

Brief loving-kindness meditation reduces racial bias, mediated by positive other-regarding emotions

Article (Accepted Version)

Stell, Alexander J and Farsides, Tom (2015) Brief loving-kindness meditation reduces racial bias, mediated by positive other-regarding emotions. *Motivation and Emotion*, 40 (1). pp. 140-147. ISSN 0146-7239

This version is available from Sussex Research Online: <http://sro.sussex.ac.uk/id/eprint/60181/>

This document is made available in accordance with publisher policies and may differ from the published version or from the version of record. If you wish to cite this item you are advised to consult the publisher's version. Please see the URL above for details on accessing the published version.

Copyright and reuse:

Sussex Research Online is a digital repository of the research output of the University.

Copyright and all moral rights to the version of the paper presented here belong to the individual author(s) and/or other copyright owners. To the extent reasonable and practicable, the material made available in SRO has been checked for eligibility before being made available.

Copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational, or not-for-profit purposes without prior permission or charge, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

Brief loving-kindness meditation reduces racial bias, mediated by positive other-regarding
emotions

Alexander J. Stell & Tom Farsides

University of Sussex, Brighton, UK

*This is a pre-print version of a manuscript accepted for publication in Motivation & Emotion,
September 2015*

APA Style Online First Citation:

Stell, A. J., & Farsides, T. (2015). Brief loving-kindness meditation reduces racial bias, mediated by positive other-regarding emotions. *Motivation and Emotion*, 1-8. Advance online publication. doi:10.1007/s11031-015-9514-x

Abstract

The relationship between positive emotions and implicit racial prejudice is unclear. Interventions using positive emotions to reduce racial bias have been found wanting, while other research shows that positive affect can sometimes exacerbate implicit prejudice. Nevertheless, loving-kindness meditation (LKM) has shown some promise as a method of reducing bias despite increasing a broad range of positive emotions. A randomised control trial ($n = 69$) showed that a short-term induction of LKM decreased automatic processing, increased controlled processing, and was sufficient to reduce implicit prejudice towards the target's racial group but not towards a group untargeted by the meditation. Furthermore, the reduction in bias was shown to be mediated by other-regarding positive emotions alongside increased control and decreased automaticity on the IAT. Non-other-regarding positive emotions conversely showed no correlation with bias. The study is the first to show that a short-term positive emotional induction can reduce racial prejudice, and aids the understanding of how positive emotions functionally differentiate in affecting bias.

Keywords: loving-kindness meditation, implicit social cognition, prejudice, positive other-regarding emotions, implicit association task

Brief loving-kindness meditation reduces racial bias, mediated by positive other-regarding emotions

Short-term interventions using emotional inductions to reduce racial prejudice are usually ineffective (Lai et al. 2014). Other research has shown that in comparison to negative affect, general positive affect can lead to *increased* prejudiced thoughts and feelings toward racial out-groups. Huntsinger et al. (2009) found that music that put white participants in a positive mood elicited more stereotypic bias towards black people compared to music that primed a negative mood. Similarly, Bodenhausen et al. (1994) found that individuals induced to feel happy were more likely to employ stereotypes in social judgements than those experiencing a neutral state. One explanation for such findings is that positive states such as happiness may have the effect of increasing reliance on internal knowledge structures such as heuristics (see Shiota 2014). Nevertheless, research is beginning to show that positive emotions are not all alike in their effects on implicit cognition. Griskevicius et al. (2010) compared the extent to which participants' persuasion processing was affected by six distinct positive emotions. Whilst those induced with contentment, anticipatory enthusiasm, attachment love or amusement were more persuaded by a weak argument, nurturant love and awe showed the opposite effect (Griskevicius et al. 2010). This finding was taken by the authors to indicate that awe and nurturant love contraindicate positive emotions' usual reliance on automatic decision-making. If positive emotions have divergent effects on automatic processing, it is possible they will also affect implicit prejudice in varying ways. The present study explores the relative effects on bias of two categories of positive emotions; those that are other-regarding or those that are non-other regarding.

The technique known to Buddhists as loving-kindness meditation (LKM) aims to self-regulate an affective state of unconditional kindness towards the self and others. Although techniques vary, practitioners of LKM typically repeat phrases such as ‘may you be happy and healthy’ while visualizing a person (the target) experiencing the outcome of such wishes (Salzberg 1995).

LKM is known to engender positive well-being outcomes for the individual, including increases in general positive affect. This effect has been measured by self-report as well as with autonomic processes such as vagal tone (Kok et al. 2013). Supporting traditional accounts that regard LKM as a tool for interindividual harmony (Salzberg 1995), a few studies have now highlighted LKM’s capacity to positively affect social cognition. Hutcherson et al. (2008) showed that LKM significantly increased self-reported as well as implicit positive affect towards a photo of a neutral stranger. Leiberg et al. (2011), demonstrated that a day-long induction of LKM increased cooperative behaviour in a specially developed pro-social economic game. Similarly, Weng et al. (2013) showed that LKM increased altruistic redistribution of funds to a ‘victim’ figure encountered outside the training context.

