Mindfulness-Based Stress Reduction Practice; Reduced Levels of Perceived Stress and Increased Mindful Awareness in an Adult Population

Makenna Linn, Carol Foust, Jude LaFollette, Bethany Kies-Bolema

ABSTRACT

Research on Mindfulness-Based Stress Reduction (MBSR) programs has demonstrated promising results in both clinical and non-clinical settings. The purpose of this study was to determine the impact of an MBSR-based program on the perceived stress and five facets of mindful awareness in an adult population. A pre-post study design was used to analyze changes in participant's perceived stress and mindful awareness after participating in an eight-week program based on MBSR in a community-based setting. Data was collected using The Perceived Stress Scale and Five Facet Mindfulness Questionnaires. A paired two sample t-test was applied to determine if any significance difference from pre to post was apparent. The study found a significant increase in each individual mindfulness facet, the total FFMQ score, as well as a significant decrease in perceived stress. These findings align with previous MBSR studies.

El Rio: A Student Research Journal. Vol. 4, No. 1 (2021), pp. 13-23 .
CC-Makenna Linn, et al.. Colorado State University Library, Pueblo, CO, 81001.

Introduction

Mindfulness has become widely known for the many benefits it provides. The definition of mindfulness provided by Jon Kabat-Zinn, the founder of Mindfulness-Based Stress Reduction (MBSR), is the "awareness that arises through paying attention, on purpose, in the present moment, non-judgmentally" (Mindful Staff, 2016). Kabat-Zinn first introduced mindfulness meditation practices in a clinical setting as a form of treatment for patients with chronic pain. He observed a considerable decrease in chronic pain reported among the patients as well as a decrease in negative mood states including depression, anxiety, tension, fatigue and confusion (Kabat-Zinn, 1982). Since Kabat-Zinn's seminal research, positive outcomes have been noted in MBSR programs and other meditation practices and therapies conducted in both clinical and non-clinical settings. Mindfulness has been defined as having different facets. One of the most common measures of mindfulness is the Five Facet Mindfulness Inventory (Baer, Smith, Hopkins, Krietemeyer & Toney, 2006). The five facets include observing, describing, acting with awareness, acting in non-judge, and non-reactivity.

MBSR is traditionally a group-based eight-week program that focuses on the cultivation of mindfulness through four formal practices: body scan, sitting meditation, purposeful movement meditation, and Hatha yoga, which focuses on breathing (Kabat-Zinn, 1982, 1990; Grossman, Schmidt, & Walach, 2004; Chiesa & Serretti, 2009). A study conducted by Carmody and Baer (2008) specifically researched the significance of the home practice component within the MBSR program and found that time spent engaging in home practice of formal meditation exercises was significantly related to improvement in most facets of mindfulness and several measures of symptoms and well-being. This finding emphasizes the importance of practicing mindfulness on an individual basis, which is encouraged throughout an MBSR program. Moreover, full or half day intensive mindfulness retreats are an integral part of MBSR, as studies show a positive effect in pre-to-post self-reported mindfulness when comparing mindfulness-based interventions with and without intensive mindfulness retreats (Visted, Vøllestad, Nielsen, & Nielsen, 2015).

