KMAN PUBLISHING INSTITUTE
Journal Website

Article history:
Received 11 January 2023
Accepted 28 March 2023
Published online 10 May 2023

Journal of Assessment and Research in Applied Counseling

Volume 5, Issue 1, pp 127-134

E-ISSN: 3041-8518

The Effectiveness of Mindfulness-Based Stress Reduction on Emotion Regulation, Pain Self-Efficacy, and Pain Perception in Patients with Cardiovascular Diseases

Mahdieh. Pourrostam[1], Ali Akbar. Khosravi Hampa[1*], Zeinab. Ganjali[2]

[1] M.A., Department of Psychology, Garmsar Branch, Islamic Azad University, Garmsar, Iran
[2] M.A., Department of Psychology, Qods Branch, Islamic Azad University, Tehran, Iran

*** Corresponding author email address**: khosravialiakbar3344@gmail.com

A r t i c l e I n f o

Article type:
Original Research

How to cite this article:
Pourrostam, M., Khosravi Hampa, A. A., & Ganjali, Z. (2023). The Effectiveness of Mindfulness-Based Stress Reduction on Emotion Regulation, Pain Self-Efficacy, and Pain Perception in Patients with Cardiovascular Diseases. *Journal of Assessment and Research in Applied Counseling*, *5*(1), 127-134.
http://dx.doi.org/10.61838/kman.jarac.5.1.16

A B S T R A C T

Objective: Stress is recognized as one of the main factors affecting cardiovascular diseases. Mindfulness-Based Stress Reduction (MBSR) has gained attention as an innovative approach to improving the psychological state of patients. This study aimed to investigate the effectiveness of MBSR on emotion regulation, pain self-efficacy, and pain perception in patients with cardiovascular diseases.

Methods and Materials: This experimental study was designed with a control group and an experimental group. Sixty patients with cardiovascular diseases were randomly divided into two equal groups. The experimental group underwent the MBSR program for 8 weeks, while the control group received no intervention. The instruments used included the Emotion Regulation Questionnaire (ERQ), the Pain Self-Efficacy Questionnaire (PSEQ), and the Pain Perception Questionnaire (PPQ). Data were analyzed using appropriate statistical tests.

Findings: The results indicated that MBSR significantly improved emotion regulation and increased pain self-efficacy in the experimental group compared to the control group ($p < 0.05$). Additionally, pain perception in the experimental group significantly decreased ($p < 0.05$).

Conclusion: The findings of this study suggest that MBSR can be used as an effective method in reducing stress and improving emotion regulation, pain self-efficacy, and pain perception in patients with cardiovascular diseases. It is recommended that this method be included as part of the therapeutic and rehabilitation programs for these patients.

Keywords: *Mindfulness, Stress Reduction, Emotion Regulation, Pain Self-Efficacy, Pain Perception, Cardiovascular Diseases.*

1. Introduction

Today, cardiovascular disease is considered a leading cause of mortality in industrialized countries and particularly in developing countries, endangering millions of lives annually and incurring substantial costs due to mortality and disability (Grinspoon et al., 2023). Global statistics indicate that this disease accounts for one-tenth of all deaths among those under 35 years old, one-third of deaths among those aged 35 to 45, and three-quarters of deaths among those over 45 (Fang et al., 2023). In Iran, the incidence of coronary heart disease has been rising, and alarmingly, the age of onset has been decreasing in recent years (Fereidouni et al., 2023). A considerable number of victims are young and middle-aged individuals, which not only poses a tragedy for families but also exerts a significant economic burden on society (Townsend et al., 2022). Moreover, studies indicate that psychological factors play a role in over 50% of conditions such as heart attacks and peptic ulcers (Redline et al., 2023).

