

# Loving-Kindness Meditation Increases Social Connectedness

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The need for social connection is a fundamental human motive, and it is increasingly clear that feeling socially connected confers mental and physical health benefits. However, in many cultures, societal changes are leading to growing social distrust and alienation. Can feelings of social connection and positivity toward others be increased? Is it possible to self-generate these feelings? In this study, the authors used a brief loving-kindness meditation exercise to examine whether social connection could be created toward strangers in a controlled laboratory context. Compared with a closely matched control task, even just a few minutes of loving-kindness meditation increased feelings of social connection and positivity toward novel individuals on both explicit and implicit levels. These results suggest that this easily implemented technique may help to increase positive social emotions and decrease social isolation.

*Keywords:* meditation, compassion, prosocial emotion, emotion regulation, implicit affect

As a species whose survival depends on the ability to build mutually beneficial relationships with others (Brewer, 2004), human beings have a deep-seated need to feel connected, to be trusted and loved, and to trust and love in return (Baumeister & Leary, 1995). Feeling connected to others increases psychological and physical well-being (Brown, Nesse, Vinokur, & Smith, 2003; De Vries, Glasper, & Detillion, 2003; Lee & Robbins, 1998) and decreases the risk of depression and physical ailments (Hawkley, Masi, Berry, & Cacioppo, 2006). A sense of connectedness also increases empathetic responding (Cialdini, Brown, Lewis, Luce, & Neuberg, 1997) as well as acts of trust and cooperation (Glaeser, Laibson, Scheinkman, & Soutter, 2000), which tend to have mutually reinforcing effects: they beget trust and cooperation in return (Fehr & Rochenbach, 2003).

Unfortunately, despite the clear benefits that feelings of social connectedness confer, our society is becoming increasingly isolated and distrustful: technological, economic, and social changes have resulted in smaller social networks (McPherson, Smith-Lovin, & Brashears, 2006), as well as an erosion of basic confidence in the trustworthiness of others (Rahn & Transue, 1998). These observations imply a worrisome predicament: increases in social isolation and mistrust of those outside one's already established social networks may prevent the very signals of cooperation and liking necessary to evoke social connectedness and trusting behavior, leading to a downward spiral in social connectedness and support that is difficult to counteract.

This dilemma is compounded by the apparent difficulty of changing these patterns of affective response. Indeed, research has highlighted the rapid, inflexible nature of automatic habits of

response toward others (Bargh, 1999). These automatic, implicit responses appear resistant to change even in the face of new or contradictory evidence (Gregg, Seibt, & Banaji, 2006), and their effects on behavior can often be difficult to consciously detect or control (Wilson, Lindsey, & Schooler, 2000).

How can we increase feelings of connection at an automatic level, most crucially toward those individuals not yet within our circle of trust? A growing psychological literature has focused on decreasing antisocial behaviors or implicit prejudice. These interventions typically involve efforts to raise awareness about the negative consequences of such prejudice (e.g., Rudman, Ashmore, & Gary, 2001), or exposure to individuals from the disliked, stereotyped group toward whom one holds a positive attitude (Dasgupta & Greenwald, 2001). However, Western science has only recently begun to recognize the benefit not just of counteracting negative, antisocial emotion, but also of *fostering* positive prosocial emotions and behaviors. Even when highlighting the important role of positivity in counteracting implicit negativity, most studies leave unanswered the question of how to generate such positivity in the first place.

Promoting a prosocial orientation has long been at the core of some Eastern philosophies, however. In particular, Buddhist traditions have emphasized the importance of cultivating connection and love toward others through techniques such as *loving-kindness meditation* (LKM). This practice, in which one directs compassion and wishes for well-being toward real or imagined others, is designed to create changes in emotion, motivation, and behavior in order to promote positive feelings and kindness toward the self and others (Salzberg, 1995).

Unfortunately, little empirical research has been done on LKM (Wallace, 2006), and the nature and extent of its effects remains largely unknown. Can a simple meditative practice really create positive feelings even toward strangers, on an implicit as well as explicit level? If so, how far-reaching are these effects? Do they extend only to specific targets of meditation, or can they generalize more broadly?

In the present study, we investigated the efficacy of a short, guided loving-kindness visualization to increase positivity and

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social connectedness toward others. We assessed several different predicted effects of LKM, including changes in mood, explicit evaluations of the self and others, and, most critically, implicit evaluations of the self and others. We also determined the extent to which changes in mood were related to changes in evaluation of self and others.

