A brief online Loving-Kindness Meditation Intervention; Effects on optimism and affect.

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## Contents

Acknowledgments ......................................................................................................................... 3
Abstract ............................................................................................................................................ 4
Introduction .................................................................................................................................... 5
Method .......................................................................................................................................... 15
  Participants ................................................................................................................................. 15
  Design ....................................................................................................................................... 16
  Materials ................................................................................................................................... 17
  Procedure .................................................................................................................................. 18
Results .......................................................................................................................................... 19
  Assumptions – Outliers .............................................................................................................. 19
  Assumptions – Normality ............................................................................................................ 20
  Assumptions – Variance .............................................................................................................. 22
  Descriptive Statistics ................................................................................................................ 23
  Inferential Statistics .................................................................................................................. 23
Discussion .................................................................................................................................... 27
  Future Research ......................................................................................................................... 30
  Conclusion ................................................................................................................................ 32
References .................................................................................................................................... 33
Appendix A ..................................................................................................................................... 35
Appendix B ..................................................................................................................................... 40
Appendix C ..................................................................................................................................... 41
Appendix D ..................................................................................................................................... 42
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Abstract

Loving-kindness mediation is a compassion based intervention aimed at increasing well-being by directing compassion to oneself and others. This study examined the effects of a brief online LKM intervention. 91 internet users were randomly assigned to control wait-list and experimental groups. Participants in the experimental group (n=24) received instructions via audio to practice Loving-kindness meditation three times in 1 week. The control wait-list group (n=37) did not receive any intervention. Optimism, Positive Affect and Negative Affect was measured twice (prior and post-intervention or post non-intervention) in both groups using LOT and PANAS. Despite noting an encouraging directional trend in Positive Affect scores, the results demonstrated the overall scores of the LKM group were not significantly improved when compared to the control group. Strengths, limitations and future directions for research are discussed.
Introduction

Prior to the start of the twenty-first century the focus of psychologists had been predominantly on the study of disorders, weaknesses and the possible causes and symptoms of human suffering. When positive psychology emerged, it brought new light to the importance of understanding happiness, character strengths and positive emotions. It seems that by understanding the interaction between happiness and suffering and by examining both separately, psychology has become more complete scientifically and more beneficial to human beings (Seligman et al 2005). In order to understand happiness, psychologists looked beyond the scientific world for answers and they found potential explanations and techniques in less traditional paths such as Buddhism.

In studying Buddha’s story, we can see issues that can be related to modern life in the Western world. Buddha was a very wealthy man who had everything that, according to common belief, should have been enough to make someone happy. He was a prince married to a wife he loved, had a new-born son and had the luxury lifestyle that comes along with money. However he still felt an inner discontentment in life and decided to leave everything behind in order to search for the non-material things he felt were missing (Rosenzweig 2013). In the modern era, research has also challenged the idea that money and happiness are closely related; for example analysis between income in developing countries and increased well-being have shown no relationship. This means that levels of happiness do not seem to increase when linked to national income per person (Jayawickreme et al 2012).

An important moment in Buddha’s story relates to the moment soon after hours of meditation when he came to the realization that he was finally ‘awake’. Some of his teachings include the ‘Four Noble Truths’; these ‘truths’ teach that there is a possible end for suffering,
that we suffer because of attachments and cravings for what we do not have and claims there is a way to end suffering. Research suggests that mindfulness may be an important step on the way to discovering these ‘truths’ and bringing about awakening/enlightenment (Rosenzweig 2013). Mindfulness is defined as “the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment” (Kabat-Zinn 2003 quoted in Cavanagh et al 2013 p145). Currently mindfulness interventions are applied in therapies such as mindfulness based cognitive therapy and mindfulness based stress reduction with research indicating that such interventions can increase well-being both physically and psychologically. These specific mindfulness interventions can include the practice of mindfulness meditation and exercises both at home and in clinical settings (Cavanagh et al 2013).

Cavanagh et al (2013) conducted a study with one hundred and four students from a University in England. Out of one hundred and four participants, ninety-two were females. The authors provided an online course called “Learning mindfulness online” to participants. The researchers utilised a waiting-list method whereby the course was made available immediately to participants assigned to the experimental group while participants of the control group received the same course exactly two weeks later. The course was delivered through the University’s virtual learning platform and participants were encouraged to practice mindfulness daily. A total of fifty-eight participants completed all required tasks (pre and post questionnaires). Sixty-one per cent of students reported they had practiced mindfulness more than once a week, while twenty-six admitted practicing more than once a day. Despite the high attrition of this study, the results indicated that a brief mindfulness course can increase levels of mindfulness and diminish levels of depression/anxiety and perceived levels of stress. The study used only students as participants, mostly women
therefore it’s difficult to predict if the results can be extended to a general/more mixed sample.

As a concept, mindfulness relates to accepting and paying attention to experiences, emotions and feelings whether they are either good or bad (Neff & Germer 2013). Loving-Kindness is a related concept to mindfulness in the sense that it’s all about experiencing non-judgemental awareness of emotions, experiences and feelings and focuses on breathing and sensory modalities (Hinton et al 2013). The main difference between the two being that Loving-Kindness’ goal is to direct warmth and caring feelings to the self and to others (Salzberg, 1995 cited in Fredrickson et al 2008). A vast amount of research has focused on general mindfulness; the current study aims to examine the effects of Loving-Kindness meditation. LKM (called Metta in Pali) is also derived from Buddhism; in this meditation type there is a combination between the concept of Loving-kindness (mental state of unconditioned and unselfish thoughts and love directed at all human beings) and Compassion (a feeling directed at alleviating the suffering of all human beings. In Cambodia this combination is often made and turned into one concept called ‘Metta Garunaa’ (Hofmann et al 2011).