Another important psychological construct that has attracted researchers' attention in the context of cardiovascular diseases in the past two decades is emotion regulation (Deng et al., 2022). Emotion regulation is a transdiagnostic and transtheoretical process that plays a crucial role in adapting to stressful life events and is a significant part of every individual's life. This regulation can be automatic or deliberate, conscious or unconscious (Han et al., 2018; Han et al., 2022). Researchers have demonstrated that individuals' capacity for effective emotion regulation influences psychological, physical, and interpersonal well-being (Han et al., 2018; Han et al., 2022). Emotion regulation refers to an individual's ability to manage and regulate their emotions. For cardiac patients, emotional problems can directly negatively impact cardiovascular status (Yang et al., 2022).

Today, multiple psychological models and frameworks have emerged in the field of pain psychology to explain pain and different responses to it, many of which address the role of avoidant and coping responses to pain (Nicholas, 2007). One of these positive variables, known as pain coping resources, is pain self-efficacy (Haraldstad & Stea, 2021). Self-efficacy is a broad concept referring to individuals' beliefs in their ability to perform specific tasks and achieve desired outcomes, considering self-efficacy in a specific domain rather than a general sense of mastery (Marshall et al., 2022). Pain self-efficacy refers to an individual's belief in their ability to manage and cope with pain. For cardiac patients, pain can be a common and concerning symptom (Tomlinson et al., 2021). Enhancing pain self-efficacy can reduce the subjective experience of pain and improve patients' quality of life (Dubé et al., 2023).

Another component related to cardiovascular disease is illness perception. Illness perception is a cognitive representation or beliefs a patient has about their illness, shaped by information obtained from formal and informal sources (Palei et al., 2023). Formal and informal sources such as healthcare professionals, media, family, and friends provide information to patients (Man et al., 2020). Additionally, patients suffering from similar illnesses and those who have recovered share information with the patient; this collective information shapes the individual's illness perception (Waszczak-Jeka et al., 2024). In a study by Lerdal et al. (2019) on illness perception in patients with heart failure, it was shown that illness perception affects the quality of life and mental health of patients with heart failure (Lerdal et al., 2019).

Various psychological therapeutic and educational methods have been employed to improve the psychological, social, physiological, and emotional components of individuals with chronic conditions, such as those with cardiovascular diseases, following open-heart surgery (Geiger et al., 2023). One approach that can improve psychological and emotional status is Mindfulness-Based Stress Reduction (MBSR) (Burns et al., 2022). This modern and effective method, developed by Jon Kabat-Zinn in the 1970s, involves full attention and non-judgmental acceptance of the present moment. This approach helps individuals accept their thoughts and feelings without interference from evaluation and judgment (Moulton-Perkins et al., 2022). Various techniques exist to enhance mindfulness, including meditation, breathing exercises, and yoga; the main goal of MBSR is to increase awareness and acceptance of moment-to-moment experiences (Hirshberg et al., 2022). Research has shown that MBSR can significantly improve emotion regulation (Hoge et al., 2023). Overall, MBSR is recognized as an effective and innovative method for improving emotion regulation, enhancing pain self-efficacy, and improving illness perception in cardiovascular patients (Kuo et al., 2021). This approach, focusing on the psychological and emotional aspects of the disease, helps patients better cope with the stress and challenges of their condition (Accoto et al., 2021). Generally, MBSR can be used as an essential complement to traditional treatments to improve the quality of life and overall health of cardiac patients (Lee et al., 2020). Further studies are needed to

JARAC Assessment and Research in Applied Counseling
E-ISSN: 3041-8518

confirm the effectiveness of this method and to provide optimal strategies for its use in treating cardiovascular diseases. Considering the above points, this study aimed to determine the effectiveness of MBSR on emotion regulation, pain self-efficacy, and pain perception in patients with cardiovascular diseases.

2. Methods and Materials

2.1. Study Design and Participants

The present study was a quasi-experimental design with pre-test, post-test, and follow-up stages with a control group. The statistical population included all patients with cardiovascular diseases in Tehran who visited treatment clinics in the second half of 2023. From this population, a sample group consisting of 30 patients with cardiovascular diseases was selected purposively and then randomly assigned to two groups: the experimental group (MBSR treatment) (15 individuals) and the control group (15 individuals) (considering that the sample size in experimental studies should be at least 15 individuals per group). Inclusion criteria included having cardiovascular disease, willingness and consent to participate in the intervention, and a minimum literacy level of a high school diploma. Exclusion criteria included chronic psychological disorders and severe depression.

