Open Access

OBM Integrative and Complementary Medicine

LIDSEN Publishing Inc.

Research Article

Does a brief mindfulness training enhance heartfulness in students? Results of a pilot study

Myriam Rudaz[1*], Thomas Ledermann[2], Michael P. Twohig[3], Michael E. Levin[3]

1. University of Bern, Institute of Practical Theology, Länggassstrasse 51, 3012 Bern, Switzerland; E-Mail: myriam.rudaz@theol.unibe.ch
2. Florida State University, Department of Family and Child Sciences, 120 Convocation Way, Tallahassee, FL 32306-1491, U.S.A.; E-Mail: tledermann@fsu.edu
3. Utah State University, Department of Psychology, 2810 Old Main Hill, Logan, UT 84322-2810; E-Mails: michael.twohig@usu.edu, mike.levin@usu.edu

* **Correspondence:** Myriam Rudaz; myriam.rudaz@theol.unibe.ch

Academic Editor: Prof. Steven K. H. Aung

Special Issue: How Compassion Benefits in the Healing Process

OBM Integrative and Complementary Medicine
2018, volume 3, issue 1
doi:10.21926/obm.icm.1801xxx

Received:
Accepted:
Published:

Abstract:

(1) *Background*: There is robust evidence that mindfulness trainings enhance mindfulness as operationalized in Western psychology, but evidence about their effect on aspects of heartfulness is sparse. This study seeks to test whether a brief mindfulness training enhances heart qualities, including self-compassion, gratitude, and the generation of feelings of happiness.

(2) *Methods*: Eighteen students enrolled in a mindfulness training that was offered as part of an interdisciplinary class. The training consisted of five training sessions and four booster sessions of 45 minutes each over the course of nine weeks. Mindfulness was measured with the Five Facet Mindfulness Questionnaire-Short Form (FFMQ-SF) and self-compassion was measured with the Self-Compassion Scale Short Form (SCS-SF). In addition, two items were drawn from the Caring for Bliss Scale (CBS) measuring gratitude and the generation of

feelings of happiness in the present moment. Assessments were conducted before the training (pre), after the training (post), and four weeks after the training (follow-up).
(3) *Results*: Results showed that mindfulness, general self-compassion, and generating feelings of happiness increased from pre to post, whereas self-critical attitudes decreased and that these changes were maintained at follow-up. Gratitude increased from pre to post and then decreased from post to follow-up.
(4) *Conclusions*: A brief mindfulness training seems to be beneficial for students to improve mindfulness and aspects of heartfulness, but further research is needed to investigate the effectiveness of the training relative to a cohort or active control group.

Keywords
Mindfulness; self-compassion; gratitude; happiness; training; students

1. Introduction

Stress and mental health issues have become a growing problem in college students [1, 2], but evidence exists that mindfulness-based trainings, such as the Mindfulness-Based Stress Reduction (MBSR) training [3], are effective in reducing stress-related symptoms. For instance, a meta-analysis covering nonclinical populations revealed that MBSR increased mental health, such as well-being, and reduced anxiety and depression relative to controls [4]. Likewise, a meta-analysis in healthy adults showed that MBSR reduced perceived stress, psychological distress, and severity of global psychological symptoms compared to waitlist controls [5]. A more recent meta-analysis of 18 studies revealed that in healthy adults MBSR reduced perceived stress, distress, anxiety, depression, burnout, and low quality of life compared to controls [6]. We are also aware of three meta-analyses that examined the effectiveness of mindfulness-based interventions on stress indicators in college students. Regehr, Glancy, and Pitts [1] meta-analyzed 24 studies with students of a wide range of disciplines (e.g., nursing, economics, technology) and found that cognitive, behavioral, and mindfulness interventions were able to reduce anxiety, depression, and cortisol relative to controls. McConville, McAleer, and Hahne [7] reviewed 19 studies with health profession students (e.g., medicine, social work, psychology) and found that mindfulness-based interventions decreased the level of stress, anxiety, and depression and improved mindfulness, mood, self-efficacy, and empathy relative to controls. In a recent meta-analysis with 25 studies with college students of diverse disciplines, Bamber and Morpeth [8] found that mindfulness meditation reduced students' anxiety relative to no-treatment controls.

In Western psychology, mindfulness has been defined as "moment-to-moment, non-judgemental awareness, cultivated by paying attention in a specific way, that is, in the present moment, and as non-reactively and as non-judgmentally and openheartedly as possible" [9, p. 108]. The term mindfulness here is used primarily to refer to the meta-awareness and not to the focusing aspect of mind [10]. Mindfulness is the key element in the 8-week MBSR training that consists of weekly group sessions (2-2.5 hours), one retreat day in silence (7-8 hours), and daily home assignment (45-60 minutes). In this training, participants learn formal and informal mindfulness practices. The formal mindfulness practices include the body scan, mindful yoga, and

different forms of meditation. The informal mindfulness practices refer to mindfulness during daily activities, such as taking a shower or doing the dishes. The home assignments typically include practicing mindfulness with the help of a CD.