When practicing compassion, the idea is not only to direct compassion to others but also to direct it towards the self. Throughout life, people often encounter challenging times where they may experience failures both in their private and professional life. When someone encounters failures and disappointment they often feel this experience is unique to them, that they are the only ones experiencing such level of pain/problem and this can bring with it a feeling of disconnectedness from the others (that they also presume are leading good/happy lives). All of this brings with it an increasing sense of isolation. The self-compassionate response proposes that the person should take a pause, to offer oneself some
soothing and comfort before trying to fix or control the problem. Being kind with oneself also means being less critical (e.g. replacing ideas of not being good enough to more supportive ones), accepting oneself is not perfect and offering support/warmth to oneself when difficulties arise (Neff and Gerner 2013).

Breines & Chen (2012) raised other questions around the outcomes of self-compassion; whether it’s actually helpful to people in the sense they can learn from their mistakes and feel motivated to grow or if in fact it allows people to only feel sorry for themselves and therefore provides no motivation or desire to change/improve. The researchers conducted a series of experiments in which they assessed the relationship between self-compassion and self-motivation when responding to personal weakness (e.g. shyness) or test failure and moral transgression. The experiment also used a self-esteem control and demonstrated encouraging results. According to the results, self-compassion was found to be significantly more helpful to people than engaging in positive distractions or doing nothing. The authors propose that self-compassion may be used across diverse areas and can help people deal with their shortcomings without harsh self-criticisms. The aim of our current study is to examine whether increases in self-compassion and compassion brought on by a meditation will bring with it other positive effects.

Research suggests that compassion is not only beneficial to the self but also to others. Compassion training is suggested to cause positive effects in both mood and health as shown in the following study. Leiberg et al (2010) introduced the Zurich Prosocial Game (ZPG), a new method that was developed to assess whether compassion can actually increase prosocial behaviour. The game consists of a treasure hunt in which the players can spend resources (time, money) knowing they might need the resources later, to help other players. The authors suggest that this can relate to real world scenarios (e.g. person running late to work and
deciding to stop and help after seeing someone falling from his/her bike). Participants were all females and their range age was 18-35. The two experiments involved compassion and memory training prior the exposure to the game. The results of the brief compassion training demonstrated an increase in prosocial behaviour towards complete strangers and suggested that it can also have longer lasting effects as the post-test was administered two – five days after training. From these findings the authors draw conclusions that a short compassion training can be beneficial to self and to society in general. It should be noted that this study had its limitations as a game format might not relate to everyone as it might target the younger and computer savvy people. Furthermore, the researcher’s decision to study only a female population may mean that results were exaggerated given that females are considered (at least anecdotally) to be more empathetic.

In Loving-Kindness Meditation the person is first instructed to direct positive feelings to themselves, then to a good friend who doesn’t induce any sexual emotions, then to a person who doesn’t evoke any positive/ negative feelings (e.g. someone you see at the bus stop or at work) and finally to someone considered difficult (e.g. a person that brings out negative feelings/emotions). Following this they move to the next stage where the person is instructed to divide their attention and direct feelings equally between all again; self, friend, neutral and difficult person. The person is then encouraged to focus and direct positive feelings in all directions; north, south, east and west. The final stage involves the person being instructed to focus and direct positive feelings towards the whole universe. The aim of this meditation is to extend the warm feelings that are usually directed towards the self to others even those who would not normally be a subject of warm feelings (the stranger or someone considered difficult). By focusing and directing positive feelings towards someone difficult, the person is exercising empathy and compassion with the result being a reduction in negative emotional states. (Hofmann et al 2011).
Other than increasing positive emotions, research has suggested that Loving-Kindness Meditation can also reshape enduring personality traits (e.g. trait anxiety). Davidson et al (2003) conducted a study where brain and immune function were measured to examine the effects of an eight week mindfulness meditation. The participants were employees considered healthy and it was administered in the workplace. Participants of the experimental and waiting-list control group had their brain activity measured before, after and also four months after the training program in mindfulness meditation. The results found significant increases in left-sided activation; this activation has been linked with positive affect. The study also demonstrated that mindfulness meditation had a positive effect on immune function. In keeping with its basis in Buddhism, LKM is not simply a tool used to help an individual experience increased positive feelings but is also a process by which one can explore how the mind operates and identify genuine sources of sustainable happiness. Furthermore, it can also change people’s perspective of themselves (e.g. they examine how they are viewed by others) and of life in general (Fredrickson et al 2008). Generally instructions are received via speech/audio and the meditator uses mental imagery to visualize the neutral person, the difficult person and oneself. These instructions often feature declarations such as ’May you be well, may you be happy, may you be loved’. The aim of these words is to evoke a genuine desire for the well-being and happiness of others (May et al 2011).

Fredrickson et al (2008) conducted research in Loving-Kindness Meditation through a business software and information technology services company in the US. Out of all suitable employees invited (1800 full-time employees), two hundred and two committed to take part in the study that proposed stress reduction through meditation. After the necessary exclusions the final sample consisted in one hundred thirty-nine participants for both groups; control (n= 67) and experimental (n=72). By random assignment, experimental group participants were required to complete baseline reports/surveys, attend workshop classes
(where they received didactic information on LKM and also on how to apply the concepts learned in their lives) and practice of group meditation. Loving-Kindness meditation was introduced in different stages at the workshops; during the first week the participants were instructed to direct love to themselves, a week later they were instructed to direct love to their loved ones, in following weeks to strangers and lastly to all human beings. In total the experiment lasted for nine weeks. Other than practicing meditation at workshops, participants were also given guided recordings and recommended to practice LKM five times a week in their own time. The results of this experiment show positive findings, with participants that practiced LKM at least one hour per week demonstrating an increase in positive emotions including in their interaction with others. This research has also suggested that LKM can have long-lasting positive effects and that the practice of LKM can direct people on a path of growth. While this experiment shows a detailed insight in the practice and effects of LKM, it also involved a large amount of resources, high-costs and commitment to apply these conditions in daily life. It is clear that this would be difficult for psychologists to promote this type of intervention on a long-term basis.

