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EFFECTS OF LOVING-KINDNESS MEDITATION ON PROSOCIAL BEHAVIOR: EMPIRICAL AND META-ANALYTIC EVIDENCE

ABSTRACT

- *Purpose.* Brief Loving-Kindness meditation (LKM) is introduced here as a valid social marketing intervention. LKM positively influences prosocial cognitions and affects. However, it remains unclear whether brief meditation interventions can influence prosocial behavior. This study aims to provide evidence of the effects of short LKM on prosocial behavior.
- *Design/methodology/approach.* The study reports the results of three experiments examining the effects of brief LKM on donations to unknown others. Results are then integrated with the results of seven other studies testing the effects of brief LKM on prosocial behavior using a meta-analysis (n=683).
- *Findings.* LKM increased love more than the control group (focused breathing) in the three experiments; however, its effects on donations were mixed. The meta-analysis shows that LKM has a small-to-medium significant effect compared to active control groups ($d=0.303$); moreover, age and type of prosocial measure used moderate the effects.
- *Originality.* Results suggest that LKM can nurture prosocial emotions such as love and lead young individuals to donate. However, these emotions may not be sufficient to lead adult meditators to share their resources with unknown others. This study presents the first meta-analysis of brief LKM and provides insights into the use of meditation in social marketing programs.

KEYWORDS: meditation; mindfulness; pro-social; donation; meta-analysis; behavioral change

1. Introduction

Enabling prosocial behavior towards unknown and distant others is one of the objectives of social marketing programs (French and Russell-Bennett, 2015; Hübscher et al., 2021; Wood, 2012), given that prosocial individuals not only have greater individual well-being but can also contribute to social change (Donald *et al.*, 2019). Social change is “the process of transforming thought, behaviour, social relationships to generate beneficial outcomes for individuals, communities... beyond the benefits for the instigators of transformations” (Stephan et al., 2016, 1252). By transforming individual thinking, feeling and acting, social change programs bridge the individual and system approaches to social marketing. Individual change enables the achievement of social change (Brennan *et al.*, 2016; Previte and Brennan, 2017), because, eventually, any societal change is produced by individuals (O’Cass and Griffin, 2015; Saunders *et al.*, 2014) that relate to one another and act upon structural contexts (Fry *et al.*, 2017). Therefore, prosocial capabilities are a particularly relevant target of social marketing programs, since they are instrumental in establishing the relationships that will, in turn, facilitate the reciprocal exchange of resources necessary for social value creation (French and Russell-Bennett, 2015; Lefevre, 2012; Saunders *et al.*, 2015).

Within the micro-managerial perspective of social marketing (Fry *et al.*, 2017), past work has largely focused on the role of communication campaigns in stimulating prosocial behavior (Allred and Amos, 2017; Huang and Yoon, 2021; Jang, 2021). Yet, more recently, attention has been shifted to other interventions that may nurture prosocial dispositions among individuals and that, by extension, may enable the performance of prosocial actions such as donating or volunteering (Mason, 2013). Among these interventions, gamified approaches (Saleme *et al.*, 2020) or immersive documentaries (Breves, 2020) have effectively increased compassion and issue involvement. Meditation is a similar intervention with potential effects

on prosocial dispositions and behavior (Donald *et al.*, 2019; Roddy and Roy, 2019). All these approaches are aligned with the social marketing ethos of engaging with existing ideas and practices in our social world (Lefevre, 2012) if they may "benefit individuals and communities for the greater social good" (Harris, 2022, 358).

Meditation facilitates prosocial behavior or acts that promote another person's (or multiple people's) well-being (Berry *et al.*, 2020: 1251). Since meditation can help individuals transcend a self-centered focus and cultivate empathy towards other living creatures (Condon, 2019; Hafenbrack *et al.*, 2020), it can be used in transformative social marketing programs that require nurturing interconnectedness and developing interpersonal competencies as a condition for larger and wider system change (Domegan, 2021; Saunders *et al.*, 2015).

There are many forms of meditation, including secular and religious contemplative activities (Nash and Newberg, 2013). A prominent type of meditation focused on ethical and socioemotional awareness is Loving-Kindness Meditation (LKM), characterized by having other beings as the attentional object of the practice. LKM consists of cultivating positive emotions towards oneself and others, whether loved ones or disliked ones, by sending wishes for peace, happiness, and well-being (Fredrickson *et al.*, 2017). This Buddhist-derived form of meditation seems more adequate than secular meditation (Chen and Jordan, 2020) to elicit prosocial behavior because of its focus on cultivating attitudes of love and caring that should eventually result in kindness towards others (Bankard, 2015; Hutcherson *et al.*, 2008; Zeng *et al.*, 2015).

Even so, two aspects that merit attention have been overlooked in past work. First, most existing evidence is based on long LKM courses spanning between 3 and 8 weeks. It needs to be clarified whether brief or short interventions (one-shot practices of less than 20 minutes, Heppner and Shirk, 2018) produce similar behavioral outcomes. Brief LKM interventions have effectively reduced implicit biases and elicited other-focused concerns (Hutcherson *et al.*,

2008). If brief interventions are effective, they could be implemented in various settings (Hafenbrack *et al.*, 2020), including fundraising events, co-creation sessions, and educational settings. Moreover, with the growing availability of self-guided online videos and apps (Galante *et al.*, 2014; Heppner and Shirk, 2018), understanding the prosocial outcomes of short LKM practices may open possibilities for target segmentation and for identification of promising online channels to insert prosocial messages, as the inclusion of prosocial native advertising in meditation-focused media would increase ad-context congruence which facilitates ad involvement (Huang and Yoon, 2022).

Second, there is limited and inconclusive empirical evidence on the effects of LKM on behaviour or actual prosocial choices, which has prompted calls for more research (Condon, 2019; Donald *et al.*, 2019; Roddy and Roy, 2019). Not only evidence is scant, but it is also contradictory: participants in an eight-week compassionate meditation training course were more likely to help an unknown other (Condon *et al.*, 2013) but not more likely to help a problematic target (a rude individual) (Condon, 2019). Similarly, Chen and Jordan (2020) found that participants in a long LKM course were more likely to donate to others than controls or participants in a mindfulness training course. Still, the amount donated was no different from the control.