To ensure ethical considerations in the study, a consent form explaining the general purpose of the research was prepared. Participants first read the consent form and participated in the study if they were willing. One of the points explained to the participants was that there would be no personal misuse in this research, and some participants wished to know their questionnaire responses. They were provided with an interpretation report of their questionnaires in simple language. Efforts were made to ensure that the information provided would not harm the sample group and that the results of this research would be used for the advancement of the sample and could be generalized to similar populations. Participants were also informed about the confidentiality of the questionnaires and their results. In the end, to maintain ethical standards, the mindfulness intervention was also provided to the control group after the research phase was completed.

2.2. Measures

2.2.1. Emotion Regulation

This questionnaire, developed by Gross and John in 2003, comprises two subscales: cognitive reappraisal (referring to the extent of using cognitive strategies to change the meaning of emotional situations) and emotional suppression (referring to the extent of effort to reduce or hide external emotional responses). The questionnaire contains 10 items: 6 items related to cognitive reappraisal and 4 items related to emotional suppression. Responses are scored on a 7-point Likert scale from "strongly disagree" (1) to "strongly agree" (7). Various studies have shown that the ERQ has good content and construct validity. Cronbach's alpha coefficient for cognitive reappraisal ranges from 0.79 to 0.82 and for emotional suppression from 0.73 to 0.76 (Gross & John, 2003).

2.2.2. Pain Self-Efficacy Perceived Stress

Developed by Nicholas in 1989, this single-factor questionnaire relates all items to a general component of pain self-efficacy, referring to an individual's ability to manage and control pain. The questionnaire includes 10 items. Responses are scored on a 7-point Likert scale from "strongly disagree" (0) to "strongly agree" (6). Total scores range from 0 to 60, with higher scores indicating greater pain self-efficacy. Results have shown that the PSEQ has strong content and construct validity. Cronbach's alpha coefficient for the PSEQ is typically above 0.90 (Nicholas, 2007).

2.2.3. Pain Perception

Developed by Melzack and Torgerson in 1971, this questionnaire includes three subscales: sensory-descriptive (referring to the sensory characteristics of pain), affective-descriptive (referring to emotional reactions to pain), and evaluative (referring to the overall assessment of pain). The questionnaire contains 78 items grouped into three main categories. Responses are scored on various scales from 1 to 5. Scores for each category are calculated separately, and the total score is used for overall assessment. Results have shown that the PPQ has good content and construct validity. Cronbach's alpha coefficient for the entire questionnaire and subscales is typically above 0.80 (Melzack & Torgerson, 1971).

JARAC Assessment and Research in Applied Counseling
E-ISSN: 3041-8518

2.3. Intervention

2.3.1. Mindfulness-Based Stress Reduction Training

This therapeutic method integrates mindfulness-based stress reduction with cognitive-behavioral therapy and guided eating meditation, used for issues related to body image, weight, and related eating processes such as appetite and the like. It is designed to create and maintain effective internal change (Accoto et al., 2021; Burns et al., 2022; Geiger et al., 2023; Hirshberg et al., 2022; Hoge et al., 2023; Kuo et al., 2021; Lee et al., 2020; Moulton-Perkins et al., 2022). This intervention was designed in the form of eight 90-minute sessions as follows:

Session 1: The first session introduces participants to mindfulness meditation and the practice of awareness. The "raisin exercise" is used to illustrate mindful eating, followed by a 45-minute body scan meditation. Participants discuss their experiences and feelings arising from these practices. Homework includes practicing mindfulness in the moment and extending the raisin exercise to other daily activities.

Session 2: This session begins with a discussion about the previous week's homework, addressing any barriers to practice and mindfulness-based solutions. The session includes mindfulness meditation, a body scan, and practicing mindfulness throughout the day. Homework involves a 45-minute body scan and increasing awareness during daily activities such as eating, bathing, sitting, and brushing teeth.