MBSR has been studied in a number of clinical settings (e.g., medical outpatient treatment centers, dermatology clinics, pain centers, and psychiatric treatment centers), and in such settings the benefits of mindfulness training on physical and mental health are numerous. Results suggest that the training is correlated with many benefits including reduced drug use relapse prevention (Bowen et al., 2014), decreased HIV pathogenesis (Cole, Korin, Fahey, & Zack,1998), improving the treatment of psoriasis (Kabat-Zinn et al., 1998), and managing chronic pain (Kabat-Zinn, 1982; Kabat-Zinn, Lipworth, Burney & Sellers,1987; McCracken & Thompson, 2009; Schutze, R., Ress, Preece, & Schutze, M., 2010). The impacts on mental health are even more widely noted in the literature and include: use in the treatment of eating disorders (Lavender, Jardin & Anderson, 2009), decreasing anxiety (Arch & Craske, 2010; Miller, Fletcher, & Kabat-Zinn, 1995; Fang et al., 2010; Rasmussen & Pidgeon, 2010), reducing the risk for relapse in major depression (Teasdale et al., 2000; Creswell & Lindsay, 2014). There have also been reports of MBSR training resulting in significant improvements in obsessive compulsive symptoms, somatization, interpersonal sensitivity, psychoticism, and paranoid ideation (Chiesa & Serretti, 2009). A three-year post-intervention follow-up study was conducted with 18 of the original 22 medical patients who engaged in an eight-week, outpatient mindfulness-based stress reduction intervention program for anxiety and depression. The research showed a significant decrease in anxiety after the intervention, as well as at three months and three years compared with others that met intervention criteria for the original study but did not participate in the program (Miller et al., 1995). This suggests that mindfulness training can provide not only short-term benefits, but lasting effects as well (Kabat-Zinn et al., 1987; Carlson, Ursuliak, Goodey, Angen, & Speca, 2001).

Mindfulness meditation practices have benefited people with a number of mental illnesses, symptoms, disorders, and brain function. Three different studies used an eight-week, group-based mindfulness training to analyze the effects of mindfulness on brain function. All of the studies found that those who participated in MBSR experienced an increase in left hemisphere activation. The participants also had an increase in gray matter concentration in the left side of the brain, which involves learning and memory processes, emotion regulation, self-referential processing, and perspective taking (Davidson et al., 2003; Holzel, Carmody, & Evan et al., 2010; Holzel, Carmody, & Vangel et al., 2010). Furthermore, results from two studies indicated an increase in immune function as a result from mindfulness training (Davidson et al., 2003; Fang et al., 2010). Overall, there is a strong body of evidence demonstrating the positive effect mindfulness has on brain function and immune function.

When reviewing the results of non-clinical settings, such as in schools, community-based programs and spiritual/religious settings, mindfulness meditation practices have shown to be beneficial. Mindfulness has been observed to increase quality

of life and well-being (Baer et al., 2006; Fang et al., 2010; Baer, Carmody, & Hunsinger, 2012; Cresswell & Lindsay, 2014; Paiva et al., 2015) and has been found to significantly increase empathy baseline and effectively improve self-compassion levels (Chiesa et al, 2009). Benefits have also included a significant reduction in perceived stress levels and an increased ability to cope (Carlson, Speca, Patel, & Goodey, 2003; Shapiro, Astin, Bishop, & Cordova, 2005). Moreover, studies have shown improvements in the quality of sleep, reduction in sleep disturbances, mood disturbance and fatigue in cancer patients (Carlson et al., 2001; Carlson & Garland, 2005; Andersen et al., 2013). The purpose of this study was to determine if an eight-week MBSR course held in a group setting for community members once a week with home practice would result in any significant outcome on 1) participants' perceived levels of stress and 2) participants' scores on the five facets of mindfulness.

Methods

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. IRB approval was reviewed and approved by the Colorado State University Pueblo Human Subjects Committee. The study did not receive external funding.

Study Participants

Participants in this study live in Pueblo, Colorado which is a moderate size of approximately 150,000 people in Southern Colorado. The 117 participants enrolled in an eight-week program titled "Mindful Me" that used a Mindfulness-Based Stress Reduction curriculum. The participants were 99% women with an average age of 54 years old and were hospital employees, patients, and community members. The participants met once a week for 2 hours in a community room at a local hospital and were asked to complete home practice. The program was facilitated by a chaplain trained in MBSR. Participation in the MBSR program was voluntary. Study participants were recruited through advertisements in a local newspaper, flyers and brochures about the program posted throughout the hospital, presentations given at various health conferences, groups, and luncheons in the local community.

Orientation Session

After participants voluntarily signed up for the program, they attended an informational session about a week before the classes started, which provided detailed information regarding the program, the expectations for the program, the potential risks and benefits of participation, and a brief, one-on-one meeting with program staff. During the orientation, participants were informed of potential risks and performed a self-assessment of their physical, mental and emotional health in order to participate. If they decided to participate, they signed an informed consent agreement and completed a participant inventory, which included demographic and contact information.