One potential reason for the conflicting evidence in long-term interventions is the presence of confounding factors, such as multimodality (Berry *et al.*, 2020). Long-term interventions, such as those based on the most cited mindfulness-based stress reduction program (Kabat-Zinn, 1994), usually include different types of meditation, which may make it difficult to isolate the effect of LKM on behavior (Berry *et al.*, 2020). Also, studies may add LKM to courses based on mindfulness meditation (as in the study described by Chen and Jordan, 2020). This combination may hinder the internal validity of the causal relationship since it is difficult to attribute the effect to one type of meditation or the other or to establish

whether synergistic effects exist. Even if the delivered meditations are of a single type (as in Condon *et al.*, 2013), in long-term studies, it is difficult to control the actual meditation practice of participants and the other activities they may engage in, these other activities may act as confounding factors in the relationship examined (Zeng *et al.*, 2015). Thus, to explore the effects of LKM on prosocial behavior, short interventions may increase the internal validity of experimental studies, as they provide greater control over possible confounding factors (Berry *et al.*, 2020; Creswell, 2017; Donald *et al.*, 2019; Davidson and Kaszniak, 2015; Heppner and Shirk 2018; Kreplin *et al.*, 2018). Short interventions are especially adequate to examine whether LKM elicits other-focused emotions, such as love, that can explain altruistic behavior towards unknown others (Cavanaugh *et al.*, 2014).

Against this background, we aim to offer rigorous evidence of the effects of short LKM practice on prosocial choices so that social marketers can make informed decisions about adequate interventions (Gordon *et al.*, 2016; Harris, 2022). An enhanced understanding of the behavioral, cognitive, and emotional aspects of LKM practice may provide a strong foundation for social marketing initiatives that resonate with individuals at a deeper, emotional level, potentially increasing engagement (Bankard, 2014; Leiberg *et al.*, 2011; Lutz *et al.*, 2008). We acknowledge that the operation of personal agency within a vast network of social interactions influences social systems, as posited by Social Cognitive Theory (Bandura, 2001). Therefore, our research supports the shift in social marketing towards a systems-level perspective and upstream social marketing approaches insofar as nurturing emotions of love nurtures dispositions and actions towards the social good that can subsequently motivate action to transform the structures in which individuals operate (Dibb, 2014; Lefevre, 2012; Gordon *et al.*, 2016; Wood, 2016).

To achieve this aim, the study reports the results of three experiments examining whether LKM elicits greater prosocial behavior compared to an active control group. Based on

the single-paper meta-analysis approach (McShane and Böckenholt, 2017), these results are later integrated with the past findings of six studies, reported in five papers, that test the effect of short LKM practice on prosocial behavior (Engel *et al.*, 2020; Hafenbrack *et al.*, 2020; Hirshberg *et al.*, 2018; Miyahara *et al.*, 2020; Reb *et al.*, 2010) using a meta-analysis ($k=10$; $n= 683$). Results show that brief LKM has a small-to-medium effect on prosocial behavior. Notwithstanding, effects are nonsignificant among community samples and when actual measures of prosocial behavior are used. The implications for the theory and practice of social marketing are discussed.

2. Loving-Kindness meditation nurtures prosocial dispositions

Social marketing has limitedly considered meditation as a social change intervention, despite encouragement to engage with “ideas and social practices that are part of our social world” (Lefevre, 2012, p. 118). Meditation is one of the constitutive practices of mindful marketing (Kumar *et al.*, 2023) that can enable individuals to pursue social transformation in different domains where social marketing is applied (Saunders *et al.*, 2015). Meditation has been used to increase individuals’ well-being and health (Galante *et al.*, 2014), to help reduce substance use disorders (Chiesa and Serretti, 2014), addictive or compulsive behavior (Turgon *et al.*, 2020) and to promote mindful consumption (Sheth *et al.*, 2011). Further, a rich scholarship on meditation has demonstrated that meditation nurtures socioemotional capabilities for transformative social and environmental action (Gómez-Olmedo *et al.*, 2020) which is consistent with the capabilities approach to social marketing (Saunders *et al.*, 2015). Contrary to prompts or nudging, meditation aims to fundamentally change our inner dispositions to facilitate better relationships with oneself and with other sentient beings (Galante *et al.*, 2014). For this, meditation is a practice consistent with social marketing ethical principles (Harris, 2022; Lefevre, 2012).

Meditation practices are aimed at self-regulating one's attention toward a selected object of awareness, with varying forms depending on the focus and context of attention as well as the emotional state it intends to arise (Nash and Newberg, 2013). All meditation techniques share “the intentional training of attention and awareness, such that consciousness becomes more finely attuned to events and experiences in the present” (Shapiro *et al.*, 2011, p. 494). Developing ethical and socioemotional awareness has attracted increasing scholarly attention during the last decades through the study of interventions grounded in Buddhist wisdom (Van Gordon *et al.*, 2021). Meditative techniques that focus on nurturing ethical and empathic awareness are especially adequate to enable prosocial behavior (Condon *et al.*, 2013; Hutcherson *et al.*, 2008).

Specifically, LKM is a prominent Buddhist-derived form of meditation where the focus of attention is placed on others to develop a mental state of unconditional kindness to all beings (Hoffmann *et al.*, 2011). This meditation intends to specifically nurture one of the four immeasurable attitudes towards all beings (loving-kindness) (Zeng *et al.*, 2015) by cultivating positive emotions and increasing one's sense of connection with others (Hutcherson *et al.*, 2008; Zeng *et al.*, 2017). In doing this, LKM practice enables decentering or disengaging from the usual self-based reactions and engagement with the universal ability for love and empathy (Kristeller and Johnson, 2005).

