Bias (*β *Scores) of Participants in the Experimental and Control Group*

	Experimental *n* = 15[a]		Control *n* = 16[d]	
Variable	*M*	*SD*	*M*	*SD*
Time and face type				
Measurement 1				
SR	1.17	0.34	0.99[e]	0.28[e]
OR	0.99	0.26	1.01	0.19
Measurement 2				
SR	1.36	0.50	1.24[f]	0.48[f]
OR	1.22[b]	0.39[b]	1.08	0.54
Measurement 3				
SR	1.16	0.67	1.03	0.42
OR	1.13[c]	0.35[c]	1.16	0.29

SR Overall	1.23	0.50	1.09	0.39
OR Overall	1.11	0.33	1.08	0.34

Note.[a]Data from two experimental participants could not be retrieved, and were excluded.[b]One experimental outlier was found, and excluded. [c]One experimental outlier was found, and excluded. [d]Data from two control participants could not be retrieved, and were excluded.[e]One control outlier was found, and excluded. [f]One control outlier was found, and excluded.

As shown in Table 3, SR repsonse bias fluctuated in the experimental group, with a slight increase in participants' β scores evinced overall (*M* = 1.23). Similar fluctiations were apparent in the OR β scores, which also increased across the meditation sessions (*M* = 1.11). In the control group, by contrast, OR β scores rose steadily over the course of the testing, culminating in a moderate increase overall (*M* = 1.08). Control SR β scores, like those in the experimental group, fluctuated considerably, while evincing a modest overall increase (*M* = 1.09).

In terms of SR response bias, the mixed designs ANOVA detected no main effects of Time, *F*(2,48) = 1.98, *p* = .149, η_p^2 = .08, or Group, *F*(1,24) =1.37, *p* = .253, η_p^2 = .05, and no significant interaction effect, *F*(1,48) =.026, *p* = .974, η_p^2 < .01.

In terms of OR response bias, analyses detected no main effect Group, *F*(1,29) =0.12, *p* = .730, η_p^2 < .01, and no significant interaction effect , *F*(2,58) =.82, *p* = .444, η_p^2 = .03. However, a trend towards significance was detected for the main effect of Time, *F*(2,58) =2.69, *p* = .077, η_p^2 = .09. Subsequent planned contrasts revealed significant differences for the β scores between session 1 and session 3, *t*(30) = 2.41, *p* = .022, *d* = .74, but not between and session 1 and session 2, *t*(33) = -1.07, *p* = .291, *d* = .86, or between session 2 and session 3, *t*(30) = 0.02, *p* = .986, *d* = .86.

The mixed designs ANOVA used to analyse the differences between the OR and SR β Scores yielded similar results, detecting no significant main effect of Time, *F*(2,44) =1.46, *p* = .243, η_p^2 = .06, or Group ,*F*(1,22) = 0.92, *p* = .526, η_p^2 = .02, and no significant interaction effect, *F*(2,44) = .38, *p* = .684, η_p^2 = .02.

Hypothesis 3: Face Recognition – Sensitivity

Table 4

Descriptive Statistics: Sensitivity (d' Scores) of Participants in the Experimental and Control Group

Variable	Experimental n = 16[a]		Control n = 16[b]	
	M	*SD*	*M*	*SD*
Time and face type				
Measurement 1				
SR	0.55	0.59	0.99[c]	1.19[c]
OR	0.69	0.49	0.47	0.47
Measurement 2				
SR	1.33	1.31	1.44[c]	1.54[c]
OR	0.82	0.69	0.84	0.63
Measurement 3				
SR	1.81	1.97	0.86	0.93
OR	0.75	0.57	0.60[d]	0.60[d]
SR Overall	1.23	1.29	1.09	1.28
OR Overall	0.75	0.58	0.79	0.75

Note. [a]Data from one experimental participant was invalid, and so excluded. [b]Data from two control participants was found to be invalid, and excluded. [c]One control outlier was found, and excluded. [d]One control outlier was found, and excluded. [e]One control outlier was found, and excluded.

As summarized in Table 4, in the region of SR faces in the experimental group, participants' *d'* scores rose considerably between baseline (*M* = .55), and measurement 2 (*M* = 1.33), with a a substantial increase exhibited overall (*M* = 1.23). By contrast, OR *d'* scores fluctuated, and evinced only a slight increase overall (*M* = .75. In the control group, both SR and OR *'d* scores fluctuated, and both increased overall (*M* = 1.09 for SR, *M* = .79 for OR). Overall, sensitivity levels were higher for SR than for OR faces in both groups – however, this was more pronounced in the experimental group.