If LKM increases prosociality, inter-group processes would appear to be an area of human life likely to benefit from such an effect. Hunsinger et al. (2012) investigated the effect of LKM on *explicit* racial prejudice, comparing long-term meditators to a passive control (non-meditators). Although this study found significantly less self-reported prejudice in long-term LKM practitioners, the authors note the difficulty in drawing causal conclusions due to the participants being a self-selecting sample, presumably drawn to the practice of meditation for reasons that might also motivate the desire to express egalitarian values to a greater extent. Nevertheless, more recent experimental work (Kang et al. 2013), has documented that a 6-week LKM training has the capability to reduce implicit racial bias as measured by the implicit association task (IAT) in comparison to both an active and a wait-list control group. Whilst such

work highlights the potential value of LKM as a method to decrease racial bias, it is unclear which mechanism or set of mechanisms mediates the effect. Kang et al. (2013) proposed two mediators – cognitive control and stress – but both were found to be ineffective. As LKM's most apparent outcome is that it increases positive emotions, its effectiveness appears to contradict past research which shows that positive emotions are either unrelated to bias or that they increase it. The current paper attempts to solve this question by proposing that LKM attenuates racial bias to the extent that it increases *positive other-regarding* emotions, and it is these emotions which mediate the effect on bias. Unlike most positive emotions, which increase self-focused attention (e.g. Abele et al. 2005) other-regarding positive emotions are those in which the locus of the emotion is turned outward, toward others. Such emotions may have evolved to facilitate fitness-enhancing activities such as cooperation, reciprocity and bonding (Shiota 2014). Gratitude, for instance, is a response to another's benevolence while awe and elevation are elicited by another's virtue, whether or not the self benefits (Horberg et al. 2011). Compassionate and nurturant forms of love likewise centre on the wellbeing of the other (Haidt 2003).

Functional-adaptive approaches suggest that positive other-regarding emotions are normally expressed in the presence of and elicited by close others. However, by encouraging such emotions towards non-close others, LKM may engender kin-like responses towards those targeted by the meditation. Thus, people who are not usually placed within one's 'Moral circle' (Singer 2011) may be experienced as such due to the emotion's associated action-tendency.

It is not known whether LKM can affect bias after a short exposure to the practice. Although Hutcherson et al. (2008) showed that just a few minutes of LKM can affect positive evaluations of a single target and Kang et al. (2013) showed that a 6-week intervention can reduce prejudice, it remains uncertain whether brief LKM can reduce prejudice. An additional aim of the current study then is to ascertain whether a short-term induction is efficacious in reducing prejudice.

Additionally, it is uncertain what the effect of targeting LKM to specific individuals or groups is. Kang et al. (2013) for example allowed their participants to choose freely their meditation targets. This would have made it likely that targets were of the same race. The present study explores this issue by presenting a focal racial group – black people – as the target of meditation and compares scores to a peripheral race untargeted by the meditation; specifically, Asian people.

Finally, it is unclear whether LKM affects bias by decreasing automatic processing, increasing controlled processing, or a combination of the two. Other meditative techniques are believed to increase controlled processing (Moore and Malinowski 2009), yet changes in automatic responding may also be predicted by LKM's highly affective nature. Using a method known as process disassociation procedure (PDP) analysis (Huntsinger et al. 2009), we will measure LKM-induced changes in both controlled and automatic processing.

Present study

In this study we aimed to ascertain whether a short-term LKM induction was capable of reducing implicit racial bias towards both a focal and a peripheral racial out-group. Additionally, in order to explore possible mechanisms by which LKM may affect bias, we examined the mediating effect of positive other-regarding emotions. Specifically, we predicted that although LKM would lead to general increases in positive emotions, only those that were other-regarding would successfully mediate LKM's effect on bias. Finally we predicted that LKM would decrease automatic and increase controlled processing on the IAT.

Method

Participants

Seventy-one undergraduate students participated in a study advertised as “investigating the effect of imagery on categorization”. Intended sample size was calculated a priori using a power analysis in which we sought to detect a medium effect size with .80 power. This rough effect size was based on prior research on LKM and bias (Kang et al. 2013, effect size between LKM and control conditions). Participation was rewarded by entry into a random draw for two cash prizes of £25. Only white people were sampled to avoid frequently observed inter-ethnic differences in implicit bias (Nosek et al. 2006). To limit the risk of introducing biases in the recruitment process, the data from non-whites signed up to the study was collected but not analysed. This affected two study sign-ups. No participant reported meditating for more than 30 minutes per week. Two participants were excluded for making errors in over 40% of IAT trials¹ leaving a total of sixty-nine participants (50 women; $M_{age} = 23.7$ years, $SD = 4.24$).