Meta-analytical evidence shows the ability of LKM to reduce negative interpersonal attitudes, which could also indirectly facilitate prosocial behavior (Zhou *et al.*, 2022). The practice of LKM has been shown to increase cognitive flexibility (Leiberg *et al.*, 2011) and neural activity in the limbic regions (Lutz *et al.*, 2008), which are associated with positive emotions (Fredrickson *et al.*, 2008; Zeng *et al.*, 2015), notably other-focused emotions such as compassion or love (Condon, 2019; Kang *et al.*, 2015; Lutz *et al.*, 2008; Seppala *et al.*, 2014). LKM has also been associated with a reduced bias towards others (Kang *et al.*, 2014; Stell and

Farsides, 2016), resulting in feelings of social connectedness and empathy (Hofmann *et al.*, 2011), and kindness towards others (Bankard, 2015; Hutcherson *et al.*, 2008; Zeng *et al.*, 2015). All these emotions are implicated in prosocial behavior (Parkinson *et al.*, 2018).

This scholarship suggests that, because of its positive individual and social benefits, LKM has the potential to be added to the already proven effective and ethical programs for social good (French and Russell-Bennett, 2015). Specifically, meditation seems a suitable intervention within the ABC framework for social marketing interventions (Bennett and Vijaygopal, 2019), as it facilitates awareness of beneficiaries, nurtures a sense of connection with them, and generates commitment to alleviate their suffering.

Insofar as LKM elicits self-transcendent emotions such as love and wholesome desires conducive to other's well-being (Hofmann *et al.*, 2011), it is particularly well-suited to promote prosocial behavior, compared to other meditations that focus on present-moment awareness (Chen and Jordan, 2020). Whereas concentrative meditations facilitate decentering or reduction of repetitive thoughts (Feldman *et al.*, 2010), LKM enables directed attention towards others and their well-being, and for this, it is considered a more suitable intervention to facilitate helping behavior (Kristeller and Johnson, 2005). Indeed, brief LKM interventions have proven effective at reducing implicit biases toward others (Hutcherson *et al.*, 2008) and nurturing empathetic responses and perspective-taking (Bankard, 2015; Hafenbrack *et al.*, 2020). In addition, LKM has been shown to be more effective for prosocial behaviour than other self-focused practices, in that LKM does not inhibit guilt-induced reparative behaviours (Hafenbrack *et al.*, 2022).

However, meta-analyses have shown that other forms of meditation, such as mindfulness-based meditations, are as effective as LKM in their ability to elicit positive emotions, reduce judgmental perceptions of others, and increase perspective-taking and empathetic concern (Donald *et al.*, 2019; Luberto *et al.*, 2018). Also, a recent experiment

comparing LKM with active control (focused breathing) found no differences between groups in compassionate responding, empathy, and perspective-taking (Hafenbrack *et al.*, 2020).

LKM can have a greater impact on prosocial choices than meditations with a focus on present-moment awareness because of its specific aim of eliciting love, a genuine desire for well-being for oneself and others (Hafenbrack *et al.*, 2022; Zeng *et al.*, 2015). Whereas positive emotions have been repeatedly proven antecedents of prosocial behavior (Shiota *et al.*, 2021), not all positive emotions lead individuals to help distant others. Instead, love (and not other positive emotions such as hope, pride, or compassion) enhances prosocial actions aimed at unknown others (Cavanaugh *et al.*, 2015). Because love changes the boundaries of caring and concern and broadens the self to connect with unknown others socially, this emotion is implicated in altruistic behavior (Cavanaugh *et al.*, 2015).

Given these arguments, we expect that LKM would elicit love among meditators, who would then exhibit greater prosocial behavior, i.e., being more willing to share their resources with unknown others. In contrast, participants in an active control group (with a focus on present-moment awareness) would not experience love and would be less willing to donate.

3. Overview of studies

Three experimental studies were conducted to test the prosocial behavioral outcomes of a brief LKM practice. In all the experiments, participants were invited to participate in a meditation event and were randomly assigned to a LKM meditation or an active control group (focused breathing). The use of active control groups is recommended, as expectancy effects about the outcomes of meditation may bias results (Asher *et al.*, 2017; Ridderinkhof *et al.*, 2017). This bias is especially more significant with passive control groups (waitlists). Indeed, meta-analysis and reviews on meditation and prosocial measures have found that LKM has moderate effects on prosocial dispositions when compared with passive controls; when

compared with active control groups, the results are mixed (Berry *et al.*, 2020; Galante *et al.*, 2014, Luperto *et al.* 2018) and non-significant in brief interventions (Hafenbrack *et al.* 2020).

In addition to using an active control group, we double-blinded the interventions to avoid expectancy biases (Kreplin *et al.*, 2018; Miyahara *et al.*, 2020; Zeng *et al.*, 2015). Following the methodological suggestions by Kreplin *et al.* (2018), the person leading the intervention was not a co-author in the publication. Finally, in all studies, we controlled for previous dispositions of individuals, such as dispositional altruism and mindfulness-as-a-trait, as these traits influence prosocial behavior (Chen and Jordan, 2020; Donald *et al.*, 2019; Fernando *et al.*, 2017).

The reported studies differed in the measure of prosocial behavior, the population under study, and the measure of emotions used as a manipulation check. The first two studies used the dictator's game, a much-used measure of prosocial behavior (e.g., Ashar *et al.*, 2016; Leiberg *et al.*, 2001; Weng *et al.*, 2013), whereas the last one used a non-hypothetical measure of donations to increase validity (Condon, 2019). Participants in the first study were university members (students and staff), whereas the second and third studies were based on a community sample. It should be noted that the student sample in Study One was not typical of those often used in psychological research. These students did not receive any academic credit or payment for participating in the experiment; instead, they voluntarily responded to a call to enroll in a mindfulness activity at the University.

Given that both LKM and focused breathing increase state mindfulness (Hafenbrack *et al.*, 2020), we used the emotions elicited by the intervention (i.e., love) as a manipulation check. Whereas in studies 1 and 2, a freely elicited measure of emotions was used, in study 3, emotions felt after the practice were measured using the modified differential emotions scale (Fredrickson *et al.*, 2003), which is a comprehensive measure of emotions widely used in past meditation studies (e.g., Fredrickson *et al.*, 2017).