In terms of SR *'d* scores, the mixed designs ANOVA detected no significant main effects of Group, $F(1,30) = .20$, $p = .662$, $\eta_p^2 = .01$, or Time ($F(2,60) = 2.41$, $p = .098$, $\eta_p^2 = .07$); however, a trend towards significance for the interaction effect was found, $F(2,60) = 2.76$, $p = .071$, $\eta_p^2 = .08$. Subsequent planned contrasts revealed significant differences between the *d'* scores of the Experimental group between session 1 and session 2, $t(22.33)$[1] = -2.22, $p = .037$, $d = .74$, and between session 1 and session 3, $t(18.90)$[1] = -2.52, $p = .021$, $d = .86$. No other significant differences were found (all *ps* > .109).

In the case of OR faces, the analysis detected no significant main effects of Group, $F(1,31) = .72$, $p = .404$, $\eta_p^2 = .02$, or Time, $F(2,62) = 1.89$, $p = .160$, $\eta_p^2 = .06$, nor a significant interaction effect, $F(2,62) = .471$, $p = .627$, $\eta_p^2 = .02$.

In terms of the difference between the OR and SR *'d* scores, analyses detected no main effects of Time, $F(2,58) = 1.15$, $p = .325$, $\eta_p^2 = .04$, or Group, $F(1,29) = .50$, $p = .484$, $\eta_p^2 = .02$, nor a significant interaction effect ($F(2,58) = 2.32$, $p = .108$, $\eta_p^2 = .07$).

Hypothesis 4: Implicit bias and ORB by racial group

Black participants.

Implicit bias. Table 5 summarizes the descriptive statistics of the *D* scores of Black participants.

Table 5

Descriptive Statistics: Implicit Bias (D scores*) of Black Participants in the Experimental and Control Groups*

	Experimental $n = 7^a$		Control $n = 11^b$	
Variable	*M*	*SD*	*M*	*SD*
Time				
Measurement 1	0.40	0.53	0.37	0.44
Measurement 2	0.02	0.43	0.01	0.52
Measurement 3	0.01	0.48	0.22	0.52
Overall	0.15	0.48	0.20	0.49

Note. [a] Data from one participant in the experimental group was invalid, and so excluded pairwise. [b]Data from one participant in the control group was invalid, and so excluded pairwise.

[1] Equal variances not assumed statistic reported, as data violated the assumption of homogeneity of variance

As shown in Table 5, Black experimental participants exhibited a substantial reduction in their *D* scores overall (*M* = 0.15), with most of the change occuring after between baseline (*M* = .40), and the third meditation session (*M* = .02). The control group's *D* scores fluctuated by comparison, while evincing a slight decrease overall (*M* = .20).

A mixed designs ANOVA detected no significant main effect of Group, $F(1,16) = .11$, $p = .743$, $\eta_p^2 = .01$, nor a significant interaction effect, $F(2,32) = .37$, $p = .694$, $\eta_p^2 = .02$. The main effect of Time approached significance, $F(2,32) = 3.25$, $p = .052$, $\eta_p^2 = .17$, however subsequent planned contrasts revealed no significant differences between the IAT scores of the two groups across the different time sessions.

Response bias. Table 6 summarizes the descriptive statistics of the Black participants' β scores.

Table 6

Descriptive Statistics: Response Bias (β Scores) of Black Participants in the Experimental and Control Groups

	Experimental *n* = 7[a]		Control *n* = 9[d]	
Variable	*M*	*SD*	*M*	*SD*
Time and face type				
Measurement 1				
SR	1.25	0.46	0.99	0.33
OR	0.99[b]	0.25[b]	1.02	0.24
Measurement 2				
SR	1.25	0.58	1.34	0.50
OR	1.23[c]	0.47[c]	1.02	0.56
Measurement 3				
SR	1.08	0.64	1.07	0.43
OR	1.08	0.47	1.14	0.32
SR Overall	1.19	0.56	1.13	0.42
OR Overall	1.10	0.40	1.06	0.37

Note. [a]Data from one experimental participant was invalid, and so excluded. [b]One experimental outlier was found, and excluded.[c]One experimental outlier was found, and excluded. [d]Data from three control participants were invalid, and so excluded.