Another Loving-Kindness Meditation experiment examined its effects on mood (positive and negative) and impact of affective responses towards self and others. In this experiment participants were given photographs of themselves, their loved ones and neutral persons in order to assess the participants’ implicit and explicit responses before and after a guided visualization. Therefore in the LKM condition, participants were instructed to first imagine two loved ones standing beside them and then to open their eyes and direct feelings of love and compassion to their photographs. The aim of this study was to increase social connectedness, with the results being an observed positive regard increase towards the target, to strangers and in acceptance of the self (Hutcherson 2008). This experiment, however, only delivered a single session of meditation delivered in a group. The question must be asked
whether such a setting would have been appropriate for meditation and whether such a short-
term intervention can be said to be ecologically valid. Furthermore, it is possible that the
presence of group is a confounding variable in the measurement of Loving-Kindness
Meditation’s effects.

As well-being focused psychology has grown, interventions focusing on improving
well-being have become an area of interest. Research suggests that interventions delivered
online managed to reduce the number of mental health symptoms experienced by people and
in particular groups reduce the number of people meeting the criteria for diagnosis of mental
health disorders or negative health behaviours (e.g. smoking, weight-loss, anxiety) (Mitchell
et al (2010). Studies involving Online Positive Psychology Interventions (OPPIS) have
demonstrated that they can be efficient and provide positive and encouraging results.
Seligman’s (2005) interventions such as ‘three good things’, ‘using signature strengths’ and
‘the gratitude visit’ have demonstrated a reduction in levels of depression and increases in
happiness levels. Some of these interventions differ in the timeline of effects with ‘the
gratitude visit’ presenting benefits up to one month while ‘the signature strengths’ and
‘three good things’ demonstrating positive benefits up to six months. Following Seligman’s theory
of happiness, Parks (2009 cited in Mitchell et al 2010) conducted a study in which he
assessed a set of six positive psychology exercises in two formats; online and group. The
exercises used were ‘identifying and using your strengths’, ‘three good things’, ‘a gratitude
visit’, ‘life summary’ and ‘savouring’. The online participants did not demonstrate the same
level of increase in well-being as the group participants did. The author speculates this might
be due to the fact that the online group did not receive the same attention or commitment as
those in the group environment. The group participants had their attendance recorded and
were asked for weekly summaries consisting of their experience in regards to the assigned
tasks, while in the online group there were no submission of tasks or human contact involved
(Mitchell et al 2010). This raises a question in regards to participant’s adherence to instructions of online interventions versus face-to-face experimental environments where observance of tasks can occur.

The current psychological literature lacks studies of Loving-Kindness Meditation interventions delivered online. To address this, the current study aims to deliver a Loving-Kindness meditation based intervention online as it is a convenient, accessible and an anonymous method. The current study provides participants with the possibility of choosing a time and a location that suits them. Other advantages of delivering an intervention online includes the possibility of reaching people in rural/far locations, cost-effectiveness (e.g. people do not have to spend money in travel expenses to/from the location of the experiment), interactivity/ multi-media options (e.g. such as the use of audio/images for meditation), personalisation and tailoring of information. Some of the disadvantages of using the internet to deliver this meditation include; the experiment might not reach all groups in the community as some people might not have internet access (e.g. elderly and unemployed), basic computer skills are required too (Mitchell et al 2010). While the literature contains many examples of interventions related to positive psychology and general meditation being delivered online this experiment will bring something novel. Furthermore, there is a potential for an additional benefit as the experiment focuses on a compassion based intervention (Loving-Kindness Meditation) that can be practiced at home.

The three variables that will be measured post-intervention are optimism, positive affect and negative affect. All of these factors have been linked to well-being and have been shown to be amenable to intervention. Dispositional optimism has been defined as a “generalized tendency to expect good (versus bad) future personal life outcomes” (quoted in Busseri 2013 p185). Research has demonstrated a link between dispositional optimism and
positive functioning (Busseri 2013). People considered optimistic are seen to be more engaged and tend to accomplish their goals more in comparison to people who expect negative personal outcomes. Shmotkin, (1998 cited in Busseri 2013) suggested that subjective evaluations of the person of previous life experiences are associated with an anticipation of good life outcomes (e.g. in uncertain times, I usually expect the best). Considering the relevance of optimism for positive functioning and well-being, optimism will play an important role in the present study.

Positive Affect has been described as the range of positive emotions, moods, sentiments and attitudes (Frederickson and Losada 2005). Positive Affect “reflects the extent to which a person feels enthusiastic, active and alert. High PA is a state of high energy, full concentration and pleasurable engagement” (Watson et al 1988 p1063). The importance of Positive Affect has been highlighted via cross-sectional studies, longitudinal research, laboratory experiments and long-term interventions (Lyubomirsky et al 2007). Those who tend to display positive affect also tend to have increased intuition and creativity. Apart from psychological correlates, positive affect is also associated with physical health benefits such as reductions in strokes, reduced physical pain, increased cardio-vascular and immune functions. Most importantly, these benefits can be induced via interventions that raise positive affect (Frederickson and Losada 2005).

Negative Affect is a dimension that covers a feeling of distress and variety of adverse moods such as anger, guilt, nervousness and lack of serenity (Watson et al 1988). While particular negative emotions can be varying in terms of corrosiveness, negativity that becomes global and/or gratuitous can dominate life (Frederickson and Losada 2005). Negative Affect has been associated with high stress levels and negative health outcomes such as smoking (Kassel et al 2003) and increased cardiovascular risk (Hildebrandt and
Hayes 2012). Some researchers argue that a limited amount of negative affect is required to promote human flourishing as long as it is an appropriate ratio to positive affect (Frederickson and Losada 2005). However, reducing negative affect is a valid aim and has been pursued in various interventions including those based around meditation (Sears and Kraus 2009).