Material

Implicit Association Task (IAT). Implicit racial bias was measured using the race Implicit Association Test (IAT), following Greenwald et al.’s (2003) recommendations.

Category word “black” and category term “white” were presented in either corner at the top of the screen. Below each was either the category term “good” or the category term “bad”. Pairings of the words in each corner varied. A series of attribute terms (e.g., “wonderful”) and photographs of either black or white people were presented in the middle of the screen. Participants used one or other computer key to identify them as belonging to a category shown in the top-left or the top-right. How long participants took to press the correct key following presentation of the target word or photograph was recorded. Racial bias is thought to be indicated by faster identification of positive attribute terms when the positive category term was paired with the “white” (in-group) category term than when it was paired with the “black” (out-group)

¹ Inclusion of these participants’ data did not alter the interpretation of any of the substantive findings.

one, and also by faster identification of negative attribute terms when the negative category term was paired with the out-group category term than when it was paired with the in-group one.

To explore whether LKM induces a *race-specific* reduction in bias, all participants completed two IATs: one with “black” people as the out-group (IAT-1) and another with “Asian” people as the out-group (IAT-2). The order in which these IATs were administered was also counterbalanced and was found to have no effect on the dependent variables.

Positive other-regarding and positive non-other-regarding emotions. To assess the effect of the manipulation on self-reported positive emotion, positive items from the modified Differential Emotions Sub-scale (mDES; Fredrickson et al. 2003) were administered. This measure asks participants to rate their strongest experience, during the manipulation, of each of 11 specific emotions on a 5-point scale (e.g. awe: “During the visualization exercise, I felt awe, wonder, or amazement” 0 = *not at all* to 4 = *extremely*). As previous research on implicit bias has shown that the specificity of an emotion in terms of its capability to provoke functional-adaptive responses is more important than some general quality like valence (Dasgupta et al. 2009) we sub-divided these emotions into either other regarding or non-other-regarding based on existing theoretical approaches (Haidt 2003; Horberg et al. 2011). Positive other-regarding emotions were gratitude, elevation, love and awe ($\alpha = .92$). Non-other-regarding emotions were: amusement, buoyancy, hope, curiosity, happiness, pride and contentment ($\alpha = .85$).

Face Images. For the LKM and Imagery manipulations, target images were one of eight possible gender-matched black people acquired from the Centre of Vital Longevity’s face database (Minear and Park 2004). Images for the IAT tasks were taken from the Multi-Category Implicit Association Test (MC-IAT; Nosek et al. 2013) which feature colour, custom-morphed images of white, black and Asian faces.

Procedure and Conditions

Participants were randomly allocated to either a loving-kindness meditation (LKM) or a visualization (Imagery) condition. In each condition, instructions lasting approximately 7 minutes were given over headphones. Replicating Hutcherson et al.'s (2008) induction, participants were asked to close their eyes, relax and take some deep breaths.

In the LKM condition ($n = 34$), participants were then instructed to imagine people who 'deeply cared for them' standing on either side of them, sending them love. Then after approximately 4 minutes, they were asked to open their eyes and redirect the feelings of love towards gender-matched black person shown in a photograph, and then wish them health, happiness and wellbeing (Salzberg, 1995).

In the Imagery condition ($n = 35$), participants were first instructed to think about the physical characteristics of two acquaintances for whom they had no strong feelings, after which they were asked to open their eyes and pay close attention to the physical features of the same gender-matched black person shown in a photograph as was used in the LKM condition.

Thus, participants in each condition underwent a closely matched procedure but with only those in the LKM condition imagining receiving and sending loving thoughts and feelings.

After the manipulation, participants were presented with the counter-balanced IATs followed by the mDES. Finally, all participants were debriefed.

(Insert Table 1 about here)

Results

Positive emotions. To gauge whether LKM increased positive emotions, a 2 (treatment: LKM/Imagery) \times 2 (emotion locus: other-regarding/non-other-regarding) mixed-model ANOVA was conducted with the first factor between and the second factor within subjects. Effects were found for treatment, $F(1, 67) = 34.22, p < .001, \eta_p^2 = .34$, emotion locus, $F(1, 67) = 9.75, p = .003, \eta_p^2 = .13$, and emotion locus \times treatment, $F(1, 67) = 35.52, p < .001, \eta_p^2 = .35$. In line with