As summarized in Table 6, Black experimental participants' SR β Scores decreased slightly between measurement 2 (M = 1.25), and measurement 3 (M = 1.08), with a moderate decreased evinced overall (M = 1.19). By contrast, their OR β Scores fluctuated, and evinced a slight increase overall (M = .10). In the control group, SR β scores also fluctuated, with an overall increase occuring across the three testing sessions (M = 1.13); however, OR β Scores remained stable, with a slight increase occuring between measurement 2 (M = 1.02) and measurement 3 (M = 1.14), culminating in a very modest increase overall (M = 1.06).

In terms of SR faces, the mixed designs ANOVA detected no significant main effect of Time, $F(2,28) = .98$, $p = .388$, $\eta_p^2 = .07$, or main effect of Group, $F(1,14) = .02$, $p = .884$, $\eta_p^2 < .01$, nor a significant interaction effect, $F(2,28) = .59$, $p = .561$, $\eta_p^2 = .04$. Interestingly, OR faces gave rise to similar findings, with the analysis detecting no significant main effects of Group, $F(1,14) = .02$, $p = .884$, $\eta_p^2 < .01$ and Time, $F(2,28) = 0.89$, $p = .421$, $\eta_p^2 = .06$, nor a significant interaction effect, $F(2,28) = 0.96$, $p = .396$, $\eta_p^2 = .06$.

Similar results were found in the case of the differences between the OR and SR β scores, with the analysis detecting no significant main effects of Group, $F(1,12) = .01$, $p = .916$, $\eta_p^2 < .01$ and Time, $F(2,24) = 1.29$, $p = .293$, $\eta_p^2 = .10$, nor a significant interaction effect, $F(2,24) = 1.56$, $p = .231$, $\eta_p^2 = .12$.

Sensitivity. Table 7 summarizes the descriptive statistics of the Black participants' *d'* scores.

Table 7

Descriptive Statistics: Sensitivity (d' Scores) of Black Participants in the Experimental and Control Groups

	Experimental n = 8		Control n =11[a]	
Variable	M	SD	M	SD

Time and face type				
Measurement 1				
SR	0.59	0.61	1.02	1.34
OR	0.94	0.48	0.51	0.59
Measurement 2				
SR	0.83	0.73	1.12	1.19
OR	1.07	0.57	0.79	0.70
Measurement 3				
SR	1.48	1.92	.66	1.01
OR	0.91	0.69	0.82	0.48
SR Overall	0.97	1.09	0.93	1.18
OR Overall	0.97	0.58	0.71	0.59

Note. [a]Data from one control participant was invalid, and excluded.

As shown by Table 7, Black experimental group participants' SR *d'* scores rose overall (*M* = .97), with the biggest increase occuring between measurement 2 (*M* = .83) and measurement 3 (*M* = 1.48). By contrast, OR *d'* scores fluctuated, and evinced only a slight increase overall (*M* = .97). The control group's SR *d'* scores, by comparison, fluctuated substantially, and decreased overall (*M* = 0.93), while the OR *d'* scores rose steadily, culminating in an overall increase (*M* =.71). Interestingly, the SR and OR *d'* scores came to approximate each other in the experimental group, while higher SR *d'* scores were found in the control group.

Analysis of the SR faces *d'* scores revealed no significant main effects of Group, $F(1,17) = .01$, $p = .924$, $\eta_p^2 < .01$ or Time, $F(2,34) = .29$, $p = .749$, $\eta_p^2 = .02$, nor was there a significant interaction effect, $F(2,34) = 1.92$, $p = .163$, $\eta_p^2 = .10$. Similarly, for OR faces, the analysis detected no significant main effects of Group, $F(1,16) = 1.99$, $p = .178$, $\eta_p^2 = .11$ or Time, $F(2,32) = .71$, $p = .501$, $\eta_p^2 = .04$, and no significant interaction effect, $F(2,32) = .47$, $p = .629$, $\eta_p^2 = .03$.