The experimental hypotheses are as follows:

Hypothesis 1: Positive Affect will be significantly higher following a Loving-Kindness Meditation intervention

Hypothesis 2: Negative Affect will be significantly lower following a Loving-Kindness Meditation intervention

Hypothesis 3: Optimism will be significantly higher following a Loving-Kindness Meditation intervention

Method

Participants

A total of 91 internet users completed the first part of the study. A mix of convenience and snowball sample was used. Participants were invited to take part and advertise the study through social media and via direct emails that could be forwarded to others. Attrition from participation in Survey one to Survey two reduced the total participants to 62. One participant was excluded from the control group as they represented an extreme outlier (see Results
section) leaving 61 participants (26 male and 35 female). Participants’ age range was 24 to 47
with an overall mean of 33.15 and standard deviation was 6.04. Within the experimental
group the age range was 24 to 47 (mean age 33.6) and in the control group the age range was
25 to 44 (mean age 32.9).

Table 1 - Characteristics of participants in Loving-Kindness and Waiting-List groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Loving-Kindness Meditation</th>
<th>Waiting List (Control Group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Gender Male</td>
<td>13</td>
<td>21%</td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
<td>18%</td>
</tr>
<tr>
<td>Native English Speaker Yes</td>
<td>11</td>
<td>18%</td>
</tr>
<tr>
<td>No</td>
<td>13</td>
<td>21%</td>
</tr>
</tbody>
</table>

Design

A mixed (between and within subjects) quantitative experiment was conducted. Random
assignment took place by asking participants to select the last digit of their telephone
number from 0 – 9 (odd numbers = experimental and even numbers = control group) during
Survey 1. The dependant variables (DVs) were positive affect, negative affect and optimism.
The Independent Variables were intervention type and time (i.e. Survey 1 and Survey 2).
Respectively these represent the between subjects and within subjects variables. The
experimental group was the Loving-Kindness meditation group while the control group was
the Waiting List group. The random assignment provided an initial total of 91 participants
(46 in the experimental group and 45 in the control group).
Materials

Audio: All experimental group participants were provided with a link to a recorded guided Loving-kindness meditation audio. This audio was obtained from a freely available and non-copyrighted YouTube video (UNH Health Services 2011) that was converted to an audio only file by the author and then hosted on the website Soundcloud (see transcript in Appendix A)

General/Demographic Questions: Each participant was asked to enter their date of birth, gender and whether they were a native English speaker.

PANAS: The 20 item Positive and Negative Affect Scale (PANAS) is designed to measure positive and negative affect. The items are words describing feelings and emotions. The scale asks participants to indicate the extent of how they are feeling at the present moment and how they have felt in the past week on a 5-point Likert-type scale from 1 - Very Slightly or Not at All to 5 – Extremely. This measure has been confirmed as internally consistent (Cronbach’s alpha scores on both negative and positive sections range from .84 to .90), stable and externally valid (Watson et al 1988) (see copy of measure in Appendix B).

LOT-R: The 10 item Life Orientation Test – Revised is a tool used to measure dispositional Optimism. The test presents statements to participants in which they are asked to state the extent of their agreement. These statements describe a series of positive and negative outlooks (e.g. “In uncertain times, I usually expect the best”). Participants can report their level of agreement on a 5-point scale from 0 – Strongly Disagree to 4 – Strongly Agree. The test also contains a number of filler questions used to conceal the overall intent. The test has been shown to have predictive validity and accurate in measuring optimism as a distinct
factor. Internal consistency as measured by Cronbach’s alpha is .78 (Scheier et al 1994) (see copy of test in Appendix C).

Procedure

In an invitation through social media and emails participants were advised that the experiment was online, it could be completed at a time of their choice and that in addition to surveys would at most involve tasks that require 3 sessions of 15 minutes each. After clicking on the link to a Google Forms survey used for the study, participants found the informed consent in which they had two options; one stating they were willing to take part in the study and that they were over eighteen years of age and another option in which they could decline participation or indicate that they were not eighteen or over. The demographic questions included date of birth, gender and a question asking if participants were native English speakers or not. We also included a field in which we asked participants to provide an email address so further steps of the experiment could be emailed to them. Once the participant agreed to the informed consent, age limit and answered demographic questions he/she was then directed to the PANAS and LOT questionnaires. After the last question, the participant was asked to select the last digit of their telephone number from 0 – 9 (odd numbers experimental vs even numbers control group). This acted as a means of random assignment and provided a total of 45 participants for the experimental and 46 for the control group. Once participants were assigned to the experimental group, there was a note with instructions advising them to complete 3 sessions of meditation in 7 days and recommendations they completed the 1st session at that time and the remaining ones every two days. In the instructions we also suggested participants to complete the meditations in a quiet location with privacy and comfort. We advised participants to click on the link for the audio meditation and explained the same link could also be used for the other two sessions. We reassured
participants that we would also send the link via email as a reminder. After two days we sent a second email with the meditation link and recommended participants now complete the 2\textsuperscript{nd} session. Two days later a final instructional email was sent asking participants to complete the last session and complete the second set of questionnaires (again PANAS and LOT). The participants assigned to the control group were put on a waiting-list. They completed the post-test questionnaires (Survey 2) one week later after the first questionnaire (receiving a reminder email in advance). The debriefing email was sent to all participants (control and experimental) explaining the aim of the study and also providing the Loving-Kindness mediation link to the participants of the control group for their own future use (see Appendix D for all emails).

Results

Assumptions – Outliers

Outliers were assessed by inspection of a box-plot for values greater than 1.5 box-lengths from the edge of the box and were found in several areas. Three outliers were found in the Positive PANAS scores of the LKM group, however, a decision was made to keep these outliers as these scores were not extreme when considered against the range of Waiting List group scores and did not appear to be due to data entry or measurement errors. Similarly two outliers were found in the Optimism scores of the second survey results for the Waiting List group, however, these were also kept as they were in keeping with the range of survey one results for the same group. One extreme outlier was found in the Negative PANAS waiting list second survey scores (Participant 3 score = 36). A decision was taken to remove this extreme outlier from all analyses as examination of the raw data showed the participant
had answered Survey 2 questions in a manner (answering ‘Extreme’ on all negative questions) that suggested they may have attempted to try to manipulate the outcome based on a guess of the hypothesis. Once this removal was carried out, due to the changes in the mean and range, a second extreme outlier appeared in the same scores. On examination of this data a decision was taken to modify the outlier (Participant 22) to the next highest score (from 25 to 21) rather than remove. In this case, the outlier was not overly extreme and appeared to be due to reasonably valid answers. Once this was completed five outliers remained in Negative PANAS second survey scores for the Waiting list group and one in survey one. These outliers were kept as they were not considered extreme in relation to the range of scores across conditions and were not due to data entry or measurement error.