Session 3: The third session starts with a discussion of homework, followed by a 45-minute meditation and body scan. Participants learn about myths regarding meditation and complete a "pleasant events calendar." A 3-minute breathing space exercise is introduced. Homework includes maintaining the pleasant events calendar, continuing daily mindfulness practices, and meditation.

Session 4: Participants review their homework and engage in a 45-minute meditation and body scan. The session covers stress reactions and introduces a 1-minute breathing space exercise. Participants are asked to complete an "unpleasant events calendar" and continue daily mindfulness practices. Homework includes maintaining the unpleasant events calendar and practicing the 3-minute breathing space exercise.

Session 5: The session reviews homework and includes a 45-minute meditation and body scan. Participants practice the 3-minute breathing space and complete a communication worksheet focusing on interactions with significant others during the week. Homework involves completing the communication worksheet and continuing daily mindfulness practices.

Session 6: This session starts with a review of homework, followed by a 45-minute meditation and body scan. Participants explore conflict management styles, discuss stress responses, and reflect on alternative attitudes and behaviors. Homework includes continuing the 45-minute meditation and body scan and maintaining daily mindfulness practices.

Session 7: Participants review their homework and engage in a 45-minute meditation and body scan. The session focuses on the process of pain, pain relief, and managing anger. Participants are asked to report their pain experiences. Homework includes continuing the 45-minute meditation and body scan, daily mindfulness practices, and pain reporting.

Session 8: The final session reviews homework and includes a 45-minute meditation and body scan. Participants practice the 3-minute breathing space and discuss their learnings so far. Questions are raised about whether they have met their expectations, feel personal growth, improved coping skills, and whether they wish to continue meditation.

2.4. Data analysis

In the descriptive analysis of the data, statistical indices related to each research variable were calculated. In the inferential statistics section, repeated measures ANOVA and SPSS-22 software were used.

3. Findings and Results

According to the results in Table 1, the mean dimensions of all variables in the post-test and follow-up stages of the experimental group showed either an increase or a decrease, whereas no such change was observed in the control group.

Table 1

Descriptive Statistics of Research Variables by Type of Test and Groups

Variable	Stage	Experimental Group	Control Group
		M (SD)	M (SD)
Emotion Regulation	Pre-test	24.26 (4.05)	24.13 (4.18)

JARAC Assessment and Research in Applied Counseling E-ISSN: 3041-8518

	Post-test	32.13 (7.93)	24.95 (5.03)
	Follow-up	33.25 (7.22)	23.78 (4.82)
Pain Self-Efficacy	Pre-test	19.40 (3.41)	18.53 (3.46)
	Post-test	31.23 (5.33)	19.46 (2.74)
	Follow-up	30.06 (5.83)	18.86 (2.74)
Pain Perception	Pre-test	112.93 (24.05)	110.38 (22.66)
	Post-test	89.54 (17.82)	112.16 (23.57)
	Follow-up	88.75 (18.92)	111.78 (22.33)

The assumptions for repeated measures ANOVA were checked and confirmed. Mauchly's test of sphericity indicated that the assumption of sphericity was met for all variables ($\chi^2(2) = 2.34$, $p = .311$).

The results of the multivariate repeated measures ANOVA among the studied groups for the research variables showed that the between-subject effect (group) was significant, indicating that at least one group differed from the others in at least one of the research variables. The within-subject effect (time) for the research variables was also significant, indicating that over time, from pre-test to follow-up, there was a significant change in the mean of at least one variable.

Table 2

Repeated Measures ANOVA for Comparing Pre-test, Post-test, and Follow-up of Research Variables in Experimental and Control Groups

Scale	Source	Sum of Squares	df	Mean Square	F	Sig	η^2
Emotion Regulation	Time*Group	106.467	2	53.233	15.790	.001	.361
	Group	88.817	1	88.817	16.956	.001	.377
Pain Self-Efficacy	Time*Group	170.556	2	85.278	25.632	.001	.423
	Group	81.667	1	81.667	19.656	.001	.412
Pain Perception	Time*Group	261.622	2	130.811	46.573	.001	.478
	Group	81.667	1	81.667	21.235	.001	.433

The results in Table 2 showed that the F ratio for the group factor in the dimensions of emotion regulation ($p < .01$), pain self-efficacy ($p < .01$), and pain perception ($p < .01$) was significant. This finding indicates that mindfulness training improved emotion regulation, pain self-efficacy, and pain perception. A repeated measures ANOVA was conducted for the experimental group at three stages of the intervention, with significant F ratios observed for improvements in emotional processing ($p < .01$) and self-differentiation ($p < .01$).

