

# The Effectiveness of Mindfulness Training on Anxiety in Male-to-Female (MtoF) Transgender Individuals Prior to Gender Affirmation Surgery in Isfahan Province

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## ABSTRACT

The present study aimed to investigate the effectiveness of mindfulness training in reducing anxiety among male-to-female (MtoF) transgender individuals prior to gender affirmation surgery. The research method was quasi-experimental with a pretest–posttest design and a control group. The statistical population consisted of male-to-female transgender individuals referring to psychological counseling centers in the city of Isfahan. Among them, 40 participants were selected through convenience sampling and randomly assigned to experimental and control groups (20 participants in each group). The experimental group participated in eight sessions of mindfulness training, while the control group received no intervention. Data were collected using the Beck Anxiety Inventory, which was administered during the pretest and posttest stages. The results of the independent samples t-test and analysis of covariance indicated that the mean anxiety scores in the experimental group significantly decreased ( $p < .01$ ), whereas no significant change was observed in the control group. The findings demonstrated the effectiveness of mindfulness training in reducing preoperative anxiety among male-to-female transgender individuals.

**Keywords:** Mindfulness, Anxiety, Male-to-Female Transgender Individuals, Preoperative Period, Psychological Intervention

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## Introduction

Gender identity is considered one of the fundamental dimensions of human identity and psychological functioning. Individuals whose experienced gender identity differs from their biological sex assigned at birth may experience a condition referred to as gender dysphoria, which is often accompanied by profound psychological distress, emotional conflict, social stigma, and anxiety. Among transgender populations, male-to-female (MtoF) transgender individuals frequently encounter unique psychological and social challenges associated with identity disclosure, family rejection, discrimination, social isolation, and the process of gender affirmation. These stressors can intensify mental health problems and negatively affect psychological well-being, particularly during the period preceding gender affirmation surgery (1, 2). The preoperative stage of gender affirmation surgery is often associated with heightened emotional vulnerability because

individuals face uncertainty regarding surgical outcomes, fear of social judgment, body dissatisfaction, and concerns related to personal identity and future social acceptance.

Recent evidence suggests that transgender and gender-diverse populations experience significantly higher rates of anxiety, depression, self-harm, and suicidal ideation compared with cisgender populations. Studies have demonstrated that chronic exposure to minority stress, discrimination, and identity invalidation contributes substantially to the development of psychological distress in transgender individuals (3, 4). In particular, anxiety has been identified as one of the most prevalent psychological symptoms among transgender individuals preparing for gender affirmation procedures. Appearance-related concerns, fear of rejection, social stigma, and uncertainty regarding transition outcomes may exacerbate emotional instability and increase vulnerability to anxiety disorders (5). In many cases, these psychological pressures not only reduce quality of life but may also interfere with treatment adherence, social functioning, and postoperative adjustment.

The psychological experiences of transgender women prior to surgery are further influenced by concerns related to voice, appearance, and body congruence. Research has shown that voice characteristics and perceived gender incongruence can significantly influence self-esteem, emotional comfort, and social integration among transgender women (6-8). Since voice and body presentation are strongly associated with social recognition of gender identity, many transgender women experience persistent anxiety regarding how they are perceived by others. Such concerns may intensify during the preoperative stage, when individuals are anticipating significant bodily changes and social transitions.

In recent decades, mindfulness-based interventions have received growing attention as effective approaches for improving psychological health and emotional regulation across diverse clinical populations. Mindfulness refers to the intentional and nonjudgmental awareness of present-moment experiences, including thoughts, emotions, bodily sensations, and environmental stimuli. Mindfulness-based approaches aim to help individuals develop greater acceptance of internal experiences while reducing maladaptive cognitive and emotional reactions. Through mindful awareness, individuals may become less overwhelmed by distressing thoughts and emotional states and may develop more adaptive coping mechanisms (9, 10). Among the most widely applied mindfulness interventions is Mindfulness-Based Stress Reduction (MBSR), which integrates meditation practices, breathing exercises, body awareness, and emotional acceptance techniques.