During the informational session, participants completed necessary paperwork including an intake form with a self-assessment to determine physical, mental and emotional readiness to complete the course. The self-assessment was developed from materials produced by the Center for Mindfulness. The Five Facet Mindfulness Questionnaire (FFMQ) and the Perceived Stress Scale (PSS) were also administered before and after participating in the program.

Five Facet Mindfulness Questionnaire

The FFMQ has been validated and showed reliable results in research for the structure of mindfulness (Tran, et al., 2013) and a factor analysis confirmed and tested a consistent reliability model (Christopher, et al., (2012). Construct mindfulness was confirmed through regression and mediation analysis showing the facets were significantly related to meditation experience and to psychological symptoms and well-being (Baer, et al. 2008).

The FFMQ incorporates the facets that are most strongly correlated to the related psychological constructs. The five mindfulness facets are: observe, describe, act with awareness, non-judge, and non-react. Each of these proves useful in understanding the relationships between mindfulness and other conceptually related variables. For example, the describe facet is the most important in understanding mindfulness' relationships with emotional intelligence and alexithymia (lacking the words to describe one's feelings to others), whereas the act with awareness facet is central to its relationships with dissociation and absent-mindedness (Muller, 2000; Baer et. al, 2006). In this way, the FFMQ has shown to be promising in predicting psychological symptoms. Santorelli and Kabat-Zinn (2002) stated that the ability to describe mindfulness in readily accessible language is essential for providers of MBSR. Understanding empirically supported facets of mindfulness may provide suggestions to clinicians about how to describe it to

clients. The FFMQ can also be a helpful tool for those teaching MBSR, not only in using it as an evaluative assessment, but also as a way to describe the dimensions of mindfulness.

Perceived Stress Scale

The 10-item PSS is an easy-to-use assessment with acceptable psychometrics (Lee, 2012). Khalili et al. (2017) tested the validity and reliability of the PSS and found the validity and scale content were remarkable. The KMO coefficient was .82 and Bartlett's Test was significant, as well as a Cronbach's Alpha of .72. The repeated measure demonstrated a high reliability of .93. Antanes et al., (2015) found the PSS was used in research to validate mindfulness using the perceived stress score to develop the awareness of mindfulness in occurrence with stress and how it is perceived while in a mindful state.

The Perceived Stress Scale is a measure of the degree to which situations in one's life are appraised as stressful. The PSS looks at the subjective measures of stress, which in certain cases is more beneficial than objective measures of stress because people actively interact with their environment and perceive potentially threatening or challenging events in regard to their available coping resources. Therefore, the causal event is cognitively mediated by the emotional response to the objective event, and not the objective event itself. Despite the fact that the PSS is a short, 10 question survey, it has substantial test reliability and validity as well as a strong correlation between various behavioral criteria associated with stress (Cohen et al, 1983). It is also noteworthy to mention that the relationship between validity and the PSS is not affected by age or gender. The PSS can be used to discern whether or not perceived stress is a risk factor for clinical psychiatric disorders, as well as analyze the relationship between the objective stressor and the individual's response (Cohen et. al, 1983).

The Intervention: Mindful Me

The intervention used in this study, Mindful Me, followed the MBSR curriculum created by Jon Kabat-Zinn and Saki Santorelli (Kabet-Zinn, Santorielli, Meleo-Meyer, & Koerbel, 2017). Participants attended a two-hour session for 8-weeks, and completed one 4.5-hour retreat in a community room at a local hospital. They also completed home practice during the eight-week session. The facilitator of the intervention was the Lead Chaplain at the hospital who had received training through the Center for Mindfulness in teaching mindfulness-based stress reduction. Each week, the two-hour face to face sessions incorporated mindfulness themes along with formal meditation practices (e.g., body scan, sitting meditation, awareness of breath meditation, purposeful walking, standing yoga and lying down yoga) and informal meditation practices based on MBSR materials (Kabet-Zinn, et al., 2017). Handouts were provided at the end of each session detailing the home practice for each week. Participants were given CD's of guided meditations to encourage and enable them to practice formal meditation on their own throughout the remainder of the week. The 4.5-hour group silent retreat took place at the same site as the weekly sessions between weeks six and seven. Its purpose was to provide an opportunity to firmly and effectively establish the use of MBSR skills and prepare participants to utilize these methods beyond the conclusion of the program.