Table 3

Results of Bonferroni Post Hoc Test for Intra-group Mindfulness Training in Emotion Regulation, Pain Self-Efficacy, and Pain Perception Dimensions in the Experimental Group

Variable	Time 1	Time 2	Mean Difference	SE	Sig
Emotion Regulation	Pre-test	Post-test	8.86	1.25	.001
	Pre-test	Follow-up	9.90	1.31	.001
	Post-test	Follow-up	1.06	1.33	.130
Pain Self-Efficacy	Pre-test	Post-test	-12.72	1.15	.001
	Pre-test	Follow-up	-11.30	1.15	.001
	Post-test	Follow-up	0.88	1.12	.196
Pain Perception	Pre-test	Post-test	23.72	1.15	.001
	Pre-test	Follow-up	24.57	1.21	.001
	Post-test	Follow-up	1.15	1.19	.110

Changes in the experimental group over time in Table 3 showed that the dimensions of emotion regulation, pain self-efficacy, and pain perception in the mindfulness training group were significant in the post-test compared to the pre-test ($p < .001$). Additionally, significant differences were observed in the follow-up stage compared to the pre-test ($p < .001$), but no significant difference was found between follow-up and post-test ($p > .01$).

JARAC Assessment and Research in Applied Counseling
E-ISSN: 3041-8518

4. Discussion and Conclusion

The aim of the present study was to determine the effectiveness of Mindfulness-Based Stress Reduction (MBSR) on emotion regulation, pain self-efficacy, and pain perception in patients with cardiovascular disease. The results showed that MBSR was effective in improving emotion regulation, pain self-efficacy, and pain perception in patients with cardiovascular disease.

One explanation for this finding is that MBSR is an evidence-based intervention effective for reducing stress and enhancing mental health across a range of conditions, including cardiovascular disease. One of the primary mechanisms through which MBSR operates is by improving emotion regulation. Emotion regulation is the ability to manage emotions and behaviors in response to situations and stimuli. Poor emotion regulation is associated with a range of mental health issues, including anxiety, depression, and substance abuse (Lee et al., 2020). Cardiovascular patients often face significant emotion regulation challenges, which can result from various factors, including the disease itself, treatment side effects, and fear of death. MBSR can help improve emotion regulation in cardiovascular patients in several ways. First, it teaches individuals to focus their attention on the present moment, helping them to let go of negative thoughts and feelings. Second, it encourages individuals to accept and experience their emotions without judgment, allowing them to regulate their emotions in a healthier way. Third, it teaches mindfulness techniques for coping with stress, which can reduce anxiety and improve mood (Accoto et al., 2021).

Multiple studies support the effectiveness of MBSR in improving emotion regulation in cardiovascular patients. For example, one study found that MBSR led to significant reductions in anxiety and depression and improvements in emotion regulation in patients with coronary heart disease. Another study found that MBSR resulted in significant reductions in internal stress and improvements in emotion regulation in patients with heart failure.

These mechanisms help explain how MBSR (Mindfulness-Based Stress Reduction) effectively improves emotion regulation in cardiovascular disease (CVD) patients. MBSR teaches individuals to focus on the present moment, which helps them let go of negative thoughts and feelings. This is particularly beneficial for CVD patients who often worry about the future or ruminate on the past (Geiger et al., 2023; Moulton-Perkins et al., 2022). MBSR also teaches individuals to accept and experience their emotions without judgment, helping CVD patients to accept and regulate their emotions in a healthier way. Additionally, MBSR teaches mindfulness techniques for coping with stress, reducing anxiety and improving mood in CVD patients (Kuo et al., 2021). Overall, evidence suggests that MBSR is an effective intervention for improving emotion regulation in CVD patients due to its ability to help individuals focus on the present, accept their emotions without judgment, and use mindfulness techniques to manage stress.