For testing the significance of a coefficient in a multiple linear regression with five variables, supposing a low effect size $f^2=.15$ (Cohen, 1992), power = .8, and alpha = .05 (Faul *et al.*, 2007), a sample size of 55 in each of the experiments was necessary. The valid sample of the pilot study (Study 1) was a bit underpowered to detect differences ($n=52$), whereas the valid samples of Study 2 and 3 exceeded the recommended size. The confidence intervals of the hypothesis tests are offered to avoid the risk of overstating the effect sizes. Therefore, sample sizes were adequate to detect differences between groups or to test the significance of a single coefficient in multiple linear regression. If non-significant results were found, these should not be attributed to limited power.

To ensure the internal validity of the sample, one-way ANOVA analyses (or t-tests) were used to carry out attrition, randomness, and manipulation checks in each study. To test the effects of the interventions on prosocial behavior, we first used t-tests to examine whether there were differences in the outcome variables between the LKM and control groups. Additionally, to control for potential confounds suggested by previous literature, we estimated for each study a multiple linear regression model, where the dependent variable was the prosocial outcome and the independent variables were a binary variable that took value 1 for the LKM group and 0 for the control group, adding as covariates, gender, age, dispositional altruism, mindfulness-as-a-trait, and previous meditation experience. Because the dependent variable (pro-social action) was quantitative, a linear regression technique was suitable for this. Inference on the significance of coefficients was made using robust heteroskedastic standard errors.

3.1. Study 1 (pilot study)

Participants. 53 students and university staff (75.4 % women; $M_{age}= 25.4$ years) responded to a call to take part in a mindfulness-based activity. For the randomization, participants were gathered at the university hall, and each was given a colored-labeled sticker; each color

corresponded to one of the two groups. All participants were blind as to which was the experimental condition (Davidson and Kaszniak, 2015) and were not offered a tangible reward for their participation (Miyahara *et al.*, 2020).

Intervention. The structure of the session was similar for the two groups. After completing the first questionnaire, with the baseline measures (*Altruism, Meditation experience, Mindfulness-as-a-trait, Demographic questions*), participants were requested to listen to audio. The two audios were equal in length (11 minutes), beginning with a 3-minute breathing exercise and ending with a 1-minute silence. To finalize the exercise, participants were asked to write on a piece of paper five adjectives that reflected how they felt after the meditation. All audios were recorded by a certified meditation instructor (Davidson and Kaszniak, 2015).

The LKM recording was designed following meditation practices that cultivate compassionate love toward the self and engagement with others (Kristeller and Johnson, 2005). They were instructed to repeat the sentences “May I be happy,” “May I dissolve my suffering,” “May I be healthy,” “May life smile at me and be fulfilled,” and “May the peace be in my heart”. Participants were then asked to shift their focus to an interpersonal meditation and gradually expand their awareness towards relatives, strangers, a problematic person, humanity, and the whole universe, sending them compassionate care and love messages (Zeng *et al.*, 2015). For the active control group, a focused-breathing (FB hereafter) practice was chosen (Feldman *et al.*, 2010). They were guided to place attention on the awareness of the physical sensations and a non-judgmental stance towards emotions, thoughts, and feelings that could emerge during the practice. The content of this audio was designed following the recommendations of initial formal meditation practices (Carmody and Baer, 2008).

Finally, participants were asked to participate in a seemingly unrelated exercise to help a research group with a study. This task was designed to elicit a pro-social choice based on the well-known dictator game (McCall *et al.*, 2014; Reb *et al.*, 2010). The task was explained as

follows: “Imagine that in the next room, there is one of the participants who will be your partner in the next game. We will give you the option to share 100 euros with them. Your partner in the other room does not have the right to claim, and you will be the only one responsible for the distribution of the money. Also, s/he will not know your identity. Indicate from 0 to 100€ how much money you would give to your partner.” The amount of money given was used as the dependent variable. Participants were then debriefed and thanked.

Altruism. Dispositional altruism was measured with a single item capturing monthly donations (*How much money do you donate to non-profit organizations per month?*). The question had eight possible responses from “0 euros” to “more than 60 euros”.

Meditation practice. Meditation practice was measured with the frequency of meditation (6-point scale from daily to never).

Mindfulness-as-a-trait. The Spanish version of the 15-item Mindful Attention Awareness Scale (MAAS; Brown and Ryan, 2003; Soler *et al.*, 2012) was used to assess attention to and awareness in day-to-day life. Sample items include “It seems I am ‘running on automatic’ without much awareness of what I’m doing” or “I find it difficult to stay focused on what’s happening in the present.” Ratings were made on a 6-point scale where higher scores indicate greater mindfulness. The MAAS scale is a simple, easy-to-administer scale, and since it has a unidimensional factor structure, it gives a single score of dispositional mindfulness (Soler *et al.*, 2012). Moreover, the wording of the items, formulating mindless rather than mindful states, was adequate for the sample of this study that did not have to have certain knowledge or experience with mindfulness practices (Brown and Ryan 2003). The internal consistency of the scale was good ($\alpha=.762$). Other demographic variables used as control were sex and age.

As a *manipulation check*, we coded the adjectives freely elicited by participants after the meditation. Specifically, we measured the words related to the semantic field of the emotion of love. If the manipulation were effective, we would expect a greater report of the emotion of

love in the LKM group than in the active control group. A free elicitation system has the advantage that the most salient emotions for participants would be reported, thus avoiding overreporting of emotions that may not have been fundamentally experienced but could be chosen when seen in a list.

In a free elicitation method, participants use different words to refer to the same emotion. The procedure established by Rangel *et al.* (2014) was followed to assess the correspondence of each word with a specific emotion. Different grammatical variants of the same word (due to gender, number, or misspelling) were unified into a single word. This procedure yielded 189 other words, codified by four researchers unaware of the condition to which the participant was assigned. Following Rangel *et al.* (2014), a four-level coding was chosen to classify the word into the semantic field of the emotion: 3, if the word was almost always used in the context of the related emotion; 2, if the word was frequently used in that context; 1, if the word could be slightly related to the emotion and 0 if the word does not bear any relation to the said emotion. This value was rescaled to a 0-1 discrete variable. So, a word with a score of 1 means that all the coders have considered that this word is always or very often used to reflect “love.” Because participants can express their emotions in many ways, this procedure allows for capturing this variability while simultaneously facilitating the posterior analyses. Cohen’s weighted kappa coefficient with a bi-quadratic weighting scheme was used (Fleiss and Cohen, 1973). The level of agreement among coders was moderate, almost substantial (.59) (Sim and Wright, 2005). Then, the participant’s score in “love” emotion was computed by averaging their word scores in such emotion.