After receiving instruction and skill development in each two-hour session, the participants were provided with CD's that had verbal instruction for practice of the learned skills, e.g., guided body scan, awareness of breath, lying down yoga and extended sitting meditation, to practice at home along with a handout detailing what the home practice consisted of and supplemental information that aligned with the theme for each week. The majority of the supplemental information came from Jon Kabat-Zinn's book "Full Catastrophe Living" and "Coming to Our Senses: Healing Ourselves and the World Through Mindfulness" and focused on meditation, the seven attitudes of mindfulness practice, the stress-reaction cycle, and how to cope with stress - responding versus reacting (Kabat-Zinn, 1990; Kabat-Zinn, 2005).

Survey Data Collection

In addition to the inventory completed during the orientation, the participants were also asked to complete the Perceived Stress Scale survey and a Five Facet Mindfulness Questionnaire. The assessments were administered via paper and pencil during the group orientation, held one week prior to the intervention, and again during the last session of the intervention. Both of these tools have been validated as effective and reliable measures to evaluate the different facets of mindfulness and an individual's perceived stress levels (Baer et al., 2006; Cohen, Kamarck, & Mermelstein, 1983).

At the last session of the program, the program leaders administered a paper and pencil post Perceived Stress Scale survey and post Five Facet Mindfulness Questionnaire, as well as a program evaluation to the participants. The pre and post-program PSS and

FFMQ were collected and entered into an Excel spreadsheet. The names of participants were used only to match the surveys and demographic information and were kept confidential.

Timeline for the Program Implementation

Advertising for the Program (4-6 week prior to intervention)

Program Orientation: Collect informed consent and Pre-Survey Data (week 0; PSS, FFMQ, and consent)

Implementation of the 8-week Mindful Me Intervention (Week 1-8; MBSR)

Post-Intervention Data Collection (PSS, FFMQ and Evaluation; Week 8)

Statistical Analysis

The pre and post program data was compared for differences by applying a paired t-test in Excel to determine if any significant change had occurred. The PSS pre and post program data was collected for two years with a total of 112 surveys analyzed. The FFQ was not administered until the second year of the program with a total of 42 questionnaires analyzed.

The qualitative outcomes of the program were collected in a post survey design with 112 surveys completed for analysis. The comments were analyzed by utilizing text analysis to determine key words and phrases. The key words and phrases were categorized into patterns through structural and pattern coding. Finally, through triangulation, common themes were developed.

Results

Post program PSS total scores of the participants were compared with the pre-program PSS total scores using a paired two sample t-test. The result showed significant reduction in perceived stress (n= 133, pre-program mean= 16.24, post-program mean= 13.86, p= 8.84E-07). Post program FFQ individual scores (observe, describe, act aware, non-judge, non-react) and total scores of the participants were compared with the corresponding preprogram FFQ scores using a paired two sample t-test. Results found significant improvements for all five facet areas as well as the total as noted in Table 1.

Table 1.
Pre- and Post-MBSR Program Measures: Perceived Stress Survey and Five Facet Questionnaire

Measure	*Pre-MBSR mean (SD)*	*Post-MBSR mean (SD)*	*p-value*
PSS*	16.24 (49.00)	13.86 (32.30)	0.000000884
Observe Facet*	27.74 (34.53)	30.98 (13.94)	0.0000295
Describe Facet*	28.48 (33.30)	30.16 (48.28)	0.012
Act Aware Facet*	23.31 (35.19)	26.41 (19.98)	0.000088
Non-judge Facet*	26.78 (45.96)	30.28 (26.67)	0.000063
Non-react Facet*	21.05 (24.81)	23.85 (15.53)	0.0000128
FFMQ Total*	127.36 (53.25)	141.67 (31.01)	0.00000349

Paired T-tests performed for each measure

*denoted statistical significant difference pre to post at the .05 alpha level.