_Assumptions – Normality_

Normality distribution was assessed via Shapiro-Wilk’s test and was found to be significant (p<.05) for two of the variables. Negative PANAS Scores – Survey 1 and Negative PANAS Scores – Survey 2 were both found to be not normally distributed for both the LKM and Waiting List group (as seen in Figure 1 & Figure 2).
However, it was decided to proceed with the analysis and note the violation should any significant effects be found in relation to these variables. This decision was taken as non-Parametric alternatives are not available for the mixed ANOVA and because “the analysis of variance is a robust statistical procedure, and the assumptions frequently can be
violated with relatively minor effects...this is especially true for the normality assumption” (Howell 2010 p334). Furthermore, as the two variables being analysed were similarly positively skewed this lessens concerns in relation to the validity of the analysis (Howell 2010).

**Assumptions – Variance**

There was homogeneity of variances for all variables based on Levene’s test of homogeneity of variance (p > .05) (see Table 2 below).

**Table 2 - Levene's Test of Equality of Error Variances**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Affect Scores - Survey 1</td>
<td>0.268</td>
</tr>
<tr>
<td>Positive Affect Scores - Survey 2</td>
<td>0.158</td>
</tr>
<tr>
<td>Negative Affect Scores - Survey 1</td>
<td>0.405</td>
</tr>
<tr>
<td>Negative Affect Scores - Survey 2</td>
<td>0.968</td>
</tr>
<tr>
<td>Optimism Scores - Survey 1</td>
<td>0.388</td>
</tr>
<tr>
<td>Optimism Scores - Survey 2</td>
<td>0.225</td>
</tr>
</tbody>
</table>

Homogeneity of variance is important given the unequal sample sizes used. Had homogeneity not been confirmed the unequal sample size would have raised questions about the robustness of the test (Howell 2010).
Descriptive Statistics

Ninety-one participants were randomly assigned to either the online Loving-Kindness Meditation intervention or to the waiting list condition. Sixty-two participants completed all required actions and were therefore suitable for analysis. One extreme outlier was removed leaving Sixty-one participants with twenty-four in the LKM group and thirty-seven in the Waiting List group. Table 3 shows the means and standard deviations for each condition of the design.

Table 3 - Descriptive Statistics for Psychological Measure Scores by Group and Time

<table>
<thead>
<tr>
<th>Variable</th>
<th>Survey</th>
<th>Loving-Kindness Meditation</th>
<th>Waiting List (Control Group)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Mean</td>
</tr>
<tr>
<td>Positive Affect</td>
<td>30.04</td>
<td>7.86</td>
<td>30.44</td>
</tr>
<tr>
<td></td>
<td>32.67</td>
<td>7.09</td>
<td>31.14</td>
</tr>
<tr>
<td>Negative Affect</td>
<td>14.38</td>
<td>3.83</td>
<td>14.30</td>
</tr>
<tr>
<td></td>
<td>13.33</td>
<td>2.92</td>
<td>13.14</td>
</tr>
<tr>
<td>Optimism</td>
<td>16.29</td>
<td>3.48</td>
<td>16.25</td>
</tr>
<tr>
<td></td>
<td>16.75</td>
<td>3.58</td>
<td>16.78</td>
</tr>
</tbody>
</table>

Inferential Statistics

To test whether LKM increased Positive Affect, decreased Negative Affect and increased Optimism we used SPSS to run separate 2 (group) X 2 (time) mixed-design analyses of variance (ANOVAs).
Positive Affect.

The mixed design ANOVA found that there was not a statistically significant main effect of group, F(1,58) = 0.073, p = .787. There was also a non-significant main effect for Time, F(1,58)= 3.924 p = .052 although this was borderline. There was an overall increase in Positive Affect from Survey 1 to Survey 2. There was not a statistically significant interaction between the intervention type by time on Positive PANAS score (F(1,58)= 1.327, p = .254) and therefore Hypothesis 1 was not supported. However when plots are examined a large increase in scores in the LKM is noted (see Figure 3).

Figure 3 – Plot Chart of Positive PANAS Scores by Group at Survey 1 and Survey 2
Negative Affect.

There was not a statistically significant main effect of group, $F(1,58) = 0.32$, $p = .86$, however, there was a statistically significant effect for Time, $F(1,58) = 6.685$, $p=0.12$. Negative Affect scores were lower in Survey 2 than in Survey 1. However, there was not a statistically significant interaction between the intervention and time on Negative PANAS scores $F(1,58) = 0.020$, $p=.888$ and therefore Hypothesis 2 was not supported. An examination of plots (see Figure 4) shows that scores reduced in both conditions in a similar manner.

Figure 4 – Plot Chart of Negative PANAS Scores by Group at Survey 1 and Survey 2
Optimism.

There was not a statistically significant main effect of group, $F(1, 58) = 0.000$, $p = .995$. A non-significant main effect was also found for time, $F(1, 58) = 3.457$, $p = .068$. There was not a statistically significant interaction between the intervention and time on LOT-R scores $F(1, 58) = 0.017$, $p = .896$ and therefore Hypothesis 3 was not supported. An examination of plots (see Figure 5) shows that scores increased across time in almost exactly the same way for participants in both groups.