our predictions, follow-up *t*-tests revealed that, compared to Imagery, LKM increased both other-regarding (Imagery: $M = .81$, $SD = .80$; LKM: $M = 2.46$, $SD = 1.14$), $t(67) = 7.02$, $p < .001$, $d = 1.67$, and non-other regarding (Imagery: $M = 1.60$, $SD = 0.68$; LKM: $M = 2.21$, $SD = 0.86$), $t(67) = 3.27$, $p = .002$, $d = 0.78$ positive emotions (see Table 1). Paired *t*-tests qualified the significant emotion locus \times treatment interaction by revealing that those induced with Imagery exhibited larger amounts of non-other regarding ($M = 1.60$, $SD = 0.68$) than other-regarding ($M = 0.81$, $SD = 0.79$) emotions, $t(33) = -7.33$, $p < .001$, $d = 1.07$, whereas this pattern was reversed for the LKM group: participants induced with LKM exhibited larger amounts of other-regarding ($M = 2.46$, $SD = 1.14$) than non-other-regarding ($M = 2.21$, $SD = 0.86$) emotions, although this difference fell just short of significance, $t(33) = 1.80$, $p = .08$, $d = 0.25$. Thus, participants induced with LKM experienced similar or heightened levels of positive affect directed towards others as they felt pertaining to themselves, whereas the Imagery group exhibited significantly more self- than other-directed positive affect.

Implicit Racial Prejudice. In order to test whether the LKM group exhibited a race-specific reduction in bias, IAT *d* bias scores were submitted to a 2 (treatment: LKM/Imagery) \times 2 (Race: Black/Asian) mixed-model ANOVA with the first factor between and the second factor within subjects. The *d* outcome measure was calculated in accordance with Greenwald et al. (2003) by subtracting *SD* corrected latencies for in-group/positive responses from out-group/positive responses and in-group/negative responses from out-group/negative responses. Effects were found for race, $F(1, 67) = 19.37$, $p < .001$, $\eta_p^2 = .22$, and race \times treatment, $F(1, 67) = 6.34$, $p = .01$, $\eta_p^2 = .09$. No significant overall treatment effect emerged, $F(1, 67) = 1.90$, $p = .17$, $\eta_p^2 = .03$. These results were qualified by follow-up independent *t*-tests. For IAT-1 with black people as the out-group, results indicated, as predicted a significant decrease in overall bias for the LKM group ($M = 0.33$, $SD = 0.41$) in comparison to the Imagery group ($M = 0.57$, $SD =$

0.40), $t(67) = -2.44, p = .02$, with a moderate effect size (Cohen's $d = 0.59$). However, in IAT-2 (with Asians as out-group), there was no significant differences in bias between the LKM ($M = 0.24, SD = 0.47$) and Imagery ($M = 0.23, SD = 0.34$) groups, $t(67) = 0.04, p = .97, d = 0.02$ (see Table 1). Therefore, LKM was only effective at reducing bias towards the focal target group; bias towards the peripheral group was unaffected.

PDP Analysis. To test whether LKM affected controlled or automatic processing (or both), PDP analysis was used in accordance with Huntsinger et al. (2009). Two separate estimates for controlled and automatic processing during the IATs were created. The controlled estimate (C) was computed by subtracting the probability of incorrect responses on the incompatible blocks from the probability of correct responses on the compatible blocks. The automatic estimate (A) was computed by taking the probability of incorrect responses on the incompatible blocks and dividing it by $(1 - C)$. A 2 (treatment: LKM/Imagery) \times 2 (processing type: automatic/controlled) mixed-model ANOVA found effects for processing type, $F(1, 67) = 68.45, p < .001, \eta_p^2 = .51$, and processing type \times treatment, $F(1, 67) = 10.59, p = .002, \eta_p^2 = .14$. Follow-up independent t -tests showed that, as predicted, automatic processing was significantly lower in the LKM ($M = .55, SD = .25$) than in the Imagery ($M = .67, SD = .21$) condition, $t(67) = -2.20, p = .03, d = 0.53$. Furthermore, controlled processing was observed to be significantly higher in the LKM ($M = .90, SD = .06$) than in the Imagery ($M = .82, SD = .15$) condition, $t(67) = 2.79, p = .01, d = 0.62$. As the data for the controlled estimate exhibited non-normality and heterogeneous variance, a Mann-Whitney U-test was also employed. The effect remained significant, $U = 391.50, p = .01$. These results indicate that LKM increased controlled and decreased automatic processing (see Table 1).