The qualitative data collected included feedback from the at home mindfulness practice. Mindfulness home practice included guided body scan, awareness of breath, lying down yoga and extended sitting meditation, which was supplemented with information that aligned with the theme for each week. Home practice was completed by 97% of the participants who filled out the post evaluation, with 20% practicing one to two days a week, 55% practicing three to four days a week, and 25% practicing five to seven days a week.

The average amount of time spent each day was varied with 30% of the participants reporting practicing five to 10 minutes, 57% reported practicing 20-30 minutes and 13% reported practicing for more than 30 minutes each day. The in-home practice had the participants practice their learned skill from the in-class instruction. Post survey comments from the participants in the program from the at-home practice resulted in five common themes.

Analysis resulted in five common themes from the evaluation comments concerning the value of the class; an increase in mindfulness skill development such as meditation, body scan and yoga, an increase in personal awareness and control, an increase in self-acceptance and compassion, awareness of the value of practicing in a group setting, and the value of a safe space with an effective facilitator. Representative participant comments are displayed below.
"I have gained and refreshed several areas of my mind. I feel at any moment I have the resources to calm, breathe and become present to what's now us. Reviewing a situation over in mind, I am more tolerant in a heated discussion and allow others' views to be heard. At times improved concentration. In addition, my yoga practice is more mindful and in moment."

"I have learned that it is important for me to slow down and notice what is happening in all aspects of my life so that my relationships with my family and my body are much calmer and gentler. I've learned to recognize what stress feels like in my body and breathe my way out of it. I've learned to be kinder and to appreciate my body and my mind and my life more."

"The calmness, skill and guidance of the facilitator helped me be more aware. The class was very effective in teaching skills and the facilitator was well trained and compassionate."

"That there is peace and strength within me that I can access at any time; fear and anxiety accomplish nothing but only closes me off to potential solutions and creativity."

"The confidence of the peaceful setting facilitated the practice and the tools to use in my own time and pace. It made it possible to improve my skills in my own time and way."

"My thoughts are not always reality; thought come and go don't have to be permanent. If you eat mindfully some foods don't taste as good as you think they do - so why eat them? I learned to be more compassionate to myself."

"Learning that I can first STOP and take hold of my emotions to stressors, sit and breathe. Kind of like it's ok to check out. Being more aware of my pace and slowing day is VERY DIFFICULT for me including the need to take care of me."

"It helped me control my ingrained anxieties caused by a lifelong pattern of running on "adrenalin." I am now better at being "aware."

Discussion

The results demonstrate differences in participants' pre and post 8-week MBSR program scores on the Perceived Stress Survey and the Five Facet Mindfulness Questionnaire. Hypothesized significant increases in all mindfulness facets and a significant decrease in perceived stress levels were accepted and confirmed. The standard deviation scores decreased for most of the factors between the pre-test and post-test scores. This may have been caused by cognitive learning experienced through the program, or through the mental and physical awareness outcomes experienced by the participants throughout the process. The participants may have become more familiar with the terminology or expectancy bias could be a factor. The fact that the participants' perceived stress levels decreased significantly upholds the assertion that Mindfulness-based Stress Reduction training positively affects a person's ability to handle stress, which aligns with previous studies (Carlson et al., 2003; Shapiro et al., 2005; Andersen et al., 2013).

Overall, the FFMQ results demonstrated a significant increase in participants' use of the constructs of mindfulness. As the facets were identified individually, interesting differences were evident. The act with awareness facet had the strongest increase compared to the other facets. This could potentially be due to the meditation and other mindfulness practices implemented, which focused on bringing awareness to one's surroundings and actions. There were comments on the participant's evaluations which stated that before they took the course they were functioning on 'autopilot,' but after taking the course they have become more aware of their lives and their actions.