*Figure 5 – Plot Chart of Revised Life Orientation Test Scores by Group at Survey 1 and Survey 2*
Discussion

Previous research in mindfulness, compassion and online interventions has suggested encouraging results in terms of effectiveness. Cavanagh et al (2013) conducted a study where an online learning mindfulness course was seen to reduce depression and anxiety levels and increase mindfulness. One of the main difficulties faced in their study was the high attrition rate; only half of the participants completed both pre and post intervention questionnaires. Fredrickson et al (2008) managed a study in which Loving-Kindness meditation was delivered through workshops and group meditations and followed by completion of questionnaires/surveys to one hundred sixty-nine employees of a software and information company in the US. The study lasted for nine weeks and after the experiment, participants demonstrated an increase in positive emotions. Their study had a significant amount of resources and controls available. The aim of the current study was to assess the effects of a LKM delivered online in a real-world situation where such extensive resources and controls may not be available. The intention was to provide people with a convenient and free tool to increase well-being.

The present study compared a brief online Loving-Kindness meditation group to a waiting-list control group. The results demonstrated a potential to further explore the use of LKM as a well-being enhancing tool. We found a slight increase in positive affect and levels of optimism and a small reduction in negative affect from Survey 1 to Survey 2. However, in none of the measures was there a significant difference found between improvements in the LKM group and the control group. Therefore, none of the hypotheses were supported by our findings. However, changes in scores all occurred in the predicted direction and when the mean improvements in Positive Affect were reviewed the LKM group showed a larger increase (2.63) than the waiting list group (0.7).
Possible limitations with the current study could be the fact that some participants might not relate to meditation and/or might have preconceptions about Eastern based techniques/interventions. A question asking about the participants’ prior experience of mediation or a quick instruction based meditation could have helped to clarify this. When the experiment was designed a decision was taken to add a question to the demographics section asking if participants were non-native English speakers. The intention of this question was to further explore any extreme scoring or repetitive answering if such issues arose (no evidence was found during data examination or assumptions checking). Out of twenty-four participants of the experimental LKM group, thirteen were non-native English speakers. We did not have the ability to measure their level of English. On the LOT-R measure there was a requirement to understand double negatives; for example, the statement “I rarely count on good things happening to me” would have required a response of Disagree or Strongly Disagree if the person actually counts on good things happening to them. This could have made it difficult for some participants to understand. Furthermore, if language issues were present they may also have created difficulties in following the guided meditation. This risk was somewhat mitigated by the fact that the guide was in relatively simple English.

Online interventions could also be seen as challenging as there is a limited control when compared to normal interventions. Internet respondents might be prone to selecting random responses to questions, may not read every question/requirement sufficiently or may not complete the required tasks in order to end participation quickly. It was not possible to track and control participants and there was a reliance on the participant to actually practice the meditation for the required three times a week. Another limitation of the experiment could be that, given there was little or no deception involved, it may have been easy to predict what the intention of the experiment was and therefore it was possible that participants answered questions in the way they believed they were expected to be answered
(either in the direction of the hypothesis or against it). Some evidence of this was seen with one participant answering in extremes in relation to a particular portion of questions (this participant’s responses to all questions were subsequently excluded from analyses as an extreme outlier). The absence of a check of the person’s mood may have meant a confounding variable went undetected. Hutcherson’s (2008) study examined the effects of LKM on Positive and Negative mood. In the study participants were asked to indicate their current mood from the following options; for Positive mood the options were calm, happy and loving, while in Negative mood the options were angry, anxious and unhappy. However, this could be considered a somewhat basic range of choices and it might not accurately represent the mood of the participant. Perhaps a more in-depth analysis of mood of the participants could be added to future research in online delivery of LKM.

The current study is innovative as it examined the effects of LKM delivered online. By having this study online and using a sample of internet users we made it easily accessible for participants. Thus, there were no financial costs involved as participants did not have to arrange travel to and from the location of the experiment. Time was also an advantage of the experiment, as participants were able to select the time that suited them best to complete the required tasks. It was our view when designing the experiment that when time is predetermined for interventions it might have unforeseen effects. For example, a participant may not have the required time or circumstances (e.g. a quiet environment). Furthermore, freedom of choice in regards to timing was important in reducing the effects of possible confounding variables. For example, forcing someone to complete the meditation at a time that impacts their schedule and disrupts other events that are important to them might cause them to lose focus and decrease the positive effects of the meditation.
A mix of convenient and snowballing sample recruited online allowed us to obtain a more broad and general sample of participants in comparison to the use of student samples. The non-use of a student sample made the intervention more ecologically valid in terms of attrition rates (e.g. a student may feel pressured to complete participation). Within the literature we observed that females are often more predominant in terms of participants and, in some cases, targeted as an individual population for study (e.g. Leiberg et al 2010). This study presents a more mixed sample with males representing forty-two per cent and females fifty-eight per cent of the participants.

Earlier, we discussed how brief interventions demonstrated encouraging results. For example a short compassion training demonstrated an increase in pro-social behaviour towards strangers, a brief mindfulness course suggested an increase in levels of mindfulness and reduction in levels of depression and anxiety and lastly a single meditation session that resulted in an increase in positive regard (Cavanagh et al 2013, Hutcherson 2008; Leiberg et al 2010). The current study follows the trend that brief online interventions aimed at increasing well-being may produce some positive results (i.e. trend in Positive effect scores) but further research is needed in terms of the strength and duration of these results. The present study differentiates itself from the current literature in LKM as it assessed Positive Affect, Negative Affect and Optimism levels. Despite not finding significant results, we can see a directional trend towards higher Positive affect scores in the LKM group that warrants further investigation.

Future Research

We certainly observed limitations with LKM being delivered online including issues such as high attrition. Further research will need to be more innovative in this regard and seek
to find a way of reducing attrition in online interventions. However, a balance must be found as establishing more strict control that will subsequently reduce attrition might involve additional resources. Moreover, it can also make the study less appealing in the sense that people might feel pressured to complete tasks. For example someone that is interested in the area might be more driven to carry on and complete the required tasks, but if someone is not fully committed to the subject, they might be less likely to continue participation. Therefore attempts to control attrition might drive attrition and cause difficulties in relation to randomisation. For example, if those participants that remain have more of a personal interest in meditation then the results of the intervention must be questioned. Further research should look to find a good balance between trying to get participants to fully commit versus creating an overly structured and restrictive control.