The effectiveness of mindfulness interventions has been extensively examined across a broad range of psychological and medical conditions. Systematic reviews and meta-analyses have consistently demonstrated that mindfulness-based therapies contribute to reductions in anxiety, stress, depression, emotional dysregulation, and psychological distress (9, 11). Furthermore, mindfulness interventions have shown beneficial effects in improving emotional resilience, enhancing self-awareness, and promoting overall psychological well-being in both clinical and non-clinical populations.

A growing body of evidence supports the effectiveness of mindfulness interventions specifically for anxiety reduction. Bose reported that mindfulness interventions significantly reduce anxiety symptoms among young adults by improving emotional regulation and reducing cognitive rumination (12). Similarly, Hazlett-Stevens demonstrated that Mindfulness-Based Stress Reduction led to meaningful improvements in symptoms of generalized anxiety disorder in hospital settings (13). Xu also emphasized the effectiveness of

mindfulness-based cognitive therapy in improving mental health among university students during periods of heightened stress and uncertainty (14). These findings suggest that mindfulness interventions may be particularly beneficial for populations experiencing chronic emotional distress and uncertainty, including transgender individuals awaiting gender affirmation surgery.

Mindfulness-based interventions have also demonstrated effectiveness in medical and oncology settings, where anxiety and emotional distress are highly prevalent. Research indicates that mindfulness can reduce depression, anxiety, fatigue, and psychological burden among patients with cancer and other chronic medical conditions (15-21). These interventions help individuals cope more effectively with uncertainty, bodily discomfort, fear of treatment outcomes, and emotional distress. Since transgender individuals preparing for surgery often experience similar anticipatory stress and body-related anxiety, mindfulness-based approaches may offer important psychological benefits during the transition process.

The therapeutic value of mindfulness has also been documented in cardiovascular, metabolic, and chronic pain populations. Mindfulness interventions have been associated with improvements in emotional regulation, stress management, physiological functioning, and overall quality of life among individuals with hypertension, cardiovascular disease, diabetes, and chronic pain conditions (22-26). These findings suggest that mindfulness can influence both psychological and physiological dimensions of well-being by reducing stress-related cognitive and emotional activation.

Beyond symptom reduction, mindfulness interventions may also contribute to decreased suicidal ideation and self-harm behaviors. This issue is particularly relevant for transgender populations, who are known to experience elevated rates of suicidality and self-injurious thoughts compared with the general population. Aguiar and colleagues identified mindfulness as a potentially protective factor against suicidal behavior due to its capacity to enhance emotional regulation and reduce impulsive reactions to distress (27). Considering the high prevalence of suicidal ideation among transgender populations reported in previous studies (3, 4), mindfulness-based interventions may play a valuable preventive role in promoting psychological safety and emotional stability.

Mindfulness interventions have additionally shown effectiveness in populations exposed to social marginalization, chronic stress, and emotionally demanding environments. For example, mindfulness-based cognitive therapy has demonstrated positive outcomes among incarcerated populations, athletes, infertile women, and healthcare professionals (10, 28-30). These interventions improve coping skills, emotional awareness, psychological flexibility, and stress tolerance. Given that transgender individuals frequently encounter social stigma, interpersonal rejection, and chronic psychological stress, mindfulness-based approaches may provide an adaptive framework for enhancing emotional resilience and reducing anxiety.

The increasing availability of online and accessible mindfulness interventions has further expanded their applicability across diverse populations and healthcare settings. Senthilnathan and colleagues reported that online mindfulness programs are increasingly used for individuals with physical and mental health conditions and have shown promising outcomes in improving emotional well-being and reducing distress (11). This flexibility may be especially important for transgender individuals who may face barriers to accessing affirming mental health services due to stigma, discrimination, or limited specialized healthcare resources.

Despite the growing evidence supporting mindfulness-based interventions, research examining their effectiveness among transgender populations remains limited. Most existing studies on transgender health have focused primarily on surgical outcomes, identity development, hormonal treatment, or prevalence of mental health disorders (1, 2). Comparatively fewer studies have investigated psychological interventions specifically designed to reduce anxiety and emotional distress during the preoperative phase of gender affirmation surgery. This gap is clinically important because unmanaged anxiety during the transition process may negatively affect emotional adjustment, quality of life, interpersonal functioning, and satisfaction with treatment outcomes.