One participant stated on their evaluation in response to the question "What have you learned, if anything, from this program?":

"(I) think before I speak in difficult situations, I notice things more clearly, not to judge myself or others, and I am aware of how my body is involved with stress."

The non-judge facet showed the second strongest increase. There is a major emphasis on not judging thoughts, feelings, or emotions during the MBSR program, which could account for the high score.

The observe facet was the third strongest facet increase in the results. This could potentially be due to participants learning and strengthening the practice of mindful awareness, which invites participants to observe what they were eating (mindful eating practice), observe bodily sensations, emotions and thoughts (body scan, mindful walking, sitting meditation and yoga) and emphasizing mindful communication. Non-react facet was the fourth strongest facet. Another emphasis in the program is to not have an immediate reaction, but to employ the STOP practice (stop, take a breath, observe, proceed). Another participant stated that they learned:

"The ability to slow down, to put things in their proper perspective. to self-regulate. When I do the mindfulness techniques everything is more manageable. As a therapist, I've heard mindfulness frequently but never had a full understanding of what it is, how to practice it properly and know it benefits the body. Now I know and will utilize it in my practice."

The describe facet was the least significant of the five facets, but still had a significance of 0.012 compared to an alpha level of 0.05. The describe facet had the highest pre-MBSR score, which suggests that the majority of participants were already relatively higher functioning in this facet compared to the other four, therefore leaving less room for improvement.

Conclusion and Recommendations

In conclusion, the participants who attended an eight-week MBSR course had a significant decrease in their perceived levels of stress and a significant increase in their scores on the five facets of mindfulness. The participants also reported an increase in mindfulness skills, an increase in personal awareness and control, and an increase in self-acceptance and compassion, which they were able to apply in their home practice and everyday life. The findings of this study align with findings in previous studies (Carlson et al., 2003; Shapiro et al., 2005; Andersen et al., 2013), which further suggests the positive effects that mindfulness has on the mind and body, and that MBSR may be useful as an intervention technique for combating stress.

The lack of a control group was a limitation for this study. Future studies could implement the use of a control group in order to compare PSS and FFMQ scores before and after the program, as well as employ a blind study to help avoid the placebo effect. Follow-up long-term evaluation could also be performed to determine the persistence of the skill development and increase in mindfulness and perceived level of stress.

Compliance with Ethical Standards:
Funding: This study did not receive external funding.
Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. IRB approval was reviewed and approved by the Colorado State University Human Subjects Committee.
Informed consent: Informed consent was obtained from all individual participants included in the study.

References

Andersen, S. R., Würtzen, H., Steding-Jessen, M., Christensen, J., Andersen, K. K., Flyger, H., Mitchelmore, Johansen, C., & Dalton, S. O. (2013). Effect of mindfulness-based stress reduction on sleep quality: Results of a randomized trial among Danish breast cancer patients. Acta Oncologica, 52(2), 336-344.

Atanes, A. C., Andreoni, S., Hirayama, M. S., Montero-Marin, J., Barros, V. V., Ronzani, T. M., ... & Demarzo, M. M. (2015). Mindfulness, perceived stress, and subjective well-being: a correlational study in primary care health professionals. BMC complementary and alternative medicine, 15(1), 303.

Arch, J. J., & Craske, M. G. (2010) Laboratory stressors in clinically anxious and non-anxious individuals: the moderating role of mindfulness. Behavior research and therapy, 48(6), 495-505.

Baer, R. A., Carmody, J., & Hunsinger, M. (2012). Weekly change in mindfulness and perceived stress in a mindfulness-based stress reduction program. Journal of Clinical Psychology, 68(7), 755–765.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. Assessment, 13(1), 27– 45.

Baer, R. A., Smith, G. T., Lykins, E., Botton, D., Krietemeyer, J., Sauer, S., Walsh, E., Duggan, D., & Williams, J. M. (2008). Construct validity of the five facet mindfulness questionnaire in meditation and nonmeditating samples. Assessment, 15(3), 329-342.