A related construct to mindfulness is self-compassion. Self-compassion can be defined as kindness towards oneself in the face of personal shortcomings, inadequacies, or failures [11]. It consists of three core components: treating oneself kindly during difficult times, recognizing that mistakes or failures are part of the common human experience, and maintaining a balanced awareness of painful thoughts and feelings. Germer and Neff [12] and Neff and Germer [13] developed an 8-week Mindful Self-Compassion (MSC) program, in which participants learn formal and informal mindful self-compassion practices such as a compassionate body scan or placing one's hand on one's heart during times of stress. The program resembles Kabat-Zinn's MBSR approach and is as time intensive as the MBSR program with the exception that the program includes a half-day retreat instead of a one-day retreat. Kirby, Tellegen, and Steindl [14] conducted a meta-analysis of 21 randomized controlled trials to examine the effect of compassion-based interventions (e.g., MSC, Loving-Kindness, Compassion Focused Therapy) on mindfulness, self-compassion, and health outcomes. Substantial effects in favour of the compassion-based interventions were found for increased levels of compassion, self-compassion, mindfulness, and well-being and decreased levels of depression, anxiety, and psychological distress. A meta-analysis of 24 studies by Macbeth and Gumley [15] found a negative relationship between self-compassion and psychopathology. With respect to self-compassion, studies showed, that self-critical attitudes correlated more strongly with negative affect, depressive symptoms, perceived stress, rumination, and neuroticism, whereas compassionate attitudes correlated more strongly with positive affect [16, 17].

Mindfulness aspects related to the quality of the heart other than self-compassion, such as gratitude or feelings of unconditional happiness, have received less attention in mindfulness research [18, 19]. This is surprising because in Asian language mindfulness can be described as presence of heart as well as mind [20, 21]. Specifically, the Japanese kanji (ideogram) for mindfulness (*nen*) is made up of two parts. The upper part (*ima*) which looks like a roof means this present moment or the now, and the lower part (*shin*) can be translated as mind or heart. Kabat-Zinn [22] emphasizes the gentle, appreciative, and nurturing side of mindfulness practice and writes that "another way to think of it would be "heartfulness"" (p. 7). Based on this, Voci et al. [19] argue that "heartfulness can be used to describe the warm side of mindfulness" (p. 339). They propose two variables that reflect this quality, namely self-compassion and gratitude. Similarly, Rosenzweig [23] describes gratitude and compassion as "sisters" of mindfulness. Two studies found that self-compassion and gratitude mediated the relationship between mindfulness and psychological well-being [19, 24]. Finlay-Jones, Kane, and Rees [25] examined a 6-week online self-compassion program for psychology trainees and found, among others, significant increases in self-compassion and happiness after the training and at 3-month follow-up.

There is an increasing interest in helping students to develop not only scientific and analytical skills, but also qualities of the heart such as compassion or the development of the whole person [26] through mindfulness. The challenge of the standard MBSR and MSC programs for integrating them into the curriculum of college students is that they require a high time commitment of up to 26 hours. Carmody and Baer [27] studied the effect of variation in mindfulness-based stress reduction class hours on psychological distress. They found that the correlation between the sizes

of the effects and the length of a program was neither significant for clinical nor nonclinical samples. Therefore abbreviated mindfulness programs may be worthwhile for university settings.

The purpose of the current study was to test the impact of a brief mindfulness training (adapted version of MBSR with elements of MSC) on heart qualities, including self-compassion, gratitude, and the generation of feelings of happiness in a student sample. We hypothesized that a brief 9-week mindfulness training of 45 minutes per week (6 hours and 45 minutes total) will enhance mindfulness and heart qualities directly after the training and four weeks later.

2. Method

2.1 Participants

The 9-week mindfulness training was offered as part of an interdisciplinary class in Mindfulness-Based Stress Reduction at Utah State University in 2017 and was advertised via a circular email at the College of Education and Human Services. There were no exclusion criteria other than age below 18 years or not being enrolled at Utah State University. A total of 18 students signed up for the class and all agreed to participate in the study. Approval for the study was received by the Institutional Review Board at Utah State University.

The mean age was 24 years (*SD* = 4.49; range: 17-33). Of the 18 students, 11 (61.1%) were female and seven (38.9%) were male. Regarding the racial background, 83.3% identified as White or Caucasian and 28% as other.