Considering our uncertainty in relation to participants’ adherence to completion of self-guided tasks (e.g. practice of meditation) it would be appropriate for further research to clarify this by adding a verification question post-intervention. The verification question in this case can be a question that requires the participant to confirm one of the central instructions of the mediation via multiple choice (e.g. the meditation involved directing positive feelings towards self, loved one, neutral person and stranger). Future research might also consider including further demographic questions to confirm details such as socio-economic and ethnic-background. Another point that future research might address is the ideas/preconceptions that people might have of meditation or Eastern based interventions in general. For example, mediation might be associated with alternative medicine and thus be viewed as generally unscientific or a participant may have religious-based inhibitions in relation to using a technique that has a basis in Buddhism. This could be addressed by asking the participant prior to the start of the experiment to share their thoughts in relation to mediation or alternatively pre-conceptions could be countered by providing the participant
with a quick explanatory guide. This guide might clarify the empirical findings in relation to meditation and its separation from use in a particular religion.

Conclusion

We have presented the resulting effects on Optimism levels, Positive affect and Negative affect of a brief online Loving Kindness Meditation versus a Waiting-List control group of general internet users. While, we have noted an encouraging directional trend in Positive Affect scores, the results demonstrated the overall scores of the LKM group were not significantly improved when compared to the control group. Therefore the three main hypotheses were not supported. The main strengths of the study include the accessibility of the intervention/tools and flexibility in terms of time and location of practice. The use of these measures for the first-time in an online LKM study is an important step forward and combined with an ecologically valid has added to literature in this area. However, the current study had some limitations in terms of attrition and control but these are issues that have also been seen in previous studies into online interventions. Further research should explore whether a LKM delivered online with higher levels of control and less attrition could produce stronger results.
References


UNH Health Services (2011, Dec 23) *Loving Kindness Meditation* [Video File]. Retrieved from https://www.youtube.com/watch?v=sz7cpV7ERsM

Appendix A

Transcript of Audio Meditation Guidance

Begin by sitting down in a comfortable position

Sit with your back erect without being strained or overarched or you can also choose to lie down on your back. You should have your legs unbent and uncrossed and your arms at your side.

Take a few deep breaths to relax your body. Take the air in through your nose breathing deeply into your lungs and release the breath through your mouth.

Feel your energy settle into your body and into this moment. As you breathe deeply you will feel your body become more heavy and more relaxed. After taking a few deep breaths no longer try to control your breath but allow it to come and go from your body naturally. Focus on your breath as it comes in to your body and as it leaves. As you breathe in and out move your focus from your breath to your heart. You might find it helpful to place one or both of your hands over your heart.

As you do this say to yourself with sincerity and clarity.

May I be well
May I be happy
May I be peaceful
May I be loved

Allow any thoughts or feelings you may experience as you say these words to fully flow when you repeat these phrases.

May I be well
May I be happy
May I be peaceful
May I be loved

With each breath let these words and love reach out from your heart to every cell in your body.
May I be well
May I be happy
May I be peaceful
May I be loved

Now call to mind someone you care about, a good friend or a family member. Someone who you have positive regards for, enjoy spending time with and are comfortable being around. Say their name to yourself, feel their presence. It may be helpful to visualise this person sitting in front of you. Direct loving kindness towards this person

May you be well
May you be happy
May you be peaceful
May you be loved

As you repeat these words feel the joy in your heart. Feel it as it radiates from your heart to every cell in your body. Visualise it radiating out of your body and touching this person.

May you be well
May you be happy
May you be peaceful
May you be loved

With each wish for them imagine them receiving your love, kindness and joy as it envelops their body and spirit.

May you be well
May you be happy
May you be peaceful
May you be loved
Be in this loving moment. Think of someone that plays some role in your life, that you don’t know very well or don’t have a particular feeling for or against. Maybe it’s the person who serves you food in the dining hall, or the cashier at the store or someone that you see periodically on the street or the bus. Imagine this person sitting in front of you. Direct loving-kindness towards this person.

May you be well
May you be happy
May you be peaceful
May you be loved

As you repeat these words, feel the joy in your heart. Feel it as it radiates from your heart to every cell in your body. Visualise it radiating out of your body and touching this person.

May you be well
May you be happy
May you be peaceful
May you be loved

With each wish imagine this person receiving your love, kindness and joy as it envelops their body and spirit.

May you be well
May you be happy
May you be peaceful
May you be loved

Be in this loving moment, think of someone you are having difficulty with in your life. A family-member, a friend, a co-worker. Someone you are experiencing conflict with or there is unhealthy communication with. Say their name, imagine them sitting in front of you. Direct loving-kindness towards this person.

May you be well
May you be happy
May you be peaceful
May you be loved

Sending this person loving-kindness may be difficult. To forgive, to understand, to accept. You may struggle, just let these feelings wash over you and continue to wish this person loving-kindness. Do not be harsh with yourself if this is a challenge to do, just continue to say

May you be well
May you be happy
May you be peaceful
May you be loved

As you repeat these words feel the joy in your heart, feel it as it radiates from your heart to every cell in your body. Feel it flowing out of your body and touching this person.

May you be well
May you be happy
May you be peaceful
May you be loved

With each wish imagine this person receiving your love, kindness and joy as it envelops their body and spirit.