Attrition check. One participant was excluded because s/he did not complete the second questionnaire. This resulted in an attrition of 1.9%. Three participants reported meditating at least five times per week. Results did not change when these participants were excluded from

the sample, so we retained them in the analysis. The valid selection for each group was then 26 (LKM) and 26 (FB). Table 1 depicts the descriptive statistics and correlations of measures.

Randomness check. ANOVA tests were conducted to test homogeneity between groups practising LKM and FB on the control variables. No differences were found (Altruism: $M_{LKM}=5.384$; $M_{FB}=6.346$; $F=.090$; $p=.768$; Mindfulness-as-a-trait: $M_{LKM}=3.454$; $M_{FB}=3.600$; $F=.650$; $p=.328$; Meditation: $M_{LKM}=.308$; $M_{FB}=.615$; $F=1.000$; $p=.323$; Female: $P_{LKM}=76.9$; $P_{FB}=73.1$; $F=.100$; $p=.755$; Age: $M_{LKM}=25.0$; $M_{FB}=25.8$; $F=.1.000$; $p=.322$).

Manipulation check. A t-test was conducted to test if the two groups had differences in the experience of love. Results show that the manipulation was effective ($M_{LKM}=1.182$; $M_{FB}=.654$; $t=2.390$; $p=.021$).

TABLE 1 HERE

Main effects. The average money given to a stranger in the dictator game was 50.35€ in the LKM group and 43.46€ in the FB group. A t-test showed that the difference was significant, with a medium effect size (Cohen, 1992), ($t=2.059$; $p=.045$, Cohen's $d=.57$), being the 95% confidence interval for the mean difference [.169; 13.600]. When Altruism, Mindfulness-as-a-trait, Meditation practice, gender, and age were added as control variables in a linear regression model, the beta coefficient of the meditation group was positive and significant ($\beta =6.561$; $p=.040$), the 95% confidence interval [.292; 12.829] (Table 4). None of the control variables were significant.

3.2. Study 2

Participants. 74 participants responded to a public call to take part in a mindfulness-based activity (68.9 % women; $M_{age}=43.8$ years) and the same procedure for random allocation to each of the groups was used.

Intervention. The structure of the session and the measures used were identical to those described in Study 1.

Attrition check. All participants filled out questionnaire 1; 6 cases did not respond to the second questionnaire or wrongly introduced the code, and the questionnaires could not be matched. This resulted in an attrition rate of 8.1%. To examine whether respondents and non-respondents were similar, t-test analyses were conducted. No significant differences were found, but for dispositional altruism: those excluded from the sample donated, on average, significantly more money than the rest of the participants ($M_{\text{excluded}}=28.33$; $M_{\text{sample}}=10.15$). (Altruism: $t=-2.772$; $p=.007$; Mindfulness-as-a-trait: $t=1.041$; $p=.301$; Meditation: $t=-.220$; $p\text{-value}=.826$; Female: $t=1.038$; $p=.303$; Age: $t=-1.185$; $p=.240$).

Three participants reported meditating at least five times per week. Results did not change when these participants were excluded from the sample, so we retained them in the analysis. The valid sample for each group was then 35 (LKM) and 33 (FB). Table 2 depicts the descriptive statistics and correlations.

TABLE 2 HERE

Randomness check. ANOVA tests were conducted to test homogeneity between groups receiving LKM and FB on the control variables. No differences were found (Altruism: $M_{\text{LKM}}=12.143$; $M_{\text{FB}}=8.030$; $F=1.330$; $p=.253$; Mindfulness-as-a-trait: $M_{\text{LKM}}=3.827$; $M_{\text{FB}}=3.675$; $F=.590$; $p=.444$; Meditation practice: $M_{\text{LKM}}=.657$; $M_{\text{FB}}=.757$; $F=.100$; $p=.752$; Female: $P_{\text{LKM}}=68.6$; $P_{\text{FB}}=72.7$; $F=.140$; $p=.712$; Age: $M_{\text{LKM}}=43.8$; $M_{\text{FB}}=42.6$; $F=.160$; $p=.686$).

Manipulation check. A t-test was conducted to test differences in the reported emotion of love between the two groups. Results showed that the manipulation was effective ($M_{\text{LKM}}=1.629$; $M_{\text{FB}}=1.061$; $t=2.135$; $p=.036$).

Main effects. Participants in the LKM group gave a mean amount of 58.28 euros, whereas those in the FB group gave an average amount of 54.54 euros. The t-test did not show any significant difference between groups ($t=.728$; $p=.469$; Cohen's $d=.176$), being a 95% confidence interval for the mean difference [-13.994; 6.513]. When the donation was regressed against the

intervention and control variables, non-significant results were found, either for the intervention variable ($\beta = 3.196$; $p = .557$), with a 95% confidence interval [-7.621; 14.013], or for the control variables (Table 4).

3.3. Study 3

Participants. 62 participants (75.8% women, $M_{\text{age}} = 42.35$ years) responded to a public call to take part in a mindfulness-based activity at the university premises. The same procedure for random allocation used in previous studies was followed.

Intervention. After completing the baseline measures (*Altruism*, *Mindfulness-as-a-trait*, *Meditation practice*, and *demographic questions*), participants listened to the same audio of Studies 1 and 2. After listening to the audio, they completed a questionnaire explaining their experience with the practice. Then, as a gratification, participants received 11 tickets to participate in a raffle to win two vouchers for 100 euros. Finally, instructors presented a (fake) NGO (Mind4all) specialized in bringing the benefits of mindfulness to people without resources. They were allowed to donate none, some, or all of their tickets to the NGO by leaving them in an envelope (a measure similar to that used by Chen and Jordan, 2020). Participants were then debriefed and thanked.