2.2 Mindfulness training

The 9-week mindfulness training consisted of weekly 45-minute group sessions and was led by the first author, a psychotherapist, mind-body medicine therapist, and hatha yoga trainer. She did also attend the 8-week practicum in Mindfulness-Based Stress Reduction at the Center for Mindfulness at the University of Massachusetts Medical School. Table 1 gives an overview of the main components of the training. During the first five sessions participants were introduced experientially to the formal mindfulness practices, such as mindful yoga, the body scan, and different forms of meditation. The next four sessions were used to deepen the formal mindfulness practices and the participants received some psychoeducation about stress. During all sessions a focus lied on the group sharing of the experiences with the mindfulness practices. The home assignments were given as invitations to practice mindful self-care. Furthermore, the participants received a handout with the working definition of mindfulness, the foundational attitudes, and some guidelines for practicing mindfulness and were pointed to a link with free audio mindfulness exercises to support the home practice.

[Table 1 here]

2.3 Measures and procedures

Two weeks before the start of the mindfulness training the students received an email with an online link to the survey and were asked to participate in the study. Assessments were conducted

via a web-based survey platform before the training (pre), after the training (post), and four weeks after the training (follow-up). It took approximately 20 minutes to complete each survey. The following measures were provided at all measurement points:

Mindfulness practices. The familiarity with different mindfulness practices (e.g., sitting meditation, body scan, yoga) was inquired before the start of the training. In addition, the participants were asked to indicate how frequent they practice each of the mindfulness practices they are familiar with on a 6-point scale ranging from 0 "never" to 5 "almost every day" as well as how useful they find them on a 5-point scale ranging from 0 "not useful at all" to 4 "extremely useful." Directly after the training and four weeks after the training, the participants were solely asked to indicate, how frequent they practice each of the mindfulness practices as well as how useful they find them.

Mindfulness. The Five Facet Mindfulness Questionnaire-Short Form (FFMQ-SF) [28] is a 24-item scale and was used to assess overall mindfulness. The items (e.g., "I perceive my feelings and emotions without having to react to them") are rated on a 5-point scale ranging from 1 "never or very rarely true" to 5 "very often or always true." Negative items were reverse-coded and all items were summed up, with higher scores indicating greater mindfulness (Cronbach's α = .80 at pre, .85 at post, and .84 at follow-up). The five facets of mindfulness were not analysed separately due to low internal consistencies (≤ .70) for three out of five facets.

Self-compassion. The Self-Compassion Scale-Short Form (SCS-SF) [29] consists of 12-items and was used to assess overall self-compassion as well as the two factors compassionate attitudes versus self-critical attitudes [30]. The items (e.g., "I'm disapproving and judgmental about my own flaws and inadequacies") are rated on a 5-point scale ranging from 1 "almost never" to 5 "almost always." A mean score was calculated for self-compassionate attitudes including the items of self-kindness, common humanity, and mindfulness (Cronbach's α = .87 at pre, .76 at post, and .80 at follow-up) and for self-critical attitudes including the items self-judgement, isolation, and over-identification (Cronbach's α = .86 at pre, .65 at post, and .90 at follow-up, respectively). For the overall score, the items of self-critical attitudes were reverse-coded and then a mean score was calculated for all items (Cronbach's α = .93 at pre, .77 at post, and .92 at follow-up).

Caring for bliss. Two items of the Caring for Bliss Scale (CBS) [31] were included in this study and analysed separately. The items are: "I take time to acknowledge the things for which I am grateful" and "I can generate a feeling of happiness in the here and now." The items are rated on a 5-point scale ranging from 0 "never" to 5 "regularly".

2.3 Statistical Analyses

Data were analyzed with multilevel modeling (MLM) using the packages nlme [32] in R [33] and an intent-to-treat sample containing all participants [34]. Measurement occasion was used as a time variable, with the pre-treatment set to 0, post-treatment set to 1, and follow-up set to 2. For each treatment outcome, a series of growth curve models were run in four steps [35, 36] using Restricted Maximum Likelihood (REML) estimation, which can deal with missing data. In the first

step, we estimated a random intercept model to calculate the intraclass correlation coefficient (ICC). In the second step, we added a fixed effect for time. In the third step, we included a random effect for time and tested whether this model was significantly better than the simpler model of step 2 using the chi-square difference test. In the fourth step, we assessed the error structure using the best model of step three. First, we estimated a model with a general correlation structure (i.e., a separate covariance for each distinct pair of time points). We then allowed for a separate residual variance for each time point in the model with a general correlation structure and compared these two models using the chi-square difference test. In comparing models, the more parsimonious model was selected when there was no difference in fit between the simpler and more complex model. In an additional step, we added a covariate reflecting how frequent each participant practices mindfulness to the equation using the model selected.

3. Results

3.1 Mindfulness practices before and after the training

The familiarity with different mindfulness practices, the frequency of practicing, and how useful the participants found these practices before the training are provided in Table 2. Awareness of breathing was the most familiar mindfulness practice (83.3%) and self-compassion or lovingkindness was the least familiar (27.8%). The 83.3% participants that reported to be familiar with awareness of breathing reported to practice it in average about once every other week. With respect to the usefulness of the practices, the participants rated, in average, the mindfulness practices they were familiar with as not very useful or neutral (usefulness not clear) for oneself.