MBSR is an evidence-based intervention that has shown efficacy in reducing stress and promoting mental health across various conditions, including cardiovascular disease. MBSR can enhance individuals' self-efficacy, referring to their belief in their ability to handle challenges. High self-efficacy is associated with better coping strategies and lower pain perception. For CVD patients, high self-efficacy can help them feel more in control of their pain and less affected by it (Hoge et al., 2023). MBSR can help individuals identify and challenge negative thought patterns that may exacerbate their pain. For instance, someone with chronic pain may constantly think that their pain will never go away. MBSR can help this individual recognize this negative thought and replace it with a more realistic and helpful one, such as "My pain may not go away entirely, but I can learn to manage it." Overall, evidence suggests that MBSR can positively impact pain self-efficacy and pain perception in CVD patients through several mechanisms (Hirshberg et al., 2022). MBSR is a safe and effective intervention that can be a valuable complement to traditional cardiovascular treatments.

5. Limitations & Suggestions

This study was conducted on a small sample of CVD patients; therefore, the results may not be generalizable to the broader population of CVD patients. Although this study was a randomized controlled trial, it did not use a blinded design, which could help reduce bias in intervention studies. Patients were only followed up for 8 weeks after the intervention, so the long-term effects of MBSR might not be stable or may require more time to manifest. The sample primarily consisted of older, white individuals, limiting the generalizability to other demographic groups, such as younger individuals or ethnic minorities. The Pain Self-Efficacy and McGill Pain scales were used to measure pain perception, but these tools might not provide the most comprehensive assessment of pain.

JARAC Assessment and Research in Applied Counseling
E-ISSN: 3041-8518

Future studies should involve larger and more diverse samples of CVD patients. Blinded designs should be used in future studies to reduce bias. Patients should be followed for longer periods post-intervention to evaluate the long-term effects of MBSR. Studies should include diverse demographic samples, such as younger individuals, ethnic minorities, and patients with comorbid conditions. More comprehensive measurement tools should be used to assess pain and other health-related outcomes.

Acknowledgments

We would like to express our appreciation and gratitude to all those who cooperated in carrying out this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

Authors' Contributions

All authors equally contributed in this article.

References

Accoto, A., Chiarella, S. G., Raffone, A., Montano, A., de Marco, A., Mainiero, F., Rubbino, R., Valzania, A., & Conversi, D. (2021). Beneficial Effects of Mindfulness-Based Stress Reduction Training on the Well-Being of a Female Sample during the First Total Lockdown Due to COVID-19 Pandemic in Italy. *International journal of environmental research and public health*, *18*(11).

Burns, J. W., Jensen, M. P., Thorn, B., Lillis, T. A., Carmody, J., Newman, A. K., & Keefe, F. (2022). Cognitive therapy, mindfulness-based stress reduction, and behavior therapy for the treatment of chronic pain: randomized controlled trial. *Pain*, *163*(2). https://journals.lww.com/pain/fulltext/2022/02000/cognitive_therapy,_mindfulness_based_stress.13.aspx

Deng, L., Ma, Z., Zhou, J., Chen, L., Wang, J., Qiao, X., Hu, D., Ma, D., Peng, J., & Ma, Y. (2022). Regulating excited state of sulfone-locked triphenylamine heteroaromatics for high-efficiency ultralong room-temperature phosphorescence. *Chemical Engineering Journal*, *449*, 137834. https://doi.org/10.1016/j.cej.2022.137834

Dubé, M.-O., Roos, M., Desmeules, F., & Roy, J.-S. (2023). Reliability, validity, and responsiveness of a Canadian French adaptation of the pain self-efficacy questionnaire (PSEQ). *Disability and Rehabilitation*, *45*(16), 2675-2682. https://doi.org/10.1080/09638288.2022.2102254