All measures were identical to those described in Studies 1 and 2, except for the dependent variable and emotions felt. The dependent variable was measured as the number of tickets donated). The emotions felt during the practice were measured with the modified differential emotions scale (Fredrickson *et al.*, 2003), which is a comprehensive measure of emotions widely used in past meditation studies (e.g., Fredrickson *et al.*, 2017). Participants indicated to what extent they had felt the emotion of love during the procedure, from 0-not at all to 4-very much so-. A control check was also included whereby participants had to indicate, from 1 (not at all) to 10 (very much so), how much they felt that they were genuinely meditating during the exercise (Johnson *et al.*, 2015).

Control checks and attrition checks. The seven participants who answered the control check question with a score lower than 5 (Mean point on the scale) were dropped from the sample. This variable took values from 1 to 10 ($M=6.6$, $Mdn=7$). Nonetheless, analyses were repeated with these cases in the sample, and the results did not differ. This resulted in an attrition rate of 11.3%. To examine whether the excluded and remaining respondents were similar, t-test analyses were conducted. No significant differences were found (Dispositional Compassion: $t=-1.116$; $p=.269$; Altruism: $t=1.114$; $p=.270$; Mindfulness-as-a-trait: $t=.259$; $p=.796$; Meditation: $t=1.147$; $p=.256$; Female: $t=1.594$; $p=.116$; Age: $t=-.215$; $p=.830$).

With these exclusions, the valid sample size for each group was 26 (LKM) and 29 (FB). Three participants reported meditating at least five times per week. Results did not change when these participants were excluded from the sample, so we retained them in the analysis. Table 3 depicts the descriptive statistics and correlations.

TABLE 3 HERE

Randomness check. ANOVA tests were conducted to test homogeneity between LKM and FB groups on the control variables. No differences were found (Meditation practice: $M_{LKM}=3.769$; $M_{FB}=3.310$; $F=3.27$; $p=.076$; Altruism: $M_{LKM}=16.923$; $M_{FB}=13.586$; $F=.160$; $p=.691$; Mindfulness-as-a-trait: $M_{LKM}=3.712$; $M_{FB}=3.678$; $F=.030$; $p=.859$; Meditation practice: $M_{LKM}=3.769$; $M_{FB}=3.310$; $F=3.27$; $p=.076$; Female: $P_{LKM}=65.4$; $P_{FB}=79.3$; $F=1.320$; $p=.255$; Age: $M_{LKM}=44.7$; $M_{FB}=39.9$; $F=.970$; $p=.328$).

Manipulation check. A t-test was conducted to test if there were differences in the emotion of love between groups. Results showed that the manipulation was effective ($M_{LKM}=3.308$; $M_{FB}=1.414$; $t=5.912$; $p<.001$)

Main effects. The mean number of donated tickets was very similar between the LKM group (7.385) and the FB group (7.345). The t-test found no significant differences ($t=-.040$; $p=.968$; Cohen's $d=.01$), being a 95% confidence interval for the mean difference [-2.051; 1.972].

When the raffle ticket variable was regressed on the intervention and the control variables, no significant effect of the intervention was found ($\beta = -.675$; $p = .499$), being a 95% confidence interval for the coefficient $[-2.667; 1.318]$. As for the remaining variables, only age ($\beta = .103$; $p < .001$) showed positive and significant effects (the higher the respondent's age, the higher the number of raffle tickets donated). Table 4 shows the results of the multiple regression models estimated in studies 1, 2, and 3.

TABLE 4 HERE

4. Meta-analysis

4.1. Method

To estimate the overall differential effect size of brief interventions of LKM *versus* active control groups on prosocial behavior, we conducted a single-paper meta-analysis (McShane and Bockenholt, 2017). This approach is recommended when individual studies show a consistent relationship but conflicting results to increase statistical power and test moderation (McShane and Bockenholt, 2017). To increase the pool of studies the results of the current three studies were combined with comparable effect sizes from previous publications. To identify similar studies, a search was carried out in Web of Science (Core Collection), Scopus, Academic Search Complete, APA PsycInfo, Business Source Complete, CINAHL Complete, Communication & Mass Media Complete, Communication Source, eBook Collection (EBSCOhost), eBook Nursing Collection, EconLit with Full Text, E-Journals, ERIC, Family & Society Studies Worldwide, MEDLINE, MEDLINE Complete, OpenDissertations, PSICODOC, Psychology and Behavioral Sciences Collection, COCHRANE DATABASE, and MEDLINE without period limitation. The search was restricted to peer-reviewed journals and was conducted using the search string ("compassion meditation" OR "loving-kindness" OR "loving-kindness" OR contemplative) AND (experiment OR trial OR intervention OR practice) AND (prosocial OR help* OR altruism OR

dictator* OR sustainable* OR donat* OR charitable) AND (brief OR short). To increase the scope of our search, cross-citations from 14 previous reviews and meta-analyses were also explored (i.e., Luberto *et al.*, 2018; Zeng *et al.*, 2015). The results produced 101 articles after duplicates were removed.

Studies were included in the analysis if they were randomized control trials in non-clinic populations that compared the effects of a brief Loving-Kindness Meditation intervention with an active control group (i.e., focused breathing meditation) and when the outcome variable was a measure of prosocial behavior. Applying these inclusion criteria yielded six studies from four published articles (Engel *et al.*, 2020; Hafenbrack *et al.*, 2020; Hirshberg *et al.*, 2018; Miyahara *et al.*, 2020) and one conference paper (Reb *et al.*, 2010) involving seven valid measurements. Thus, when integrated with the three previously reported studies, the meta-analysis was done on ten measures (k) and $n= 683$.

Engel and colleagues (2020) show in two studies how a brief LKM meditation leads to higher sustainable decision-making in social entrepreneurs. Hafenbrack and colleagues' (2020) study involved 98 employees and was implemented in the workplace using compassionate responding as the outcome variable. Non-significant differences were found between the two interventions in promoting pro-social behavior. Hirshberg and colleagues (2018) assess the effects of LKM and breath relaxation on time donation in 80 university students showing similar donation rates in both mediations. Miyahara and colleagues' (2020) intervention involved a sample of 32 university students. It used two different outcome measures of helping intention based on The Empathic Concern for Disability and Accessibility (ECDA) task (Miyahara *et al.* 2017). Differences were not found between the two meditation interventions. Finally, Reb and colleagues (2020) used a sample of 54 students, showing that those engaged in the LKM meditation significantly donated more in a dictator's game.