[Table 2 here]

All 18 participants completed the training and filled out the pre and post assessment. At follow-up two participants did not fill out the assessement. The frequency of practicing different mindfulness practices and how useful the participants found these practices directly after the training and four weeks after the training are provided in Table 3. The most frequent practiced techniques were awareness of breathing, bring mindfulness to a daily activity such as eating, walking, or brushing teeth, and tune into your breathing during the day. The participants reported to practice these techniques between once a week to two or three times a week and rated these three mindfulness practices as well as self-compassion or lovingkindness as most useful with scores between somewhat useful to extremely useful.

[Table 3 here]

3.2 Treatment outcomes

Table 4 shows the means and standard deviations (*SD*) of the treatment outcomes and effect sizes for the differences between pre-treatment and post-treatment, pre-treatment and four-week follow-up, and post-treatment and four-week follow-up. As can be seen, all changes between pre-treatment and post-treatment were at least small in size. A large effect size change resulted for self-

compassion and medium effect size changes were found for self-critical attitudes and happiness. Comparing pre-treatment with follow-up resulted in changes that were at least small in size with the exception of gratitude, which decreased between post and follow-up. Again, the largest effects revealed for self-compassion, self-critical attitudes, and happiness.

[Table 4 here]

Mindfulness. The growth curve model with random effect for the intercept, but not for time, the residual variances constrained to be equal across time points (homoscedasticity), and no residual correlations between the time points was most appropriate for mindfulness. In this model, the effect of time was positive (2.170, *SE* = 0.970) and statistically significant, $t(33) = 2.237$, $p = .032$. This indicates that mindfulness increased in average by 2.17 between the time points. As can be seen from Table 4, mindfulness increased across all time points (small effects), indicating that the training has a lasting effect on people's mindfulness. Adding mindfulness practice as covariate to the model, neither time nor mindfulness practice were statistically significant, $b = 1.1785$, $SE = 1.387$, $t(31) = 1.287$, $p = .208$ and $b = 0.412$, $SE = 1.101$, $t(31) = 0.374$, $p = .711$, respectively.

Self-compassion. For the total score of self-compassion, the model with random effect for the intercept and time, a separate residual variance for each time point (heteroscedasticity), and no residual correlations between the time points was most appropriate. In this model, the effect of time was positive (0.206, *SE* = 0.079) and statistically significant, $t(33) = 2.623$, $p = .013$. The increase of self-compassion was large in size between pre-treatment and post-treatment and medium between pre-treatment and follow-up (see Table 4). The effect of time remained statistically significant after adding mindfulness practice as covariate, $b = 0.234$, $SE = 0.098$, $t(31) = 2.395$, $p = .023$. No significant effect emerged for mindfulness practice, $b = -0.037$, $SE = 0.048$, $t(31) = 0.762$, $p = .452$.

For compassionate attitudes, the growth curve model with random effect for the intercept, but not for time, the residual variances constrained to be equal across time points, and no residual correlations between the time points was most appropriate. In this model, the effect of time (0.086, *SE* = 0.074) was statistically not significant, $t(33) = 1.174$, $p = .249$. The increase of compassionate attitudes towards self between pre-treatment and post-treatment and between pre-treatment and follow-up was small in size (see Table 4). Adding mindfulness practice as covariate, neither time nor mindfulness practice were statistically significant, $b = 0.076$, $SE = 0.105$, $t(31) = 0.727$, $p = .473$ and $b = 0.005$, $SE = .083$, $t(31) = 0.057$, $p = .955$, respectively.

For self-critical attitudes, the growth curve model with random effect for the intercept and time, the residual variances constrained to be equal across time points, and no residual correlations between the time points was most appropriate. In this model, the effect of time was negative (-0.263, *SE* = 0.082) and statistically significant, $t(33) = 3.194$, $p = .003$. The decrease of self-critical attitudes was medium in size between all three time points (see Table 4), indicating that the training has a lasting positive effect on self-critical attitudes. Again, the inclusion of mindfulness practice as covariate resulted in a model in which neither time nor mindfulness practice were significant, $b = -0.191$, $SE = 0.101$, $t(31) = 1.893$, $p = .068$ and $b = -0.067$, $SE = .063$, $t(31) = 1.053$, $p = 300$, respectively.