Fang, X., Ardehali, H., Min, J., & Wang, F. (2023). The molecular and metabolic landscape of iron and ferroptosis in cardiovascular disease. *Nature Reviews Cardiology*, *20*(1), 7-23. https://doi.org/10.1038/s41569-022-00735-4

Fereidouni, S., Hejazi, N., Homayounfar, R., & Farjam, M. (2023). Diet quality and dietary acid load in relation to cardiovascular disease mortality: Results from Fasa PERSIAN cohort study. *Food Science & Nutrition*, *11*(3), 1563-1571. https://doi.org/10.1002/fsn3.3197

Geiger, C., Cramer, H., Dobos, G., & Kohl-Heckl, W. K. (2023). A systematic review and meta-analysis of mindfulness-based stress reduction for arterial hypertension. *Journal of Human Hypertension*, *37*(3), 161-169. https://doi.org/10.1038/s41371-022-00764-z

Grinspoon, S. K., Fitch, K. V., Zanni, M. V., Fichtenbaum, C. J., Umbleja, T., Aberg, J. A., Overton, E. T., Malvestutto, C. D., Bloomfield, G. S., & Currier, J. S. (2023). Pitavastatin to prevent cardiovascular disease in HIV infection. *New England Journal of Medicine*, *389*(8), 687-699. https://www.nejm.org/doi/full/10.1056/NEJMoa2304146

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of personality and social psychology*, *85*(2), 348-362. https://doi.org/10.1037/0022-3514.85.2.348

Han, J., Liu, X., Sun, C., Li, Y., Yin, H., & Shi, Y. (2018). Ingenious modification of molecular structure effectively regulates excited-state intramolecular proton and charge transfer: a theoretical study based on 3-hydroxyflavone. *RSC advances*, *8*(52), 29589-29597. https://pubs.rsc.org/en/content/articlehtml/2018/ra/c8ra05812a

Han, J., Shi, Y., Jin, X., Yang, X., & Duan, P. (2022). Regulating the excited state chirality to fabricate high-performance-solid-state circularly polarized luminescence materials. *Chemical Science*, *13*(20), 6074-6080. https://pubs.rsc.org/en/content/articlehtml/2022/sc/d2sc01846b

Hirshberg, M. J., Goldberg, S. B., Rosenkranz, M., & Davidson, R. J. (2022). Prevalence of harm in mindfulness-based stress reduction. *Psychological medicine*, *52*(6), 1080-1088. https://doi.org/10.1017/S0033291720002834

Hoge, E. A., Bui, E., Mete, M., Dutton, M. A., Baker, A. W., & Simon, N. M. (2023). Mindfulness-Based Stress Reduction vs Escitalopram for the Treatment of Adults With Anxiety Disorders: A Randomized Clinical Trial. *JAMA Psychiatry*, *80*(1), 13-21. https://doi.org/10.1001/jamapsychiatry.2022.3679

JARAC Assessment and Research in Applied Counseling
E-ISSN: 3041-8518

Kuo, J. R., Zeifman, R. J., Morrison, A. S., Heimberg, R. G., Goldin, P. R., & Gross, J. J. (2021). The moderating effects of anger suppression and anger expression on cognitive behavioral group therapy and mindfulness-based stress reduction among individuals with social anxiety disorder. *Journal of affective disorders*, *285*, 127-135. https://doi.org/10.1016/j.jad.2021.02.022

Lee, E. K. P., Yeung, N. C. Y., Xu, Z., Zhang, D., Yu, C.-P., & Wong, S. Y. S. (2020). Effect and Acceptability of Mindfulness-Based Stress Reduction Program on Patients With Elevated Blood Pressure or Hypertension. *Hypertension*, *76*(6), 1992-2001. https://doi.org/10.1161/HYPERTENSIONAHA.120.16160

Lerdal, A., Hofoss, D., Gay, C. L., & Fagermoen, M. S. (2019). Perception of illness among patients with heart failure is related to their general health independently of their mood and functional capacity. *Journal of Patient-Reported Outcomes*, *3*(1), 55. https://doi.org/10.1186/s41687-019-0142-1