In terms of the difference between the SR and OR *d'* scores, the analysis detected no significant main effects of Group, $F(1,16) = 1.09$, $p = .313$, $\eta_p^2 = .06$ or Time, $F(2,32) = .15$, $p = .858$, $\eta_p^2 = .01$; however, a trend towards significance was found in the interaction effect, $F(2,32) = 2.61$, $p = .089$, $\eta_p^2 = .14$. Subsequent planned contrasts revealed a near significant difference between the control and experimental groups at session 1, $t(52) = 1.77$, $p = .083$, $d = .61$, but no other significant differences were found (all *ps* >.114).

White participants.

Implicit bias. Table 8 summarizes the descriptive statistics of the *D* scores of the White participants

Table 8

Descriptive Statistics: Implicit Bias (D scores) of White Participants in the Experimental and Control Groups

	Experimental $n = 9$		Control $n = 6$	
Variable	*M*	*SD*	*M*	*SD*
Time				
Measurement 1	0.56	0.26	0.71	0.70
Measurement 2	0.65	0.25	0.37	0.56
Measurement 3	0.66	0.25	0.52	0.74
Overall	0.62	0.25	0.53	0.66

As shown in Table 8, White experimental group participants' *D* scores increased slightly overall ($M = .62$), with the biggest change occuring between baseline ($M = .56$), and measurement 2 ($M = .65$). The control group's *D* scores fluctuated by comparison, and decreased overall ($M = .53$).

A mixed designs ANOVA detected no significant main effect of Group, $F(1,13) = .18$, $p = .679$, $\eta_p^2 = .01$, or Time, $F(2,26) = .87$, $p = .430$, $\eta_p^2 = .06$, and no significant interaction effect, $F(2,26) = 2.62$, $p = .092$, $\eta_p^2 = .17$.

Response bias. Table 9 summarizes the descriptive statistics of the White participants' β scores.

Table 9

Descriptive Statistics: Response Bias (β Scores) of White Participants in the Experimental and Control Group

Variable	Experimental n = 7[a]		Control n = 3[b]	
	M	*SD*	*M*	*SD*
Time and face type				
Measurement 1				
SR	1.09	0.16	1.03	0.07
OR	0.97	0.27	0.93	0.14
Measurement 2				
SR	1.46	0.42	0.95	0.31
OR	1.24	0.40	0.86	0.37
Measurement 3				
SR	1.25	0.74	0.89	0.45
OR	1.16	0.29	1.29	0.37
SR Overall	1.27	0.44	0.96	0.28
OR Overall	1.12	0.32	1.02	0.29

Note. [a]Data from two experimental participants were invalid, and excluded. [b]Data from three control participants were invalid, and excluded.

As summarized by Table 9, White experimental participants' SR β scores fluctuated, with the biggest change occuring between baseline (*M* = 1.09) and measurement 2 (*M* = 1.46), and a moderate increase exhibited overall (*M* = 1.27). OR β scores also fluctuated, albeit to a lesser extent, and evinced a slight increase overall (*M* = 1.12). The control group's SR β scores, by contrast, decreased steadily across the meditation sessions, culminating in a moderate overall reduction (*M* = .96), while their OR β scores flucuated slightly, and evinced an overall increase (*M* = 1.02). Interestingly, higher SR than OR criterion scores were found in the experimental group, while in the control group, this effect was reversed.

Regarding SR faces, a mixed designs ANOVA detected no main effects of Group, $F(1,8) = 1.97$, $p = .198$, $\eta_p^2 = .19$ or Time, $F(2,16) = .339$, $p = .717$, $\eta_p^2 = 04$, and no significant interaction effect, $F(2,16) = .68$, $p = .502$, $\eta_p^2 = .08$. Similar results were heralded in the area of OR faces, with the analysis detecting no main effect of Group, $F(1,8) = .37$, $p = .562$, $\eta_p^2 = .04$) or Time, $F(2,16) = 2.27$, $p = .136$, $\eta_p^2 = .22$), and no significant interaction effect, $F(2,16) = 1.97$, $p = .172$, $\eta_p^2 = .19$.

Finally, in the area of the difference between the participants' OR and SR β scores, the analysis detected no main effect of Group, $F(1,8) = .882$, $p = .375$, $\eta_p^2 = .09$ or Time, $F(2,16) = .73$, $p = .500$, $\eta_p^2 = .08$, and no significant interaction effect, $F(2,16) = .391$, $p = .683$, $\eta_p^2 = .05$).

Sensitivity. Table 10 summarizes the descriptive statistics of the White participants' *d'* scores.