Using also the studies reported here, the sample size, means, and standard deviation values for each intervention group were assembled for each survey using standardized data extraction sheets; only the final follow-up measures were used. We determined the effect sizes using the standardized mean difference (SMD). All these measures were converted into a d , following Borenstein *et al.* (2021) and Laroche and Soulez (2012). The meta-analysis was performed with pooled effect sizes using the inverse variance statistical method with random effects models (REMs). The pooled effect sizes were reported as Hedge's measure of the SMD with a 95% confidence interval (CI), and homogeneity was reported with the Q , I^2 , and p values.

4.2. Results

The studies included in the meta-analysis totaled 683 participants (Table 5). Overall, LKM yielded a small-to-medium and significant pooled effect size ($k=10$; $SMD=0.303$, 95% CI [-0.079, 0.526], $p=.011$) and homogeneity was found ($Q=11.735$; $p=.228$; $I^2=23.308\%$). The presence of homogeneity indicates that one could expect to see this differential effect of LKM *versus* active control groups when applied to new samples (Borenstein *et al.*, 2021). Nevertheless, this homogeneity test value should be taken cautiously, considering the limited sample of studies included in this meta-analysis (von Hippel, 2015).

A multi-group analysis was conducted to test the presence of moderator variables, particularly the type of sample (student *vs.* community samples) or type of behavior (hypothetical *vs.* actual prosocial actions). The results of the moderator analyses revealed a significant moderating effect of these two variables on the relationship between prosocial behavior and LKM. First, the type of the sample of the study is found to moderate the effect of the LKM interventions on prosocial behavior, being the effect size significant among student samples ($k=7$; $d=0.422$, 95% CI [0.224, 0.620], $p<.01$) and non-significant among community samples ($k=3$; $d=-0.002$, 95% CI [-0.264, 0.259], $p=.388$). Also, the effect size is significant when the measure of prosocial action is hypothetical (dictator or scenarios) ($k=8$; $d=0.272$,

95% CI [0.068, 0.475], $p=.012$) and non-significant when actual (donations) are used ($k=2$; $d=0.037$, 95% CI [-0.355, 0.429], $p=.392$). This is consistent with other meta-analyses showing greater effects for hypothetical measures in different domains (Schmidt and Bijmolt, 2021).

TABLE 5 HERE

5. Discussion

This study extends the toolbox of social marketing intervention strategies (French and Russell-Bennett, 2015; Gordon *et al.*, 2016) by defending the role of meditation and notably LKM as a suitable social marketing intervention. We argue that the proven benefits of ethical meditation suggest its inclusion in social marketing programs as their goals are similar: the promotion of individual well-being and social welfare (Lefebvre, 2012). Aiming to provide sound and rigorous evidence of the potential of this intervention, this research examines whether brief Loving-Kindness meditations that focus on nurturing empathy and awareness towards liked and disliked others may also modulate prosocial choices among non-meditators. Combining the evidence provided by three experimental studies and a meta-analysis of the effects of Loving-Kindness meditation on prosocial behavior, the results show a small-to-medium significant effect of LKM *versus* active groups in promoting prosocial behavior.

This study makes three contributions to existing research. First, the experiments show the potential of LKM to elicit love. Developing a loving and compassionate attitude towards beneficiaries is a fundamental objective in social marketing programs, especially when working with stigmatized populations (Bennett and Vijaygopal, 2019). The reported evidence indicates that Buddhist-derived meditation such as LKM may be especially appropriate in these contexts. It should be noticed that trait mindfulness, used in the three studies as a control, was not found significant in any of the studies, thus confirming the results of past studies that also failed to find a significant association (Guo *et al.*, 2021; Schindler and Pfattheicher, 2021).

Second, to our knowledge, this is the first meta-analysis of the effects of brief LKM on prosocial behavior. The findings provide some empirical support to claims that LKM influences prosocial choices to a larger extent than other meditative practices (Bankard, 2015; Hoffmann *et al.*, 2011; Kristeller and Johnson, 2005; Trautwein *et al.*, 2016; Weng *et al.*, 2013). The results of the meta-analysis yield a small-to-medium effect on prosocial choices. However, moderation analysis also shows that the effects are significant with hypothetical measures of prosocial behavior. This result is not surprising considering the length of the intervention (Polizzi *et al.*, 2022).

Furthermore, the meta-analysis demonstrates that the differential effect of LKM in prosocial behavior is only significant in young samples. This finding appears counterintuitive, given the consistent evidence suggesting that older adults tend to exhibit greater altruism compared to younger individuals (Sparrow *et al.*, 2021). One possible explanation for this phenomenon is that LKM, as an intervention, elicits stronger emotional responses than secular forms of meditation. These responses are particularly pronounced in empathetic emotions such as love and guilt, and such emotions are more readily experienced by younger populations (Carrero *et al.*, 2023). Previous research supports this, indicating that younger individuals, when experiencing feelings of guilt, are more likely to engage in altruistic behaviors, such as increased donations, compared to their older counterparts (Basil *et al.*, 2008). Therefore, the heightened emotional receptivity of younger individuals to LKM may amplify its effectiveness in fostering prosocial behaviors within this demographic group. Also, considering that LKM has been used as an intervention to promote altruism, it is plausible that in those populations where the baseline is higher (older adults), its efficacy might be smaller. This may be especially true in short interventions where the ceiling effects may be even greater and limit the effectiveness. Considering these findings, future research should explore the mechanisms underlying the age-related differences in response to LKM. It would be particularly insightful

to investigate whether these differences are attributable to variations in emotional processing, life experiences, or other psychosocial factors.