## Method

### Participants

A total of 93 participants (57% female; mean age = 23.6 years, range = 18–40; 46% Caucasian, 27% Southeast Asian, 14% Asian or Asian American, 5% Latino/Hispanic, 3% Black, 5% other) volunteered for this study. Because extensive experience in meditation has been shown to alter neural structure, and may affect baseline responding (Lazar et al., 2005), participants were excluded if they reported meditating for more than 30 minutes/day. Average meditative practice of participants included in the study was less than 1.7 hours per month. Of participants who reported meditating, only eight reported practicing some version of LKM, and results are unchanged if these participants are excluded from analyses.

### Procedure

To assess the affective impact of LKM, we examined its effects on positive and negative mood. To assess the impact of LKM on affective responses to the self and others, we measured participants' explicit and implicit evaluative responses to photographs of themselves, a close other,<sup>1</sup> as well as three neutral strangers, matched to the participant's gender, age, and ethnicity,<sup>2</sup> before and after a guided visualization directed toward a photograph of one of the neutral strangers. To control for nonspecific effects of meditation on general (nonsocial) emotional responding, we also assessed responses to a nonsocial object (a lamp). All photos were edited to appear against a gray background.

Following baseline assessment of explicit and implicit responses to the six photographs, as well as mood, participants were randomly assigned to complete either a guided loving-kindness meditation (LKM) or neutral imagery induction (IMAGERY). Instructions were presented over speakers, and lasted about seven minutes. All participants began with the instruction to close their eyes, relax, and take deep breaths.

In the LKM condition ( $n = 45$ ), this was followed by instructions to imagine two loved ones standing to either side of the participant and sending their love. After four minutes, participants were told to open their eyes and redirect these feelings of love and compassion toward the photograph of a neutral stranger appearing in the center of the screen. Participants repeated a series of phrases designed to bring attention to the other, and to wish them health, happiness, and well-being.

In the IMAGERY condition ( $n = 48$ ), which was designed to be as structurally similar as possible to the LKM instructions while remaining affectively neutral, participants first imagined two acquaintances that they did not know very well and for whom they did not have strong feelings standing to either side of them. Participants were instructed to focus on each acquaintance's physical appearance. After 4 minutes, the participants were told to open

their eyes, look at a photograph of a neutral stranger, focus their attention on the visual details of the stranger's face (e.g., shape of the eyebrows) and imagine details of the stranger's appearance (e.g., what clothes they might be wearing).

For both groups, a second set of explicit and implicit evaluation measures and mood probes followed the 7-min visualization procedure. Finally, participants completed a set of demographic questionnaires, were thanked, debriefed, and paid.

### Measures

**Mood.** To assess changes in affect accompanying the manipulation, and to examine whether it mediated changes in explicit or implicit evaluations of others, participants indicated their current mood. Positive (*calm, happy, loving*) and negative (*angry, anxious, unhappy*) terms were averaged to create separate positive ( $\alpha = .68$ ) and negative ( $\alpha = .67$ ) mood composites.

**Explicit evaluative responses.** For each picture, participants indicated how connected, similar, and positive they felt toward the subject on a seven-point Likert scale. An explicit positive evaluation composite was created using these responses (average  $\alpha = .82$ ).

**Implicit evaluative responses.** To assess implicit responses to each picture, we used an affective priming task developed by Fazio, Sanbonmatsu, Powell, and Kardes (1986). On each trial, a fixation appeared for 2 s. One of the photographs then appeared for 315 ms, followed by a 135-ms fixation. Each face was presented 18 times in random order, followed once each by nine positive words (e.g., *brilliant, loyal*) and nine negative words (e.g., *cruel, immoral*). Each word appeared for 1,750 ms. Participants were instructed to judge as quickly and accurately as possible whether the word was positive or negative. Implicit evaluations were determined by taking the difference between the average response time to positive and negative words following a particular prime. An implicit positive response manifests as a bias to respond faster to positive words, and slower to negative words, after the prime. Data from six participants who failed to respond or responded incorrectly on >20% of trials were excluded.