Table 10

Descriptive Statistics: Sensitivity (d' Scores) of White Participants in the Experimental and Control Groups

	Experimental $n = 9$		Control $n = 6$	
Variable	*M*	*SD*	*M*	*SD*
Time and face type				
Measurement 1				
SR	0.52	0.61	0.92[a]	0.83[a]
OR	0.47	0.41	0.42	0.19
Measurement 2				
SR	1.77	1.58	2.30[b]	2.24[b]
OR	0.59	0.74	0.94	0.56
Measurement 3				
SR	2.10	2.08	1.41	0.30
OR	0.61	0.44	0.22	0.65
SR Overall	1.46	1.42	1.54	1.12
OR Overall	0.56	0.53	0.53	0.47

Note. [a] One control outlier was found, and excluded. [b] One control outlier was found, and excluded.

As shown by Table 10, White experimental participants' SR *d'* scores underwent a substantial increase overall ($M = 1.46$), with the biggest change occuring between baseline ($M = .52$) and measurement 2 ($M = 1.77$). OR *d'* scores also increased overall, albeit only slightly by comparison (M = .56). The control group's SR *d'* scores fluctuated, culminating in an overall increase across the three testing sessions (M = 1.54), while their OR *d'* scores exhibited similar fluctuations, and evinced a moderate increase overall (M = .53).

In terms of SR faces, a mixed designs ANOVA detected no significant main effects of Group, $F(1,11) = .02$, $p = .889$, $\eta_p^2 < .01$ or Time, $F(1.543, 9.586)$[2] = 2.45, $p = .126$, $\eta_p^2 = .18$, and no significant interaction effect, $F(1.543, 9.586)$[2] = .57 $p = .534$, $\eta_p^2 = .05$. Similarly, in the case of OR faces, the analysis detected no significant main effect of Group, $F(1,13) = .04$, $p = .847$, $\eta_p^2 < .01$ or Time, $F(2,26) = 2.03$, $p = .152$, $\eta_p^2 = .14$, and no significant interaction effect, $F(2,26) = 1.83$, $p = .181$, $\eta_p^2 = .12$.

In terms of the differences between the SR and OR *d'* scores, a mixed designs ANOVA heralded similar findings, detecting no main effects of Group, $F(1,11) = .074$, $p = .791$, $\eta_p^2 = .01$ or Time, $F(2,22) = 1.72$, $p = .202$, $\eta_p^2 = .14$, and no significant interaction effect, $F(2,22) = .097$, $p = .908$, $\eta_p^2 = .01$.

Discussion

This study sought to explore whether repeated exposure to a combination of lovingkindness and mindfulness meditation would significantly reduce implicit racial bias, and the own-race-bias (ORB) effect commonly observed in cross-racial face recognition studies. In terms of ORB, we hypothesized that meditation would decrease levels of response bias and increase levels of sensitivity, and that this effect would be more marked for other-race faces than same-race faces. It was also hypothesized that participants of different race groups would respond in distinctive ways to the intervention. Overall, the evidence produced very little support for the study's key hypotheses; however, some novel findings emerged, which deserve consideration.

Firstly, in the area of implicit racial bias, while the intervention did not have a statistically significant effect on participants' levels of bias – both as a whole, and within each racial group – very different patterns emerged in the IAT results of the Black versus White participants. Specifically, Black participants' scores *decreased* considerably between baseline, and after three meditation sessions, and remained low after the fifth meditation session. In contrast, White participants scores *increased* slighty over the course of the meditation sessions. This unexpected finding contrasts with previous studies – most of which were conducted with White participants – which generally found that meditation reduced implicit racial bias (Hunsinger et al., 2012; Kang et al., 2014; Lueke & Gibson, 2014; Stell & Parsides, 2014). One possible reason for this study's unique finding is that participants were required to complete both a race IAT and a face-recognition test (with the two tasks counterbalanced) – as a result, participants completing the IAT during those testing sessions in which the face-recognition task was completed first might have experienced higher levels of cognitive load, which could have offset any ameliorative effects of the meditation. Indeed, several studies have revealed that the enhanced cognitive load and fatigue resulting from competing mental tasks, as well as the intrinsic cognitive demands of the task at hand, tend to increase implicit bias (Burgess, 2010; Burgess et al., 2014; Johnson et al., 2016). As to the why this pattern was only evinced in White participants, it is possible that their higher levels of baseline implicit bias – another finding that is well-supported by the literature (Baron & Banaji, 2006) – rendered them more vulnerable to the effects accompanying increased cognitive load. Indeed, one recent study found that amplified cognitive load in the form of ego-depletion resulted in significantly more automatic stereotyping behavior, but only in participants with high levels of bias to begin with (Govorun & Payne, 2006). Higher baseline levels of implicit bias are also generally less malleable, and more resistant to change (Gregg, Banaji & Seibt, 2006), which could constitute another reason why White participants' implicit bias levels failed to shift significantly. Finally, recent research has found that the IAT might constitute a stereotype effect for White participants, with this outcome found to be most pronounced in participants who were motivated to control their bias (Frantz, Cuddy, Burnett, Ray & Hart, 2004). Given that this study took place in the liberal context of a university, along with the fact of the increased coverage afforded to race-related issues in recent years, it is possible such a stereotype effect artificially inflated the implicit bias scores of White participants in this study.