These results among young adults offer promising evidence for the use of LKM in social marketing education. This study contributes to extending previous work in the area focused on specific pedagogical tools, such as service learning and community engagement (Domegan and Bringle, 2010), by grounding broader approaches that operate at deep emotional levels. Specifically, our results suggest that meditation should be considered in social marketing education for its potential to nurture student motivation to work to advance system transformation (Harris, 2022). Moreover, our findings reinforce the transformational and system-level view of the social marketing discipline as a whole (Lefebvre, 2012; Wood, 2016), while responding to the call to broaden its epistemological diversity (Lefevre, 2012), as ideas from the Global South ideas are underrepresented in the field (Cateriano-Arévalo *et al.*, 2022). We do so by foregrounding Buddhist-derived interventions and providing evidence of their potential to influence individual behaviors for social good.

This study opens fruitful lines of work further to explain the role of meditation in behavioral change programs. Future work could examine whether the effects of meditation on prosocial behavior can be moderated by participants' motives for engaging in meditation or by individuals' self-construal, as suggested by other authors (Poulin *et al.*, 2021; Reddy and Roy, 2019). Similarly, future work could delve deeper into the psychological mechanisms that explain why LKM nurture prosocial capabilities. Finally, future studies could compare the effects of disparate prosocial interventions, such as gamification, advertising, or meditation, in driving prosocial choices to provide more precise recommendations for designing social marketing programs aiming at individual behavioral change.

However, this work presents some limitations. The first study was slightly underpowered, although significant differences were found among groups (Faul *et al.*, 2007).

Also, the measure of altruism used was limited in scope as it only considered monetary donations; this could have limited its content validity. In addition, we compared LKM with focused breathing; future studies could examine whether the results are similar when LKM is compared with wait lists or other control groups. Finally, future studies should examine whether, after a longer time of practice, LKM may influence prosocial choices.

6. Conclusion

This study proposes that Loving-Kindness Meditation may work as a suitable intervention for behavioral change, especially for driving prosocial choices. This paper expands on the scant evidence of the association between LKM and prosocial behavior. Our work introduces love-based meditation as a fruitful intervention in social marketing for developing prosocial capabilities that eventually may help individuals transform social systems for the greater good.

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Table 1. Descriptive statistics and correlation matrix of Study 1

	Mean	SD	[1]	[2]	[3]	[4]	[5]	[6]
[1]] LKM	.500	.505						
[2]] Altruism	5.865	11.578	-.042					
[3]] MAAT	3.527	.649	-.114	-.119				
[4]] Meditation practice	.462	1.111	-.140	.037	.095			
[5]] Gender (Female=1)	.750	.437	.044	-.053	-.061	.121		
[6]] Age	25.385	2.774	-.140	.722*	-.158	.069	.081	
[7]] Donation	46.904	12.432	.280*	.108	-.021	-.108	.107	.035

Note: * indicates significant correlation at 5% level

Table 2. Descriptive statistics and correlation matrix of Study 2

	Mean	SD	[1]	[2]	[3]	[4]	[5]	[6]
[1]] LKM	.515	.503						

[2]	Altruism	10.147	14.736	.141					
[3]	MAAT	3.753	.811	.094	.219				
[4]	Meditation practice	.706	1.294	-.039	.257*	.197			
[5]	Gender (Female=1)	.706	.459	-.046	-.049	-.097	.254*		
[6]	Age	43.235	12.922	.050	.413*	.167	.120	-.265*	
[7]	Donation	56.471	21.091	.089	.136	-.040	.019	-.194	.158

Note: * indicates significant correlation at 5% level

Table 3. Descriptive statistics and correlation matrix for Study 3

	Mean	SD	[1]	[2]	[3]	[4]	[5]	[6]
[1]	LKM	0.473	0.504					
[2]	Altruism	15.164	30.668	.055				
[3]	MAAT	3.694	0.680	.025	.042			
[4]	Meditation practice	0.527	0.959	.241	.120	.199		
[5]	Gender (Female=1)	0.273	0.449	.156	.181	-.037	-.082	
[6]	Age	42.182	17.854	.134	.269*	.014	.222	.072
[7]	Donation	7.364	3.679	.005	.106	.171	.191	.499*

Note: * indicates significant correlation at 5% level

Table 4. Multiple regression results of Studies 1,2 and 3

	Study1 (donations in the dictator's game)	Study 2 (donations in the dictator's game)	Study 3 (donations of raffle tickets)
LKM	6.561**	3.196	-0.674
Altruism	.177	0.134	-0.006
MAAT	.722	-2.861	0.833
Meditation practice	-1.025	0.961	0.318
Gender (female=1)	3.447	-8.783	0.509
Age	-.198	0.123	.103***

No. observations	52	68	55
F test p-value	0.042	0.353	<.001
R ²	.113	0.074	0.289

Note: ***, **, * indicate significance at 1,5,10% levels.

Table 5. Description of studies (k=10)

Study	N	Sample	Behavior	M Active control	M LKM	SD Active control	S LKM	N Active control	N LKM	d	p
Engel et al. (2010)	69	Students	Sustainable decision making	2.6	3.78	1.25	1.77	33	36	0.756	<.05
Engel et al. (2010)	114	Students	Sustainable decision making	4.06	4.79	1.78	1.79	53	61	0.406	<0.05
Hafnbraek et al. (2019)	98	Community	Compassionate responding	3.07	2.83	1.82	1.73	52	46	0.134	.560
Hirshberg et al. (2018)	80	Students	Time donation	70.59	73.81	45.56	43.97	36	44	0.0714	n.r.
Miyahara et al. (2020)	32	Students	Helping intention	3.79	5.07	2,20	1,95	16	16	0.600	n.r.
Miyahara et al. (2020)	32	Students	Helping intention	7.87	7.93	1.83	1.73	16	16	0.032	n.r.
Reb et al. (2010)	49	Students	Dictator	2.52	4.06	2.57	2.61	24	25	0.850	.08

Study 1	76	Students	Dictator	43.46	50.34	14.13	9.55	26	26	0.562	<0.05	
Study 2	68	Community	Dictator	54.55	58.29	21.69	20.65	33	35	0.175	n.s.	
Study 3	55	Community	Tickets donation	7.34	7.38	3.25	4.16	29	26	0.011	n.s.	