Gratitude. The growth curve model with no random effect, the residual variances constrained to be equal across time points, and no residual correlations between the time points was most appropriate for gratitude. In this model, the effect of time (0.101, *SE* = 0.162) was statistically not significant, *t*(33) = 0.624, *p* = .535. As can be seen from Table 4, gratitude increased substantially between pre-treatment and post-treatment and then decreased between post-treatment and follow-up, indicating that the training did not have a lasting effect on gratitude. Adding mindfulness practice as covariate, neither time nor mindfulness practice were statistically significant, *b* = 0.200, *SE* = 0.210, *t*(31) = 0.948, *p* = .348 and *b* = -0.068, *SE* = .158, *t*(31) = 0.431, *p* = .668, respectively.

Happiness. The growth curve model with a random effect for the intercept, but not for time, the residual variances constrained to be equal across time points, and no residual correlations between the time points was most appropriate for happiness. In this model, the effect of time was positive (0.214, *SE* = 0.073) and statistically significant, *t*(33) = 2.934, *p* = .006. The increase of happiness was medium in size between pre-treatment and post-treatment and between post-treatment and follow-up (see Table 4). A medium-size increase occurred between pre-treatment and follow-up, indicating that the program seems to have a lasting effect on people's happiness. Adding mindfulness practice as covariate, the effect of time remained significant, *b* = 0.224, *SE* = 0.104, *t*(31) = 2.148, *p* = .040. Mindfulness practice yielded not significant, *b* = 0.004, *SE* = 0.083, *t*(31) = 0.043, *p* = .966.

4. Discussion

The present study investigated whether a brief mindfulness training of 6 hours and 45 minutes can improve mindfulness and heart qualities directly after the training and four weeks later in college students. We used self-compassion, gratitude, and the generation of feelings of happiness in the here and now, as indicators of heartfulness. Consistent with our expectation, mindfulness, self-compassion, gratitude, and the generation of feelings of happiness increased from pre to post. This is in line with other studies that demonstrated positive effects on people's mindfulness and self-compassion after a mindfulness-based and compassion-based training [7, 14, 25]. Results of the current study showed that compassionate attitudes towards the self increased and that self-critical attitudes decreased from pre to post, with a larger effect for self-critical attitudes. In fact, self-critical attitudes showed, besides total self-compassion, the strongest effect that was further reduced substantially even four weeks after the training. The results of the multilevel modeling analysis revealed that there was a significant time effect for mindfulness, general self-compassion, self-critical attitudes, and happiness that remained significant for general self-compassion and happiness after adding mindfulness practice as covariate.

These findings are a first answer to the question of Costa [30] whether a compassion-based training can increase people's kindness and reduce their self-critical attitudes. The results of the present study indicate that people become both kinder and less self-critical. Though there is no significance test, the effect sizes and the results of the multilevel modeling analysis suggest that the effect was stronger for self-critical attitudes than for compassionate attitudes or kindness. Furthermore, the effects for mindfulness, self-compassion, and the generation of feelings of happiness were maintained four weeks after the training, but not for gratitude. A reason why the positive effect on gratitude did not last may be that the training did not explicitly focus on this heart quality, whereas mindfulness and self-compassion were integral components of the training conducted. Nevertheless, gratitude increased from pre to post indicating that the training did

indirectly foster it. However, it should be noted, that the generation of feelings of happiness in the present moment increased from pre to post and was maintained four weeks later, although it was also not explicitly trained. In fact, the change in happiness was the strongest after the changes of general self-compassion and self-critical attitudes. Thus, further mindfulness training research on gratitude is needed.

The present study demonstrated also that even students who found mindfulness practices not very useful or neutral before the training can benefit from a brief mindfulness training. The overall rating of the usefulness of different mindfulness practices increased from somewhat useful to extremely useful directly after the training as well as four weeks later. Interestingly, after the training and four weeks later, the students indicated to practice in particular mindfulness techniques that can be practiced everywhere and that can be integrated easily into daily activities (i.e., awareness of breathing, tune into your breathing during the day, bring mindfulness to a daily activity). This raises the question whether it would be especially useful for the students to focus on informal mindfulness practices. It may be that participants view these practices as doable and not as an extra task that needs to be accomplished.

While cultivating mindfulness seems to be a promising intervention for strengthening heart qualities in college students, our pilot-study was based on a relatively small number of self-selected participants that warrants further investigation. Also, the mindfulness training should be compared to a cohort control group or an active control group (e.g., relaxation group), and it would be useful to have follow-up measurement points approximately three to six months after the training. In future studies, it would also be interesting to incorporate practices to enhance gratitude and the generation of feelings of happiness in the training directly. For instance, practices form positive psychology such as counting your blessings or expressing gratitude [37] could be added and combined with mindfulness and compassion. We would also recommend to include different measures of mindfulness such as the Freiburg Mindfulness Inventory (FMI) [38, 39] in order to examine mindfulness more broadly as well as to include other indicators of heartfulness such as for example generosity.