Man, M. A., Toma, C., Motoc, N. S., Necrelescu, O. L., Bondor, C. I., Chis, A. F., Lesan, A., Pop, C. M., Todea, D. A., Dantes, E., Puiu, R., & Rajnoveanu, R.-M. (2020). Disease Perception and Coping with Emotional Distress During COVID-19 Pandemic: A Survey Among Medical Staff. *International journal of environmental research and public health*, *17*(13), 4899. https://doi.org/10.3390/ijerph17134899

Marshall, A., Joyce, C. T., Tseng, B., Gerlovin, H., Yeh, G. Y., Sherman, K. J., Saper, R. B., & Roseen, E. J. (2022). Changes in Pain Self-Efficacy, Coping Skills, and Fear-Avoidance Beliefs in a Randomized Controlled Trial of Yoga, Physical Therapy, and Education for Chronic Low Back Pain. *Pain Medicine*, *23*(4), 834-843. https://doi.org/10.1093/pm/pnab318

Melzack, R., & Torgerson, W. S. (1971). On the Language of Pain. *Anesthesiology*, *34*(1), 50-59. https://doi.org/10.1097/00000542-197101000-00017

Moulton-Perkins, A., Moulton, D., Cavanagh, K., Jozavi, A., & Strauss, C. (2022). Systematic review of mindfulness-based cognitive therapy and mindfulness-based stress reduction via group videoconferencing: Feasibility, acceptability, safety, and efficacy. *Journal of Psychotherapy Integration*, *32*(1), 110-130. https://doi.org/10.1037/int0000216

Nicholas, M. K. (2007). The pain self-efficacy questionnaire: Taking pain into account. *European Journal of Pain*, *11*(2), 153-163. https://doi.org/10.1016/j.ejpain.2005.12.008

Palei, S., Behera, S. K., & Sethy, P. K. (2023). A Systematic Review of Citrus Disease Perceptions and Fruit Grading Using Machine Vision. *Procedia Computer Science*, *218*, 2504-2519. https://doi.org/10.1016/j.procs.2023.01.225

Redline, S., Azarbarzin, A., & Peker, Y. (2023). Obstructive sleep apnoea heterogeneity and cardiovascular disease. *Nature Reviews Cardiology*, *20*(8), 560-573. https://doi.org/10.1038/s41569-023-00846-6

Tomlinson, R. M., Bax, K. C., Ashok, D., & McMurtry, C. M. (2021). Health-related quality of life in youth with abdominal pain: An examination of optimism and pain self-efficacy. *Journal of psychosomatic research*, *147*, 110531. https://doi.org/10.1016/j.jpsychores.2021.110531

Townsend, N., Kazakiewicz, D., Lucy Wright, F., Timmis, A., Huculeci, R., Torbica, A., Gale, C. P., Achenbach, S., Weidinger, F., & Vardas, P. (2022). Epidemiology of cardiovascular disease in Europe. *Nature Reviews Cardiology*, *19*(2), 133-143. https://doi.org/10.1038/s41569-021-00607-3

Waszczak-Jeka, M., Żuchowski, P., Dura, M., Bielewicz-Zielińska, A., Kułakowski, M., & Góralczyk, A. (2024). Interleukin levels and depressive symptoms in psoriatic arthritis patients: insights from a case–control study on socio-demographic factors and disease perception. *Rheumatology International*. https://doi.org/10.1007/s00296-024-05599-0

Yang, J.-G., Song, X.-F., Cheng, G., Wu, S., Feng, X., Cui, G., To, W.-P., Chang, X., Chen, Y., Che, C.-M., Yang, C., & Li, K. (2022). Conformational Engineering of Two-Coordinate Gold(I) Complexes: Regulation of Excited-State Dynamics for Efficient Delayed Fluorescence. *ACS Applied Materials & Interfaces*, *14*(11), 13539-13549. https://doi.org/10.1021/acsami.2c01776

JARAC Assessment and Research in Applied Counseling
E-ISSN: 3041-8518