Mediation analysis. Mediation analysis was performed using Preacher and Hayes' (2008) INDIRECT macro for SPSS, which has been shown to have more power in smaller samples than

normal theory tests such as the Sobel test. Significance tests for indirect effects are reported as bias corrected and accelerated 95% confidence intervals (Preacher and Hayes 2008) while direct effects between IV, mediator and DV are reported using critical alpha values. First, to test whether our primary candidate mediator, positive other-regarding emotions, accounted for the effect of LKM on implicit prejudice, we used the overall bias score from IAT-1 as dependent variable and conducted a single mediation analysis with treatment group as independent variable, and either positive other-regarding or positive non-other-regarding emotions as proposed mediators. LKM was associated with increases in other-regarding emotions ($B = 1.66$, $SE = 0.24$, $p < .001$) and other-regarding emotions were associated with decreases in bias ($B = -0.13$, $SE = 0.05$, $p = .02$). Results of 5000 bias-corrected and accelerated bootstrapped samples confirmed a significant indirect effect of LKM on bias through other-regarding positive emotions with 95% bootstrapped confidence intervals (BCI) showing no overlap with zero ($B = -0.21$, $SE = 0.10$, 95% BCI [-0.44, -0.05]). Contrastingly, whilst positive non-other-regarding emotions were increased by LKM, ($B = 0.61$, $SE = 0.19$, $p = .002$), there was no relationship between these emotions and bias, ($B = -0.05$, $SE = 0.06$, $p = .40$) and accordingly, the indirect effect of LKM on bias through non-other-regarding emotions was nonsignificant ($B = 0.001$, $SE = 0.04$, 95% BCI [-0.09, 0.07]). Finally, we took an exploratory step and added the controlled and automatic estimates from the PDP analysis as candidate mediators in a multiple mediator model that included positive other-regarding emotions. Regression coefficients and BCIs for the final model are presented in Figure 1. LKM was associated with decreases in automatic processing ($B = -.12$, $SE = .24$, $p < .001$), and this mediator was associated with increases in bias ($B = .43$, $SE = .20$, $p = .03$). LKM was associated with increases in controlled processing ($B = -.08$, $SE = .24$, $p < .001$). However, although this candidate mediator evidenced significant zero-order negative correlations with bias ($r = -.28$, $p = .02$), when controlling for the effect of the other mediators in the multiple mediation model, it fell over the threshold for significance ($B = .66$, $SE = .40$, $p =$

.10). Nevertheless, bootstrapped estimates of indirect effects for both processing types were significant (Automatic: $B = -.05$, $SE = .04$, 95% BCI [-.14, -.002], Controlled: $B = -.05$, $SE = .03$, 95% BCI [-.14, -.003]), indicating that, alongside inducing positive other-regarding emotions, LKM reduces bias through reducing automatic as well as increasing controlled processing. Additionally, it was observed that the effect of adding these three successful mediators to the mediation model meant that the direct path from treatment group to implicit bias became non-significant ($B = -0.05$, $SE = 0.12$, $p = .71$). This suggested that the mediators accounted for much of the effect of LKM on bias.

(Insert Figure 1 about here)

Discussion

We found that just seven minutes of loving-kindness meditation directed to a member of a racial out-group was sufficient to reduce racial bias towards that out-group. The practice was only effective in reducing bias for the focal race; implicit bias scores towards a peripheral racial group – Asian people – were not impacted. Additionally, LKM's effects on bias were mediated by the presence of other-regarding but not non-other-regarding positive emotions. Furthermore, LKM appears to gain efficacy both by increasing controlled processing and by decreasing automatic processing.

The current study is the first to successfully find a short-term positive emotion induction that reduces racial prejudice as measured by the IAT. Furthermore we have found support for the possibility that it is the social locus of the positive emotion (whether or not it is other-regarding) that is crucial in whether the emotion will decrease bias. Finally, we have shown, again for the first time, how improved appraisals of others that result from LKM practice extend beyond the metalized recipient (target) of LKM, towards those categorically related (the target's race).

No previously published study has demonstrated that a short-term emotional induction has the power to reduce racial bias as measured by the IAT (see Lai et al. 2014). Furthermore, given that successful (non-affective) interventions in Lai et al. (2014) achieved a reduction of bias by in some way priming negative construals of the in-group, LKM seems to constitute a technique that may be more easily scaled up to programs promoting prejudice reduction in the world outside the laboratory. It seems reasonable to suggest that LKM, with its reported benefits for the individual, is a more *acceptable* method of bias reduction than, for example, interventions that include priming reviled white figures such as Adolf Hitler and Ted Bundy (Lai et al. 2014; intervention 5).

We found a decrease in prejudice towards a focal racial group but no difference in scores for a group not targeted by the intervention, Asian people. This result appears to depart from Kang et al. (2013), who found that prejudice towards black people was decreased by a 6-week LKM training, despite this group not being explicitly directed to in the training. One possible reason for this difference, that should be tested in future research, is that LKM enacts both a specific effect on the target of meditation and their group, as well as a diffuse, but perhaps weaker, effect on other groups. This diffuse effect may not have been measurable due to the short-term nature of our intervention. Finding a specific effect of LKM is notable in the context of previous work on the subject, where it has been unclear to what extent *implicit* positive appraisals extend beyond the person who is the target of meditation (Hutcherson et al. 2008). Presently, we have shown that the effects of LKM appear to extend at least to the target's racial group.