In conclusion, the current findings suggest that a brief mindfulness training can enhance mindfulness and that even a primarily mindfulness-based training with some self-compassion elements can strengthen aspects of heartfulness directly after the training and to some extend also four weeks after the training. The strongest effects were found for general self-compassion, self-critical attitudes, and happiness. Given the enormous costs and suffering chronic stress and mental health issues can produce in college students, it may be worth strengthening not only qualities of the head (i.e., scientific and analytical skills), but qualities of the heart through mindfulness practices in university settings. The present pilot-study showed that it is feasible to integrate a brief mindfulness training into a class and that students are willing to participate and benefit from such a training.

Acknowledgments

We would like to thank the students that participated in the study and Madison Hurmence for helping with the data collection.

Author Contributions

Myriam Rudaz designed and conducted the study and wrote the manuscript.

Thomas Ledermann helped with the statistical analysis, writing of the result section, and editing of the manuscript.
Michael P. Twohig helped designing the study and editing the manuscript.
Michael E. Levin helped designing the study and editing the manuscript.

Funding

No funding was provided for this research.

Competing Interests

The authors have declared that no competing interests exist.

References

1. Regehr C, Glancy D, Pitts A. Interventions to reduce stress in university students: A review and meta-analysis. Journal of affective disorders. 2013;148(1):1-11.
2. Storrie K, Ahern K, Tuckett A. A systematic review: students with mental health problems—a growing problem. International journal of nursing practice. 2010;16(1):1-6.
3. Kabat-Zinn J. Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness: Delta; 2009.
4. Grossman P, Niemann L, Schmidt S, Walach H. Mindfulness-based stress reduction and health benefits: A meta-analysis. Journal of psychosomatic research. 2004;57(1):35-43.
5. Chiesa A, Serretti A. Mindfulness-based stress reduction for stress management in healthy people: a review and meta-analysis. The journal of alternative and complementary medicine. 2009;15(5):593-600.
6. Khoury B, Sharma M, Rush SE, Fournier C. Mindfulness-based stress reduction for healthy individuals: A meta-analysis. Journal of psychosomatic research. 2015;78(6):519-528.
7. McConville J, McAleer R, Hahne A. Mindfulness training for health profession students—the effect of mindfulness training on psychological well-being, learning and clinical performance of health professional students: a systematic review of randomized and non-randomized controlled trials. Explore. 2017;13(1):26-45.
8. Bamber MD, Morpeth E. Effects of mindfulness meditation on college student anxiety: A meta-analysis. Mindfulness. 2019;10(2):203-214.
9. Kabat-Zinn J. Coming to our senses: Healing ourselves and the world through mindfulness: Hachette UK; 2005.
10. Lutz A, Dunne JD, Davidson RJ. Meditation and the neuroscience of consciousness: An introduction. Cambridge handbook of consciousness. 2007;499-555.
11. Neff KD. The development and validation of a scale to measure self-compassion. Self and identity. 2003;2(3):223-250.
12. Germer CK, Neff KD. Self-compassion in clinical practice. Journal of clinical psychology. 2013;69(8):856-867.
13. Neff KD, Germer CK. A pilot study and randomized controlled trial of the mindful self-compassion program. Journal of clinical psychology. 2013;69(1):28-44.