## Results

### Mood Effects

To test whether LKM had mood effects compared to IMAGERY, we conducted separate 2 (group)  $\times$  2 (time) analyses of variance (ANOVAs) on positive and negative mood. We observed a significant Group  $\times$  Time interaction for positive mood,  $F(1, 82) = 11.17, p < .001, p_{rep} = .99, \eta_p^2 = .12$ , and a marginal interaction for negative mood,  $F(1, 82) = 3.46, p < .07, p_{rep} = .85, \eta_p^2 = .04$ . Participants in the LKM group became more positive,  $M_{pre} = 4.82, M_{post} = 5.55, t(38) = 5.03, p < .001, p_{rep} = .99, d' = .77$ , and less negative,  $M_{pre} = 2.46, M_{post} = 1.91$ ,

<sup>1</sup> Participants provided a full frontal digital photograph of an age- and gender-matched close other prior to the laboratory session. A photograph was taken of the participant in the lab, just prior to the experimental task.

<sup>2</sup> Photographs of faces were obtained from an online face database developed by Minear and Park (2004).

$t(38) = 4.31, p < .001, p_{\text{rep}} = .99, d' = .60$  following meditation. Mood did not significantly change in the IMAGERY group.

### Explicit Evaluative Responses

To test whether LKM had effects on *explicit* positivity (compared with IMAGERY), we conducted a 6 (photo: self, close, visualization target, neutral 1, neutral 2, object)  $\times$  2 (time: baseline, postvisualization)  $\times$  2 (group: LKM, IMAGERY) repeated-measures ANOVA on the explicit evaluation composite. We predicted and observed a significant three-way interaction between photo, time, and group,  $F(5, 87) = 2.42, p < .04, p_{\text{rep}} = .90, \eta_p^2 = .03$ . Decomposition of this effect indicated that both groups became more positive toward the target after the visualization, LKM:  $t(44) = 5.42, p < .001, p_{\text{rep}} = .99, d' = .89$ ; IMAGERY:  $t(47) = 2.27, p < .03, p_{\text{rep}} = .91, d' = .24$ ; however, this effect was stronger in the LKM group,  $F(1, 91) = 5.80, p < .02, p_{\text{rep}} = .99, \eta_p^2 = .03$ . Furthermore, only the LKM group also became significantly more positive toward the nontarget neutral strangers (both  $t_s > 3.3$ , both  $ps < .002$ ) and toward the object ( $p < .01$ ) (see Table 1). Although this latter finding indicates that the effects we observed arise from a generalized shift toward positive responding, responses to self and close other did not change; moreover, effects of LKM for each neutral face remained significant after controlling for change in positivity toward the object (all  $ps < .01$ ).

To determine whether mood changes accounted for changes in explicit positivity, we performed a mediation analysis using group status and change in positivity as the independent and dependent variables, and mood change as the mediator. Change in positive mood (but not negative mood) significantly correlated with change in positivity toward the target ( $r = .39, p < .001$ ), and average evaluations across the two nontarget strangers ( $r = .33, p < .003$ ). Furthermore, the results of a Sobel  $z$  test (Sobel, 1982) indicated that change in mood partially mediated the difference between the LKM and IMAGERY groups for the target ( $z = 2.19, p < .03$ ), and nontargets ( $z = 1.74, p < .08$ ), although it did not mediate change in positivity toward the object ( $z = 1.24, p < .22$ ). Controlling for mood, the effect of group status on explicit positivity was only marginally significant for the target ( $p < .09$ ), but remained significant, albeit at a reduced level, for the nontarget strangers ( $p < .005$ ). Change in mood explained 10% of the

Table 1  
Change in Explicit Evaluative Responses After Loving-Kindness Meditation (LKM) or Neutral Imagery Induction (IMAGERY)

Photograph	LKM ( $n = 45$ )		IMAGERY ( $n = 48$ )	
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
Target	1.13**	0.21	0.33*	0.15
Nontarget 1	0.62**	0.15	0.08	0.13
Nontarget 2	0.49**	0.14	0.01	0.14
Self	0.13	0.13	0.11	0.08
Close	0.20	0.14	0.06	0.11
Object	0.37*	0.14	0.01	0.14

Note. Presents change pre- to postmanipulation in explicit evaluations, which were assessed by using a 7-point Likert scale.

\*  $p < .05$ . \*\*  $p < .005$ .

change in positivity toward the target, and 5% of change toward the nontarget strangers.