May you be well
May you be happy
May you be peaceful
May you be loved

Be in this loving moment. Know visualise kindness, love, happiness, well-being and peace. Let these radiate out from you and your heart out to the person who is close to you, the person you don’t know but touches your life and the person you have difficulty with.
May you be well
May you be happy
May you be peaceful
May you be loved

Now return to this current space and time. Bring with you the feelings of kindness, peace, well-being, love and happiness. Carry it with you and share it with others. When you are ready open your eyes and stretch out your body.
Appendix B

The Positive and Negative Affect Schedule (PANAS; Watson et al., 1988)

PANAS Questionnaire
This scale consists of a number of words that describe different feelings and emotions. Read each item and then rate the number from the scale below next to each word. Indicate to what extent you feel this way right now, that is, at the present moment OR indicate the extent you have felt this way over the past week (circle the instructions you followed when taking this measure)

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<tr>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>1</td>
<td>Very Slightly or Not at All</td>
<td>A Little</td>
<td>Moderately</td>
<td>Quite a Bit</td>
<td>Extremely</td>
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1. Interested  
2. Distressed  
3. Excited  
4. Upset  
5. Strong  
6. Guilty  
7. Scared  
8. Hostile  
9. Enthusiastic  
10. Proud  
11. Irritable  
12. Alert  
13. Ashamed  
14. Inspired  
15. Nervous  
16. Determined  
17. Attentive  
18. Jittery  
19. Active  
20. Afraid

Scoring Instructions:
Positive Affect Score: Add the scores on items 1, 3, 5, 9, 10, 12, 14, 16, 17, and 19. Scores can range from 10 – 50, with higher scores representing higher levels of positive affect. Mean Scores: Momentary 29.7 (SD 7.9); Weekly 33.5 (SD 7.2)

Negative Affect Score: Add the scores on items 2, 4, 6, 7, 8, 11, 13, 15, 18, and 20. Scores can range from 10 – 50, with lower scores representing lower levels of negative affect. Mean Score: Momentary 14.8 (SD 5.4); Weekly 17.4 (SD 6.2)

Appendix C

Revised Life Orientation Test (LOT-R)

Instructions:
Please answer the following questions about yourself by indicating the extent of your agreement using the following scale:

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<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>![ = strongly disagree</td>
<td>![ = disagree</td>
<td>![ = neutral</td>
<td>![ = agree</td>
<td>![ = strongly agree</td>
</tr>
</tbody>
</table>

Be as honest as you can throughout, and try not to let your responses to one question influence your response to other questions. There are no right or wrong answers.

1. In uncertain times, I usually expect the best.
2. It's easy for me to relax.
3. If something can go wrong for me, it will.
4. I'm always optimistic about my future.
5. I enjoy my friends a lot.
6. It's important for me to keep busy.
7. I hardly ever expect things to go my way.
8. I don't get upset too easily.
9. I rarely count on good things happening to me.
10. Overall, I expect more good things to happen to me than bad.

Scoring:
1. Reverse code items 3, 7, and 9 prior to scoring (0=4) (1=3) (2=2) (3=1) (4=0).
2. Sum items 1, 3, 4, 7, 9, and 10 to obtain an overall score.

Note: Items 2, 5, 6, and 8 are filler items only. They are not scored as part of the revised scale.

The revised scale was constructed in order to eliminate two items from the original scale, which dealt more with coping style than with positive expectations for future outcomes. The correlation between the revised scale and the original scale is .95.

Reference:
Appendix D

Email One (Experimental Group):

Dear Participant,

Thank you for completing the first part of our psychology study.

By now you have hopefully completed your first session of meditation (if not please do this as soon as possible).

Please practice a second session of meditation by clicking on the following link:

https://soundcloud.com/psych14/loving-kindness-meditation

This same link can also be used for your third and last session which you should complete before xx/xx/xx

We will contact you again in few days to inform you of the last part of the experiment (this will take less than 10 minutes to complete).

If you need any further instructions or have any questions please reply to this email. In order to keep anonymity we kindly ask you to not include your name or any other information that might serve to identify you.

We appreciate your cooperation!

Email Two (Control Group):

Dear Participant,

This is the last instruction email regarding your participation in this Psychology study.

Please now complete the final survey by xx/xx/xx

https://docs.google.com/forms/d/1pzmn0FaJJIbdv-DyN7_CxTWjtqsDGUpWyyQQ-8cyNW4I/viewform

After submitting the survey you will then have completed all the required tasks and we would like to thank you for your time and effort. It’s very much appreciated.

Kind Regards,
Email Three (Experimental Group)

Dear Participant,

This is the last instruction email regarding your participation in this Psychology study.

By now you have hopefully completed your first and second sessions of meditation (if not please do so via the link below).

Please practice a third and last session of meditation by clicking on the following link:

https://soundcloud.com/psych14/loving-kindness-meditation

Once you complete the third session of meditation, please complete the final survey:

https://docs.google.com/forms/d/1pznn0FaJIIbdv-DvN7_CxTWjitqsdGjUpWvQO-8cvNW4I/viewform

Please complete this survey by xx/xx/xx

After submitting the survey you will then have completed all the required tasks and we would like to thank you for your time and effort. It’s very much appreciated.

If you found the meditation helpful in any way, please feel free to continue using the meditation link.

Kind Regards,

Debrief Email (Both Groups)

Dear Participant,

Recently you took part in a Psychology study and I would now like to provide some further information on the purpose of this study.

Over the last decade, some psychologists have attempted to move away from simply treating problems and refocus on improving well-being. In doing so researchers have looked to techniques from outside traditional psychology. Loving-Kindness meditation is a Buddhism related technique that seeks to direct warmth and caring feelings towards the self and others. The technique is formed around the belief that compassion can improve resilience, mood and lead to a reduction in stress. The purpose of our study was to determine whether other positive effects would be found from practicing Loving-Kindness meditation e.g. improvements in optimism and general affect (the experience of feeling/emotion) and whether an online delivery of the meditation could be effective.

Some of you were randomly assigned to a control group (for the purposes of comparison). The rest of the participants were asked to complete three sessions of Loving-Kindness meditation over a period of 7 days. We would encourage you to try/continue using this meditation and see if you find it helpful. You can access the Loving-Kindness meditation through this link:

https://soundcloud.com/psych14/loving-kindness-meditation

Your input will contribute to our understanding of this and I would like to thank you again for your participation.
If you have any complaints, concerns or questions about this research please feel free to contact myself by replying to this email.

If you are interested in reading further in this area of research, you may wish to read the following references:


Kind Regards,