Based on a social-functional understanding of emotions, we hypothesized that one sub-set of positive emotions would serve to mediate LKM-induced reductions of bias. Specifically, we predicted that positive other-regarding emotions – that is, emotions that have a direct linkage with positive social aspects of inter-individual functioning – would predict bias reduction, but

that non-other-regarding positive emotions would not evidence such effects. Our results indicated this to be the case. Although LKM was demonstrated to significantly increase a broad range of other-focused and non-other-focused positive emotions, the latter category showed no relationship with changes in implicit bias. This indicates that positive emotions need to implicate others if they are to affect bias; feeling good *per se* – whilst an outcome of LKM practice – is probably not the mechanism by which it attenuates prejudice. Such observations then provide reason to doubt the sufficiency of adapting valence-based theories to prejudice reduction (e.g. Johnson and Fredrickson 2005) as it appears it is the social locus of the emotion, and not valence, that matters.

Making the distinction between other- and non-other regarding positive emotions also adds to the debate on the relationship between positive emotion and either automatic or controlled cognitive processes. The process-dissociation procedure and mediation analysis showed that positive emotions induced by LKM served to increase controlled and reduce automatic processing, thereby reducing bias. That LKM increases control on the IAT may relate to the practice's close association with mindfulness, a construct linked to elevated attentional performance and cognitive flexibility (Moore and Malinowski 2009). A more puzzling question regards LKM's role in decreasing automaticity when past research has shown positive emotions' capacity to increase automatic thinking. One possibility is that this was due to relatively pronounced other-regarding emotions which, instead of directing attention towards internal knowledge structures (e.g. biases), focused attention outwards towards the elicitor. Some support for this interpretation is found in Griskevicius et al.'s (2010) study in which six out of eight positive emotions increased susceptibility to a weak argument. Awe and nurturant love, however – two other-regarding emotions – had the opposite effect. This finding was interpreted in terms of these emotions' capacity, compared to the other positive emotions measured, to decrease reliance on heuristics thereby reducing the persuasiveness of the argument.

It is important to consider the reasons why LKM succeeded in reducing bias despite positive emotions' (even those that are other-regarding) bad track record in this context. Recent work focusing on elevation for example has shown it to be ineffective in changing racial bias, even when it is elicited in the context of an admirable black person (Lai et al. 2014; Lai et al. 2013). One possibility is that LKM may differ from other positive emotion inductions by recruiting *multiple* other-regarding emotions. Effect sizes are generally much smaller for positive than negative emotional inductions (Westermann et al. 1996), so it is possible that the cumulative effect of the various relevant positive emotions is enough to make the difference. Another, related possibility is that LKM might gain efficacy by affecting *sentiments* (Prinz 2007) towards the target directly. Sentiments are not emotions themselves but an orientation (e.g. liking, disliking) towards a person or object that modulates the occurrence of specific emotions. Love for instance appears to defy categorization as single, distinct emotion (Scherer 2005) and might be better classified as a sentiment. LKM may work by modulating sentiments towards targets, which produce emotions, rather than increasing emotions per se. Nevertheless, future research will need to employ experimental manipulations of specific emotions and (or) sentiments to investigate the relationship between positive emotions and bias reduction.

The present study helps identify the effect of positive emotions on implicit bias in loving-kindness meditation, and isolates positive other-regarding emotions, alongside changes in cognitive processing, as putative mechanisms towards inter-group harmony.

References

- Abele, A., Silvia, P., & Zöller-Utz, I. (2005). Flexible effects of positive mood on self-focused attention. *Cognition & Emotion, 19*(4), 623–631. doi:10.1080/02699930441000391
- Bodenhausen, G. V., Kramer, G. P., & Süsner, K. (1994). Happiness and stereotypic thinking in social judgment. *Journal of Personality and Social Psychology, 66*(4), 621–632. doi:10.1037/0022-3514.66.4.621
- Dasgupta, N., DeSteno, D., Williams, L. A., & Hunsinger, M. (2009). Fanning the flames of prejudice: The influence of specific incidental emotions on implicit prejudice. *Emotion, 9*(4), 585-591. doi:10.1037/a0015961
- Fredrickson, B. L., Tugade, M. M., Waugh, C. E., & Larkin, G. R. (2003). What good are positive emotions in crisis? A prospective study of resilience and emotions following the terrorist attacks on the United States on September 11th, 2001. *Journal of Personality and Social Psychology, 84*(2), 365-376. doi:10.1037/0022-3514.84.2.365
- Greenwald, A. G., Nosek, B. A., & Banaji, M. R. (2003). Understanding and using the implicit association test: I. An improved scoring algorithm. *Journal of Personality and Social Psychology, 85*(2), 197-216. doi:10.1037/0022-3514.85.2.197
- Haidt, J. (2003). The moral emotions. In R. J. Davidson, K. R. Scherer, & H. H. Goldsmith (Eds.), *Handbook of affective sciences* (pp. 852– 870). Oxford, UK: Oxford University Press.
- Horberg, E. J., Oveis, C., & Keltner, D. (2011). Emotions as moral amplifiers: An appraisal tendency approach to the influences of distinct emotions upon moral judgment. *Emotion Review, 3*(3), 237-244. doi:10.1177/1754073911402384
- Hunsinger, M., Livingston, R., & Isbell, L. (2012). Spirituality and intergroup harmony: Meditation and racial Prejudice. *Mindfulness, 5*(2), 139–144. doi:10.1007/s12671-012-0159-5