### Implicit Evaluative Responses

To test whether LKM had effects on *implicit* positive evaluations (compared to IMAGERY), we conducted a 6 (face)  $\times$  2 (time)  $\times$  2 (group) repeated-measures ANOVA on the implicit positive evaluation measure. We predicted and observed a significant 3-way interaction between photo, time, and group,  $F(5, 81) = 2.31, p < .04, p_{\text{rep}} = .89, \eta_p^2 = .03$ . Follow-up repeated measures conducted separately for each face indicated that there were significant group  $\times$  time interactions for only two faces: the target of visualization,  $F(1, 85) = 5.80, p < .02, p_{\text{rep}} = .93, \eta_p^2 = .06$ , and the self,  $F(1, 85) = 5.47, p < .02, p_{\text{rep}} = .93, \eta_p^2 = .06$ . Participants became significantly more positive toward the target after LKM,  $t(41) = 2.39, p < .02, p_{\text{rep}} = .93, d' = .36$ , but did not change after neutral imagery,  $t(44) = 1.04, p > .3$ ; see Table 2. A group  $\times$  time interaction also achieved significance for the self; however, paired  $t$  tests comparing changes within each group fell just short of significance. Participants became marginally more positive toward the self,  $t(41) = 1.56, p < .12, p_{\text{rep}} = .80, d' = .22$  after LKM, but marginally more *negative* after IMAGERY,  $t(41) = 1.56, p < .09, p_{\text{rep}} = .83, d' = .24$ . Implicit positivity toward nontarget neutral strangers did not change significantly (both  $ps > .25$ ). No changes were observed in positivity toward the close other or the object, and the increase in positivity seen toward the target in the LKM group remained significant after controlling for changes in positivity either toward the object or the two nontarget neutral faces (all  $ps < .05$ ).

To determine whether mood changes accounted for changes in implicit positivity in a manner similar to explicit positivity, we examined whether mood mediated the effect of group on changes in implicit positivity. However, neither positive nor negative mood change correlated with implicit evaluations, and Sobel tests indicated that mood did not mediate the effects of meditation on implicit responses ( $z = .82, p < .41$ ). Furthermore, the three-way interaction between face, time and group in a repeated measures ANOVA of affective priming remained significant after controlling for change in positive and negative mood ( $p < .02$ ).<sup>3</sup> Mood accounted for <1% of the change in implicit positivity for both the target and neutral strangers. Thus, although changes in mood accompanying meditation appeared to mediate changes in explicit positivity toward others, they did not account for changes in implicit positivity.

### Discussion

The benefits of identifying techniques for increasing social connection and positivity are increasingly apparent in the face of rising societal isolation and distrust. Yet while it is easy to espouse high-minded ideals of love and harmony with all individuals, it is often quite difficult to implement them. The process of impression formation can proceed spontaneously and without conscious effort (Todorov & Uleman, 2003), and in situations of cognitive load, for example, resources may not be available to monitor and control the

<sup>3</sup> Results were comparable when controlling for raw mood measures.

Table 2  
*Change in Implicit Evaluative Responses After Loving-Kindness Meditation (LKM) or Neutral Imagery Induction (IMAGERY)*

Photograph	LKM ( <i>n</i> = 42)		IMAGERY ( <i>n</i> = 45)	
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
Target	53.88*	22.55	-23.83	22.98
Nontarget 1	27.93	28.09	-43.24	16.07
Nontarget 2	29.95	22.33	-3.53	26.07
Self	25.91	20.43	-32.67	17.59
Close	-21.64	22.04	14.27	18.79
Object	9.66	18.76	5.57	21.23

*Note.* Table presents change pre- to postmanipulation in implicit evaluations, which were measured as response time bias in milliseconds.

\*  $p < .05$ .

expression of more automatic evaluative responses (Van Knippenberg, Dijksterhuis, & Vermeulen, 1999). Furthermore, although external, stimulus-driven cues (such as category membership or descriptions of a person's moral behavior) can quickly create implicit evaluations (Castelli, Zogmaister, Smith, & Arcuri, 2004), it is less clear that automatic affective responses can be as easily manufactured through top-down, intentionally controlled processes. Can conscious efforts to achieve socially harmonious motivations create real, automatic affective responses?