14. Kirby JN, Tellegen CL, Steindl SR. A meta-analysis of compassion-based interventions: Current state of knowledge and future directions. Behavior Therapy. 2017;48(6):778-792.
15. MacBeth A, Gumley A. Exploring compassion: A meta-analysis of the association between self-compassion and psychopathology. Clinical psychology review. 2012;32(6):545-552.
16. López A, Sanderman R, Smink A, Zhang Y, van Sonderen E, Ranchor A, et al. A reconsideration of the Self-Compassion Scale's total score: self-compassion versus self-criticism. PloS one. 2015;10(7):e0132940.
17. Körner A, Coroiu A, Copeland L, Gomez-Garibello C, Albani C, Zenger M, et al. The role of self-compassion in buffering symptoms of depression in the general population. PloS one. 2015;10(10):e0136598.
18. Fulton CL, Cashwell CS. Mindfulness-based awareness and compassion: Predictors of counselor empathy and anxiety. Counselor Education and Supervision. 2015;54(2):122-133.
19. Voci A, Veneziani CA, Fuochi G. Relating Mindfulness, Heartfulness, and Psychological Well-Being: the Role of Self-Compassion and Gratitude. Mindfulness. 2019;10(2):339-351.
20. Shapiro S, de Sousa S, Jazaieri H. Mindfulness, mental health, and positive psychology. Mindfulness in Positive Psychology: Routledge; 2016. p. 108-125.
21. Skinner JD, Bladen S. Practical Zen for Health, Wealth and Mindfulness: Singing Dragon; 2018.
22. Kabat-Zinn J. Wherever you go there you are: Mindfulness meditation in everyday life. Hyperion; 1994.
23. Rosenzweig D. The sisters of mindfulness. Journal of Clinical Psychology. 2013;69(8):793-804.
24. Hollis-Walker L, Colosimo K. Mindfulness, self-compassion, and happiness in non-meditators: A theoretical and empirical examination. Personality and Individual differences. 2011;50(2):222-227.
25. Finlay-Jones A, Kane R, Rees C. Self-compassion online: A pilot study of an internet-based self-compassion cultivation program for psychology trainees. Journal of clinical psychology. 2017;73(7):797-816.
26. Dvořáková K, Kishida M, Li J, Elavsky S, Broderick PC, Agrusti MR, et al. Promoting healthy transition to college through mindfulness training with first-year college students: Pilot randomized controlled trial. Journal of American College Health. 2017;65(4):259-267.
27. Carmody J, Baer RA. How long does a mindfulness-based stress reduction program need to be? A review of class contact hours and effect sizes for psychological distress. Journal of clinical psychology. 2009;65(6):627-638.
28. Bohlmeijer E, Ten Klooster PM, Fledderus M, Veehof M, Baer R. Psychometric properties of the five facet mindfulness questionnaire in depressed adults and development of a short form. Assessment. 2011;18(3):308-320.
29. Raes F, Pommier E, Neff KD, Van Gucht D. Construction and factorial validation of a short form of the self-compassion scale. Clinical psychology & psychotherapy. 2011;18(3):250-255.
30. Costa J, Marôco J, Pinto-Gouveia J, Ferreira C, Castilho P. Validation of the psychometric properties of the Self-Compassion Scale. Testing the factorial validity and factorial invariance of the measure among borderline personality disorder, anxiety disorder, eating disorder and general populations. Clinical Psychology & Psychotherapy. 2016;23(5):460-468.
31. Rudaz M., Ledermann T., May RW, Fincham FD. A brief scale to measure caring for bliss: Conceptualization, initial development, and validation. Under review.

32. Pinheiro J, Bates D, DebRoy S, Sarkar D, R Core Team. Package nlme: Linear and nonlinear mixed effects models. 2013;3(1):111.
33. R Core Team. R Foundation for Statistical Computing; Vienna, Austria: 2014. R: A language and environment for statistical computing. http://www.R-project.org/.
34. Hedeker D, Gibbons RD. Longitudinal data analysis: John Wiley & Sons; 2006.
35. Bliese PD, Ployhart RE. Growth modeling using random coefficient models: Model building, testing, and illustrations. Organizational Research Methods. 2002;5(4):362-387.
36. Snijders TAB, Bosker RJ. Multilevel analysis: An introduction to basic and advanced multilevel modelling (2nd Ed.): Sage; 2012.
37. Bolier L, Haverman M, Westerhof GJ, Riper H, Smit F, Bohlmeijer E. Positive psychology interventions: a meta-analysis of randomized controlled studies. BMC public health. 2013;13(1):119.
38. Buchheld N, Grossman P, Walach H. Measuring mindfulness in insight meditation (Vipassana) and meditation-based psychotherapy: The development of the Freiburg Mindfulness Inventory (FMI). JMMR; 2001.
39. Walach H, Buchheld N, Buttenmüller V, Kleinknecht N, Schmidt S. Measuring mindfulness—the Freiburg mindfulness inventory (FMI). Personality and individual differences. 2006;40(8):1543-1555.

Table 1 Main components and home assignments of the five mindfulness sessions and the four booster sessions.

Session 1	Session 2	Session 3	Session 4	Session 5	Booster Sessions 6-9
Main components					
Reception and group rules. Raisin exercise. Automatic pilot. Working definition of mindfulness and the foundational attitudes. Intro awareness of breathing/belly breathing.	Group sharing of the home assignments. Belly breathing and intro to mindful yoga.	Group sharing of the home assignments. Intro to the body scan.	Group sharing of the home assignments. Intro to sitting and walking meditation.	Group sharing of the home assignments. Intro to the concept of self-compassion. Guided self-compassion meditation.	Repetition of the formal mindfulness practices: Mindful yoga, body scan, sitting meditation, walking mediation, self-compassion meditation. Psychoeducation stress.
Home assignments					
Eat one meal mindfully. Awareness of breathing at six of seven days before sleeping (minimum 15 minutes).	Alternate mindful yoga and awareness of breathing at least once in seven days (minimum 15 minutes).	Alternate body scan and awareness of breathing at least once in seven days (minimum 15 minutes).	Alternate sitting or walking meditation and awareness of breathing at least once in seven days (minimum 15 minutes).	Alternate self-compassion meditation and awareness of breathing at least once in seven days (minimum 15 minutes).	Formal mindfulness practice of choice at least once in seven days (minimum 15 minutes). Invitation to bring an object, poem or anything else related

	Journalize any insights or experiences with the practices.	Journalize any insights or experiences with the practices.	to mindfulness for the final group sharing.