- Huntsinger, J. R., Sinclair, S., & Clore, G. L. (2009). Affective regulation of implicitly measured stereotypes and attitudes: Automatic and controlled processes. *Journal of Experimental Social Psychology, 45*(3), 560–566. doi:10.1016/j.jesp.2009.01.007
- Hutcherson, C. A., Seppala, E. M., & Gross, J. J. (2008). Loving-kindness meditation increases social connectedness. *Emotion, 8*(5), 720-724. doi:10.1037/a0013237
- Johnson, K., & Fredrickson, B. (2005). "We all look the same to me": Positive emotions eliminate the own-race bias in face recognition. *Psychological Science, 16*(11), 875-881. doi:10.1111/j.1467-9280.2005.01631.x
- Kang, Y., Gray, J. R., & Dovidio, J. F. (2014). The nondiscriminating heart: Lovingkindness meditation training decreases implicit intergroup bias. *Journal of Experimental Psychology: General, 143*(3), 1306–1313. doi:10.1037/a0034150
- Kok, B. E., Coffey, K. A., Cohn, M. A., Catalino, L. I., Vacharkulksemsuk, T., Algoe, S. B., ... Fredrickson, B. L. (2013). How positive emotions build physical health: Perceived positive social connections account for the upward spiral between positive emotions and vagal tone. *Psychological Science, 24*(7), 1123–1132. doi:10.1177/0956797612470827
- Lai, C. K., Haidt, J., & Nosek, B. A. (2013). Moral elevation reduces prejudice against gay men. *Cognition & Emotion, 28*(5), 781–794. doi:10.1080/02699931.2013.861342
- Lai, C. K., Marini, M., Lehr, S. A., Cerruti, C., Shin, J.-E. L., Joy-Gaba, J. A., ... Nosek, B. A. (2014). Reducing implicit racial preferences: I. A comparative investigation of 17 interventions. *Journal of Experimental Psychology: General, 143*(4), 1765–1785. doi:10.1037/a0036260
- Leiberg, S., Klimecki, O., & Singer, T. (2011). Short-term compassion training increases prosocial behavior in a newly developed prosocial game. *PloS one, 6*(3): e17798. doi:10.1371/journal.pone.0017798

- Minear, M., & Park, D. C. (2004). A lifespan database of adult facial stimuli. *Behavior Research Methods, Instruments, and Computers*, *36*, 630-633. doi:10.3758/BF03206543
- Moore, A., & Malinowski, P. (2009). Meditation, mindfulness and cognitive flexibility. *Consciousness and Cognition*, *18*(1), 176–186. doi:10.1016/j.concog.2008.12.008
- Nosek, B. A., Greenwald, A. G., & Banaji, M. R. (2007). The Implicit Association Test at age 7: A methodological and conceptual review. In J. A. Bargh (Ed.), *Social psychology and the unconscious: The automaticity of higher mental processes* (pp. 265– 292). New York, NY: Psychology Press.
- Nosek, B. A., Sriram, N., Smith, C. T., & Bar-Anan, Y. (2013). *The multi-category Implicit Association Test*. Unpublished manuscript.
- Prinz, J. J. (2007). *The emotional construction of morals*. Oxford, England: Oxford University Press.
- Salzberg, S. (1995). *Loving-kindness: The revolutionary art of happiness*. Boston, MA: Shambhala Publications.
- Scherer, K. R. (2005). What are emotions? And how can they be measured? *Social Science Information*, *44*(4), 695–729. doi:10.1177/0539018405058216
- Singer, P. (2011). *The expanding circle: Ethics, evolution, and moral progress*. Princeton, NJ: Princeton University Press.
- Shiota, M. N. (2014). The evolutionary perspective in positive emotion research. In M. M. Tugade, M. N. Shiota, & L. D. Kirby (Eds.). *Handbook of positive emotions* (pp. 44-59). Guilford Publications.
- Weng, H. Y., Fox, A. S., Shackman, A. J., Stodola, D. E., Caldwell, J. Z., Olson, M. C., ... & Davidson, R. J. (2013). Compassion training alters altruism and neural responses to suffering. *Psychological science*, *24*(7) 1171–1180. doi:10.1177/0956797612469537