In the area of ORB, and specifically in the area of participants' response bias, several interesting, if non-signficiant, between-race findings were also apparent: firstly, while White experimental participants' overall SR scores increased (thereby indicating a more stringent standard for same-race faces), this effect was reversed in the control group; furthermore, Black experimental participants' SR response bias appeared to decrease as a function of the intervention, while the control group's SR response bias increased by comparison. As such, it would appear that the intervention had the opposite effect in the two race groups, facilitating an increase in White participants' same-race criterion scores, and a decrease in Black participants' scores; furthermore while same-race criterions were higher, or more stringent, than their other-race counterparts in the experimental participants of both race groups, this effect was more pronounced in the White experimental group participants. While variations in ORB across different race groups is not an uncommon finding in the literature (Doyle, 2001; Wright et al., 2003), the findings of this study, while not statistically significant, nonetheless highlight the need for more research in this area.Interestingly, no between-race differences were apparent in the region of participants' levels of perceptual sensitivity, with both race groups evincing substantial increases in their d-prime scores as a function of the intervention, and a statistically significant overall interaction effect found when White and Black participants' scores were combined. However, contrary to our hypothesis, this change was limited to same-race faces in both race groups.

There are a number of potential explanations for such heightened sensitivity levels. Firstly, it is a well-documented finding that meditation enhances episodic memory – that is, the ability to remember events that occured at a particular time and place – which is essential for tasks that require the application of past knowledge to current problems (Brown, Goodman, Ryan & Analayo, 2016), such as face recognition tests. Meditation has also been linked to enhanced attention, especially sustained attention, due to a 'freeing up' of cognitive resources as a function of enhanced perception and visual discrimination (Maclean et al., 2010). In the context of face recognition, this could result in participants' successfully encoding the finer details of more faces, thereby resulting in increased senitivity. As to the finding that this effect occurred only for SRfaces, this could be due the fact that we tend to pay more attention to same-race faces, in comparison with other-race faces (Golby, Gabrieli, Chiao & Eberhardt, 2001). Indeed, a key mechanism that is thought to underlie ORB is the amount and quality of attention paid to same-race faces, with one recent study showing that divided attention significantly reduced participants' ORB, as a function of the less accurate recall of same-race faces (Zhou, Pu, Young & Tse, 2014). As such, it is possible that any enhanced attention resulting from the meditation disproportionately affected same-race faces.. Finally, recent, fMRI studies have found that meditation enhances activity in the left fusiform cortex (Kang et al., 2013) and the parahippocampal gyri (Luders, Kurth, Toga, Narr & Gaser, 2013), of which both areas have been linked to superior same-race memory (Golby et al., 2001).

Study limitations and directions for future research

An important limitation of this study was its small sample size, which was particularly pronounced when the sample was further subdivided along racial lines. Future studies seeking to understand the impact of interventions such as meditation on implicit bias and related phenomena such as ORB in South Africa should aim to recruit higher numbers of participants and to sample extensively from South Africa's various racial groups. Indeed, this study's finding that the effects of meditation varied in participants of different racial groups suggests an important avenue for future research: for instance, it would be both interesting and relevant to explore whether or not the manifestations (and subsequent malleability) of implicit bias varies across the different subgroups comprising the superordinate category of 'Biko Black'.