Bowen, S., Witkiewitz, K., Clifasefi, S.L., Grow, J., Chawla, N, Hsu, S.H., Carroll, H.A., Harrop, E., Collins, S.E., Lustyk, M.K., & Larimer, M.E. (2014). Relative efficacy of mindfulness-based relapse prevention, standard relapse prevention, and treatment as usual for substance use disorders: a randomized clinical trial, Journal of American Medical Association Psychiatry, (5),547-56.

Carlson, L. E., & Garland, S. N. (2005). Impact of mindfulness-based stress reduction (MBSR) on sleep, mood, stress and fatigue symptoms in cancer outpatients. International Journal of Behavioral Medicine, 12(4), 278-285.

Carlson, L. E., Speca, M., Patel, K. D., & Goodey, E. (2003). Mindfulness based stress reduction in relation to quality of life, mood, symptoms of stress, and immune parameters in breast and prostate cancer outpatients. Psychosomatic Medicine, 65(4), 571–581.

Carlson, L.E., Ursuliak, Z., Goodey, E., Angen, M., & Speca, M. (2001). The effects of a mindfulness meditation-based stress reduction program on mood and symptoms of stress in cancer outpatients: 6-months follow-up. Support Care Cancer, 9, 112–23.

Carmody, J., & Baer, R. A. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. Journal of Behavioral Medicine, 1, 23-33.

Chiesa, A., & Serretti, A. (2009). Mindfulness-based stress reduction for stress management in healthy people: A review and meta-analysis. Journal of Alternative and Complementary Medicine, 15(5), 593-600.

Christopher, M., Neuser, N., Michael, P., & Baitmangalkar, A. (2012). Exploring the psychometric properties of the Five Facet Mindfulness Questionnaire. Mindfulness, 3(2), 124-131.

Creswell, D. J., & Lindsay, E. K. (2014). How does mindfulness training affect health? A mindfulness stress buffering account. Carnegie Mellon University, Current Directions in Psychological Science, 1-7.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. Journal of Health and Social Behavior, 24, 385-396.

Cole, S. W., Korin, Y. D., Fahey, J. L., & Zack, J. A. (1998). Norepinephrine accelerates HIV replication via protein kinase A-dependent effects on cytokine production. The Journal of Immunology, 161, 610–616.

Davidson, R. J., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli, S. F., Urbanowski, F., Harringhton, A., Bonus, K., & Sheridan, J. F. (2003). Alterations in brain and immune function produced by mindfulness meditation. Psychosomatic Medicine, 65(4), 564-570.

Fang, C. Y., Reibel, D. K., Longacre, M. L., Rosenzweig, S., Campbell, D. E., & Douglas, S. D. (2010). Enhanced psychosocial well-being following participation in a mindfulness-based stress reduction program is associated with increased natural killer cell activity. Journal of Alternative & Complementary Medicine, 16(5), 531-538.

Grossman, P., Schmidt, L. N., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. Journal of Psychosomatic Research. 57(1), Pages 35–43.

Holzel, B. K., Carmody, J., Vangel, M., Congleton, C., Yerramsetti, S. M., Gard, T. & Lazar, S. W. (2010). Mindfulness practice leads to increases in regional brain gray matter density. American Journal of Psychiatry Residents, 191(1), 36-43.

Holzel, B. K., Carmody, J., Evans, K. C., Hoge, E. A., Dusek, J. A., Morgan, L., Pitman, R. K., & Lazar, S. W. (2010). Stress reduction correlates with structural changes in the amygdala. Social Cognitive and Affective Neuroscience 5(1), 11-17.

Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. General Hospital Psychiatry, 4, 33–47.

Kabat-Zinn, J. (1990). Full catastrophe living: Using the wisdom of your mind and body to face stress, pain, and illness. New York, NY: Delacorte.

Kabat-Zinn, J. (2005). Coming to our senses: Healing ourselves and the world through mindfulness. New Your, NY: Hyperion.

Kabat-Zinn, J., Lipworth L., Burney R., & Sellers W. (1987). Four-year follow-up of a meditation-based program for the self-regulation of chronic pain: treatment outcomes and compliance. Clinical Journal of Pain, 3(1), 60.