The present study demonstrated significant effects of loving-kindness meditation on both explicit and implicit positivity toward neutral strangers. Even a brief (7-min) exercise in cultivating positive regard was sufficient to induce changes of small to moderate effect size. These results were observed in comparison to a tightly matched neutral imagery task that controlled for effects of exposure, relaxation, and cognitive activity. On an explicit level, LKM had both general and specific effects, increasing positivity significantly not only toward its target, but also toward other strangers. On an implicit level, however, the effects of meditation were most pronounced for its target, with little or no impact on responses toward nontarget neutral strangers. Some changes in implicit positivity were also observed toward the self, a finding in keeping with one of the goals of LKM, to become more accepting of the self. Changes in mood mediated effects on explicit evaluations, but neither mood nor explicit evaluations accounted for the implicit effects.

The convergence and divergence of the effects of LKM on explicit and implicit responding raise a number of interesting questions, and suggest several avenues for future research. One particularly interesting question concerns the ways in which explicit or implicit effects of LKM relate to social behavior. Implicit measures such as the Implicit Association Test or the affective priming task used in this study may be more difficult to consciously manipulate than explicit reports (Kim, 2003). Moreover, explicit attitudes often predict controlled behavior while implicit measures predict spontaneous, nonverbal behavior (e.g., Dovidio, Kawakami, & Gaertner, 2002). Future research will be needed to determine whether the implicit positivity that we observed in this study is more strongly tied to pro-social behavior than explicit reports, or predicts behavior under conditions of cognitive load.

The results of our study provide the first evidence that LKM can impact responding at an automatic level, but raise important questions concerning mechanism. Of particular importance will be to

determine the active ingredients that made our manipulation successful, particularly at the implicit level. LKM may be viewed as a single instantiation of a family of internally generated, consciously controlled techniques for regulating emotion and motivation (Gross, 1998), and was associated with large changes in mood and affect. However, simple explicitly reported mood changes did not account for increases in implicit positivity. Future work will thus be needed to develop a more detailed understanding of the critical emotional and cognitive factors mediating the effects of meditation on implicit evaluations. Are the implicit effects we observed primarily driven by particular affective or physiological changes induced by the meditation, or are they driven more by the repetition of particular thoughts during the procedure?

Although we used a control condition that matched LKM for many low-level features, such as simply viewing a person's face, there are also many ways in which the two procedures may have differed. LKM may have recruited processes of verbal elaboration, perspective taking, and emotional or physiological arousal that may have contributed either separately or in combination to the explicit and implicit effects we observed. One way to tease apart the contribution of these different ingredients will involve investigating the efficacy of simpler methods containing single elements of the LKM procedure. For example, would simple perspective taking or individuation (e.g., Wheeler & Fiske, 2005) be enough to induce the implicit positivity observed as a result of LKM? Would externally produced positive mood induction be equally effective, or do effects depend on the *type* of emotion induced (e.g., pride vs. compassion)?

Another set of questions arises when comparing our manipulation to loving-kindness meditation as it is typically practiced. Often, the focus in LKM is on expanding compassion and care to larger social groups, or even to disliked others. In our study we required participants to focus on a single, neutral individual. We observed generalization to other, nontarget individuals at an explicit level, but these effects did not translate as strongly to implicit evaluations. Whether a meditative practice with a more expansive focus, in which people focus not on a single individual but deliberately attempt to evoke compassion for larger numbers of people, can have effects on implicit positivity remains an open question. Can love or concern be fostered in a way that extends to others who have not been the direct focus of the meditation? Can it be used not just to induce positive emotion toward neutral strangers, but to counteract the automatic negative feelings engendered by disliked others, such as competitors or people with whom one has had difficult or upsetting interactions? In our study, participants focused on a person of the same gender and race, making the target of meditation fairly similar. Would meditation be as effective if it were focused on out-group members? How does it compare in effectiveness to other techniques for reducing explicit or implicit negative attitudes (e.g., Rudman et al., 2001)?

A final set of questions concerns the durability and real-world consequences of these effects. A small but growing literature suggests that other types of meditation may have important benefits for mental well-being and immune function (Davidson et al., 2003). Does LKM have similar effects? Can it impact real-life decision-making behavior, or have effects that endure beyond a single laboratory session? One outcome of continued meditative practice may be to transform the transient affective changes that occur during and shortly after meditation into longer lasting, more

habitual patterns of responding (Brefczynski-Lewis, Lutz, Schaefer, Levinson, & Davidson, 2007; Cahn & Polich, 2006), but it is not yet known whether practiced loving-kindness meditators would show more long-lasting or stronger effects. We believe that questions such as these will guide the development of effective interventions to increase a more deeply rooted sense of connection, compassion, and concern for others in our daily lives.

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