Westermann, R., Spies, K., Stahl, G., & Hesse, F. W. (1996). Relative effectiveness and validity of mood induction procedures: A meta-analysis. *European Journal of Social Psychology*, 26(4), 557-580. doi:10.1002/(SICI)1099-0992(199607)26:4<557::AID-EJSP769>3.0.CO;2-4

Table 1. *Participant demographics and descriptive statistics of study variables*

<i>Variable</i>	<i>Loving-Kindness (n = 34)</i>	<i>Neutral Imagery (n = 35)</i>	<i>Statistic</i>
Demographic			
Age in years (SD)	23.29 (3.83)	24.09 (4.61)	
Female (%)	74	72	
Study Variable			
Implicit Bias (IAT): black people	.33 (.41)	.57 (.40)	$t = -2.44^*$
Implicit Bias (IAT): Asian people	.24 (.47)	.23 (.33)	$t = .04$
Automaticity on IAT-1	.55 (.25)	.67 (.21)	$t = -2.20^*$
Cognitive control on IAT-1	.90 (.06)	.82 (.15)	$t = 2.79^*$
Positive other- regarding emotions	2.46 (1.14)	.81 (.80)	$t = 7.02^{***}$
Positive non-other- regarding emotions	2.21 (.86)	1.60 (.68)	$t = 3.27^{**}$

Note: Mean values are displayed with standard deviations in parentheses where applicable. Values for self-reported emotions are 5-point likert scale scores.

IAT = Implicit Association Task.

*** $p < .001$, ** $p < .01$, * $p < .05$

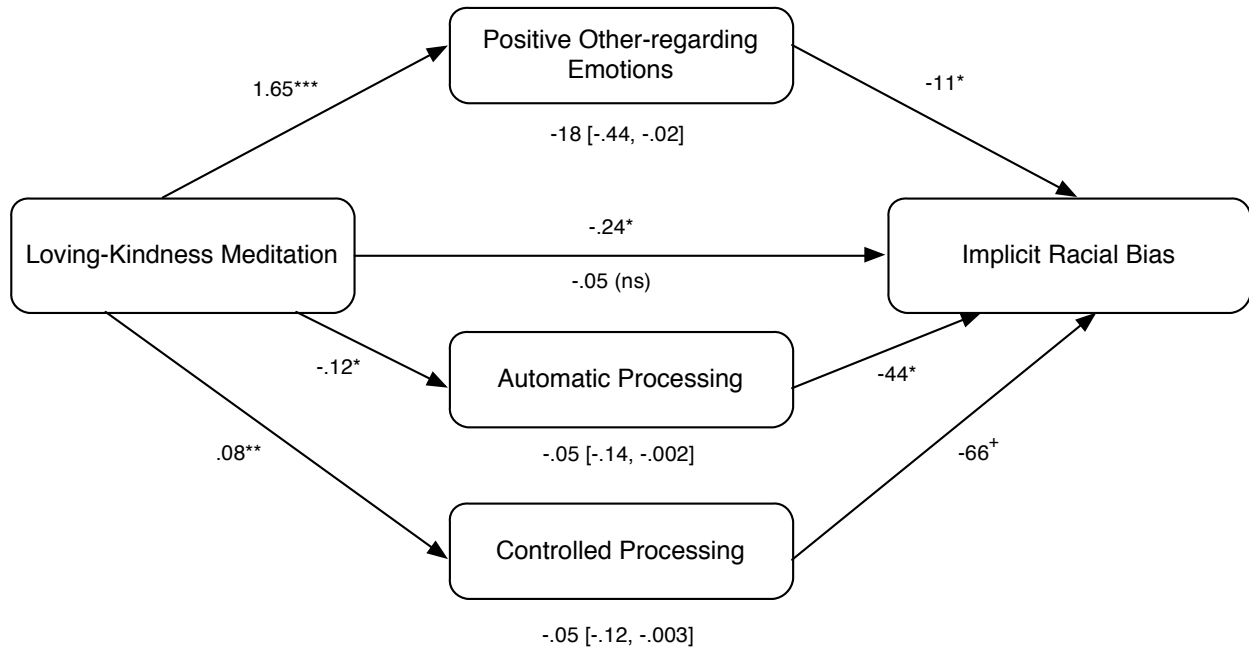


Figure 1. Multiple Mediation Model showing variables that mediate LKM's effect on implicit racial bias. Values are unstandardised regression coefficients with bootstrapped confidence intervals for each mediator's specific indirect effect in square brackets.

*** $p < .001$, ** $p < .01$, * $p < .05$, + $p = .10$