Another, related limitation of this study was that, while the sample size was somewhat diverse racially, it was relatively homogenous along other dimensions, such as gender, and education-level, Importantly, if we are to enrich our current knowledge of phenomena such as implicit racial bias and ORB – of which both are generally presumed to present universally, in some form or other – and their contextual variations, it is essential that research be undertaken with more diverse populations.

Two limitations regarding the tests used in this study warrant mention. Firstly, only one task was used to assess participants' capabilities in the area of face-recognition; furthermore, this task involved dichotomous categorical judgments (i.e. 'yes' and 'no'), as opposed to answers provided along a continuum, which may have yielded more nuanced indicators as to participants' levels of ORB. Secondly, concerning the IAT, only one block of trials for each pairing (i.e. black + bad, white + good; and white + bad, black + good, respectively) was used; furthermore, the 'compatible' trial (i.e. black + bad; white + good) preceded the incompatible trial, which has been shown to inflate the implicit bias revealed by the test. Importantly, this undesirable artifact has been shown to be attenuated when the first practice trial subsequent to the second testing block includes 40 or more trials (Lane et al., 2007). As such, future research utilizing the IAT should ensure that this, and other measures such as counterbalancing the testing blocks, are taken, in order to minimize such adverse order effects.

A further limitation of this study was its relatively brief nature, and the fact that the meditation audio utilized was only 12-minutes long. Future research investigating the specific impact of meditation on phenomena such as ORB and implicit racial bias might benefit from a longer period over which a more rigorous intervention is administered. This recommendation is leant even more weight by the fact that several of the changes in experimental groups *approached* statistical significance – as such, exploring the effects of meditation on implicit racial bias and related cognitive phenomena remains a promising avenue for future research.

A final limitation of this study was its use of multiple statistical analyses, which heightens the possibility of Type 1 errors (incorrectly reporting an association between two variables). Bonferroni corrections were not performed to control for the use of multiple analyses as these corrections increase the likelihood of Type II errors (incorrectly dismissing a relationship between two variables) – and, given the exploratory nature of the current study, it was deemed important to identify possible relationships.

Study contributions and implications

Despite its limitations, this study nonetheless makes several important contributions to the body of research on implicit bias, ORB, and interventions designed to reduce them in the context of South Africa.

Firstly, this is one of a few studies to explore implicit racial bias outside of 'First-World' countries such as the United States, and is amongst the first of its kind in South Africa: as such, it constitutes an important contribution to current knowledge of implicit attitudes, and their malleability, across diverse contexts. Over and above such *prima facie* value is the fact this study found that a combination of lovingkindness, and mindfulness meditationdifferentially impacted participants of the different racial groups. . Not only does this have important implications for the applicability of future interventions designed to reduce implicit bias, it also potentially points to disparities in the underlying nature of such bias in different social groups – an area that definitely warrants further research.

In terms of ORB, both racial groups evinced increases in same-race sensitivity as a function of the meditation intervention. This might be due to enhanced attentional capacity, and could illuminate a potential mechanism underlying ORB, insofar as it provides tentative support for the hypothesis that ORB emerges due to the unequal attention paid to same-race versus other-race faces (Golby et al., 2001; Zhou et al., 2014). While the evidence provided by this study is more speculative than conclusive in this regard, our findings nonetheless suggest interesting avenues for future research into attention, sensitivity in face recall, and ORB.

Conclusion

. This study explored whether or not a brief meditation intervention consisting of a combination of lovingkindness and mindfulness meditation reduced participants' implicit racial bias and ORB, and whether or not the effects of the intervention differed across race groups. While findings indicated no significant reduction in implicit bias as a result of the intervention, different effects were observed in Black participants, whose implicit bias levels decreased, versus White participants, whose scores remained relatively constant by comparison. Furthermore, both Black and White experimental group participants exhibited substantial increases in their same-race sensitivity levels.

These findings highlight the need to explore phenomena such as implicit bias and ORB in diverse contexts, and within various social groups – research that will, in turn, provide clues as to the malleability of such detrimental phenomena. Given that stark racial inequalities continue to mar our world, thereby rendering the possibility of a post-racial future ever distant, such knowledge is not only timeous, but deeply necessary – especially insofar as it might help us, in the words of Buddhist teacher, Thich Nhat Hahn, to "awaken from the illusion of our separateness" (p. 38).

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