Kabet-Zinn, J., Santorielli, S., Meleo-Meyer, F., & Koerbel, L. (2017). Mindfulness-based stress reduction authorized curriculum guide. University of Massachusetts Center for Mindfulness in Medicine, Health Care and Society.

Kabat-Zinn, J., Wheeler, E., Light, T., Skillings, A., Scharf, M. J., Cropley, T.G., Hosmer, D., & Bernhard, J.D. (1998). Influence of a mindfulness meditation-based stress reduction intervention on rates of skin clearing in patients with moderate to severe psoriasis undergoing photo therapy (UVB) and photochemotherapy (PUVA). Psychosomatic Medicine, 60(5), 625-632.

Khalili, R., Sirati, N., Ebadi, A., Tavallai, A., & Habibi, M. (f2017). Validity and reliability of the Cohen 10-item Perceived Stress Scale in patients with chronic headache. Asian Journal of Psychiatry, 4(26), 136-140.

Lavender, J. M., Jardin, B. F., & Anderson, D. A. (2009). Bulimic symptoms in undergraduate men and women: Contributions of mindfulness and thought suppression. Eating Behaviors, 10(4), 228-231.

Lee, E. (2012). Review of the psychometric evidence of the Perceived Stress Scale. Asian Nursing Research, 6(4), 121-127.

Miller, J.J., Fletcher, K., & Kabat-Zinn, J. (1995). Three-year follow-up and clinical implications of a mindfulness meditation-based stress reduction intervention in the treatment of anxiety disorders General Hospital Psychiatry, 17(3), 192–200.

Mindful Staff (2016). Jon Kabat-Zinn: Defining Mindfulness. Mindful: taking the time that matters. Retrieved from: http://www.mindful.org/jon-kabat-zinn-defining-mindfulness/

McCracken, L., & Thompson, M. (2009). Components of mindfulness in patients with chronic pain. Journal of Psychopathology and Behavioral Assessment, 31(2), 75-82.

Muller, R.J. (2000). When a patient has no story to tell: alexithymia. Psychiatric Times: UBM Medica, LLC.

Paiva, S. C., Nery, S. F., Magalhães, E. B., Couto, B. M., Amaral, C. V., Campos, F. F., & Reis, F. M. (2015). Impact of a short-term, mindfulness-based stress reduction program on the well-being of infertile women: a mixed-method study. Journal of Endometriosis & Pelvic Pain Disorders, 7(4), 136-140.

Rasmussen, M. K., & Pidgeon, A. M. (2010). The direct and indirect benefits of dispositional mindfulness on self-esteem and social anxiety. Anxiety, Stress & Coping, 24(2), 227-233.

Santorelli, S., & Kabat-Zinn, J. (2002). Mindfulness-based stress reduction professional training: MBSR curriculum guide and supporting materials. Worcester: University of Massachusetts Medical School.

Shapiro, S. L., Astin, J. A., Bishop, S. R., & Cordova, M. (2005). Mindfulness-Based Stress Reduction for Health Care Professionals: Results from a Randomized Trial. International Journal of Stress Management, 12(2), 164–176.

Schutze, R. Ress, C., Preece, M., & Schutze M. (2010). Low mindfulness predicts pain catastrophizing in a fear-avoidance model of chronic pain. Pain, 148(1), 120-127.

Teasdale, J. D., Segal, Z. V., Mark, J., Ridgeway, V. A., Soulsby, J. M., & Lau, M. A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. Journal of Consulting and Clinical Psychology, 68, 615–623.

Tran, U. S., Glück, T. M., & Nader, I. W. (2013). Investigating the Five Facet Mindfulness Questionnaire (FFMQ): Construction of a short form and evidence of a two-factor higher order structure of mindfulness. Journal of Clinical Psychology, *69*(9), 951-965.

Visted, E., Vollestad, J., Nielsen, M. B., & Nielsen, G. H. (2015). The impact of group-based mindfulness training on self-reported mindfulness: A systematic review and meta-analysis. Mindfulness. *6*(3), 501-522.