Table 2 Familiarity with different mindfulness practices, frequency of practicing, and the usefulness for oneself before the training.

		Familiarity	Practicing		Usefulness	
Mindfulness practice	*n*	%	*M*	*SD*	*M*	*SD*
Awareness of breathing	15	83.3	2.27	1.33	1.87	0.92
Sitting meditation	14	77.8	1.64	1.65	1.86	1.17
Yoga, Qigong or Tai Chi	11[a]	61.1	1.73	1.74	1.40	0.52
Bring mindfulness to a daily activity such as eating, walking or brushing teeth	11	61.1	1.82	1.60	1.64	0.67
Body Scan	8[b]	44.4	0.63	0.74	1.71	0.76
Walking meditation	7	38.9	1.29	1.98	2.29	0.95
Tune into your breathing during the day	7	38.9	2.43	1.72	1.71	1.11
Self-Compassion/Lovingkindness	5	27.8	1.80	1.30	1.00	1.00

Note. *M* = Mean, *SD* = Standard deviation. Possible range: 0-5 for frequency practicing (0 = never, 1 = less than once every second week, 2 = about once every second week, 3 = about once a week, 4 = about 2 or 3 times a week, 5 = almost every day), 0-4 for usefulness for oneself (0 = not useful at all, 1 = not very useful, 2 = neutral (usefulness not clear), 3 = somewhat useful, 4 = extremely useful). [a]*n* = 10 for usefulness item, [b]*n* = 7 for usefulness item.

Table 3 Frequency of practicing different mindfulness practices and the usefulness for oneself after the training.

	Practicing						Usefulness					
	Post[1]			Fu[2]			Post[1]			Fu[2]		
Mindfulness practice	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Awareness of breathing	18	3.94	1.21	16	3.81	0.98	18	3.72	0.46	14	3.79	0.43
Sitting meditation	17	2.35	1.32	16	2.44	1.36	18	3.33	0.69	14	3.36	0.63
Yoga, Qigong, or Tai Chi	18	1.56	1.04	16	1.31	1.62	18	3.00	1.19	14	2.79	1.31
Bring mindfulness to a daily activity such as eating, walking, or brushing teeth	18	3.67	1.03	16	3.56	1.09	18	3.50	0.71	14	3.43	0.76
Body Scan	18	1.78	1.17	16	1.75	1.44	18	3.06	1.06	14	2.79	1.05
Walking meditation	18	1.89	1.37	16	1.81	1.52	17	3.06	0.97	14	2.79	1.05
Tune into your breathing during the day	18	4.06	1.21	16	3.81	1.47	18	3.61	0.70	14	3.71	0.47
Self-Compassion/Lovingkindness	18	2.94	1.30	16	2.56	1.41	17	3.47	1.07	14	3.50	0.94

Note. *M* = Mean, *SD* = Standard deviation. Fu = Follow-up. Possible range: 0-5 for frequency practicing (0 = never, 1 = less than once every second week, 2 = about once every second week, 3 = about once a week, 4 = about 2 or 3 times a week, 5 = almost every day), 0-4 for usefulness for oneself (0 = not useful at all, 1 = not very useful, 2 = neutral (usefulness not clear), 3 = somewhat useful, 4 = extremely useful). [1]since the fifth mindfulness training session/last four weeks, [2]since the last booster session/last four weeks.

Table 4 Means, standard deviations and pre-post, pre-follow-up, and post-follow-up comparisons.

		Pre (*n* = 18)		Post (*n* = 18)		Fu (*n* = 16)		Cohen's *d*		
Variable	Range	*M*	*SD*	*M*	*SD*	*M*	*SD*	Pre-Post	Pre-Fu	Post-Fu
Mindfulness (FFMQ-SF total)	24-120	74.17	9.05	77.00	8.98	78.88	8.66	0.36	0.54	0.27
Self-compassion (SCS-SF total)	1-5	2.78	0.79	3.02	0.51	3.15	0.65	0.86	0.58	0.29
compassionate attitude	1-5	3.09	0.81	3.26	0.66	3.30	0.59	0.30	0.31	0.08
self-critical attitude	1-5	3.54	0.80	3.21	0.58	3.00	0.78	-0.78	-0.79	-0.51
Gratitude (CBS)	0-4	2.44	0.98	3.06	0.87	2.63	0.89	0.49	0.18	-0.32
Happiness (CBS)	0-4	2.11	0.76	2.39	0.92	2.56	0.81	0.50	0.74	0.30

Note. *M* = Mean, *SD* = Standard deviation. Fu = Follow-up. The post-assessment did take place after the ninth training session. The follow-up assessment did take place four weeks after the ninth training session. FFMQ-SF = Five Facet Mindfulness Questionnaire-Short Form, SCS-SF = Self-Compassion Scale-Short Form, CBS = Caring for Bliss Scale, PSS = Perceived Stress Scale.