Furthermore, the cultural and social context surrounding transgender identity may influence psychological experiences and access to mental health support. In many societies, including more traditional cultural contexts, transgender individuals often encounter substantial social stigma and discrimination, which may intensify anxiety and psychological distress. Therefore, investigating effective and culturally adaptable psychological interventions for transgender populations represents an important area of clinical research.

Considering the high prevalence of anxiety and psychological vulnerability among male-to-female transgender individuals prior to gender affirmation surgery, as well as the demonstrated effectiveness of mindfulness-based interventions across diverse clinical populations, the present study aimed to investigate the effectiveness of mindfulness training on reducing anxiety among male-to-female transgender individuals prior to gender affirmation surgery in Isfahan Province.

## **Methods and Materials**

### *Study Design and Participants*

The present study employed a quasi-experimental research design using a pretest–posttest format with a control group. This design was selected to examine the effectiveness of a psychological intervention, namely mindfulness training, on the anxiety levels of male-to-female (MtoF) transgender individuals prior to gender affirmation surgery. In this design, both the experimental and control groups were initially assessed during the pretest phase. Subsequently, the experimental group received the intervention, whereas the control group did not receive any psychological training. Following the completion of the intervention period, both groups were reassessed during the posttest stage. The statistical population consisted of all male-to-female transgender individuals who referred to five valid psychological clinics in the city of Isfahan during 2025 and were in the preparation stage for gender affirmation surgery. All participants had received an official diagnosis of Gender Dysphoria from psychiatrists and clinical psychologists and expressed willingness to participate in the educational program. Sampling was conducted using a convenience and voluntary sampling method. Initially, 25 eligible individuals were identified, and after conducting preliminary interviews and evaluating the inclusion and exclusion criteria, 20 participants were selected as the final sample. The participants were randomly assigned into experimental and control groups, with 10 individuals in each group. The inclusion criteria included having a confirmed diagnosis of male-to-female transgender identity by a psychiatrist, being between 18 and 40 years of age, being in the preoperative stage of gender affirmation surgery, not having initiated new psychiatric medication during the previous month, not participating in similar psychotherapy programs during the last three months, and obtaining moderate to

severe anxiety scores on the Beck Anxiety Inventory. The exclusion criteria included withdrawal from the study, absence from more than two intervention sessions, initiation of new pharmacological treatment during the intervention period, and diagnosis of severe psychiatric disorders such as psychosis.

### *Data Collection*

Data collection in the present study was carried out using the Beck Anxiety Inventory (BAI). The BAI is a standardized self-report instrument developed by Beck and colleagues to assess the severity of anxiety symptoms experienced during the previous week. The questionnaire consists of 21 items, each describing a common symptom of anxiety, and participants respond to each item based on a four-point Likert scale ranging from 0 (not at all) to 3 (severely). Total scores range from 0 to 63, with higher scores indicating greater levels of anxiety severity. The Beck Anxiety Inventory has demonstrated strong psychometric properties, including high internal consistency, test–retest reliability, and construct validity across different populations. In addition, the Persian version of the instrument has been standardized and validated in several Iranian studies and has shown satisfactory reliability and validity for assessing anxiety symptoms among Iranian clinical and non-clinical populations.

### *Intervention*

The experimental group participated in a Mindfulness-Based Stress Reduction (MBSR) training program designed to reduce psychological distress and enhance present-moment awareness. The intervention consisted of eight group sessions, each lasting 90 minutes, conducted in person at the psychological clinic. The sessions included mindfulness meditation exercises, breathing awareness techniques, body scan practices, nonjudgmental observation of thoughts and emotions, and training in acceptance and emotional regulation. Participants were encouraged to practice mindfulness exercises daily outside the sessions in order to strengthen their self-awareness and coping skills. The therapeutic process emphasized reducing automatic negative reactions to stress and anxiety-provoking thoughts related to the upcoming gender affirmation surgery. Meanwhile, the control group did not receive any psychological intervention during the study period and continued their routine clinical care.

### *Data Analysis*

After data collection, the obtained data were analyzed using SPSS software version 26. Initially, descriptive statistical methods, including means, standard deviations, and scatter plots, were used to summarize and examine the data distribution. The normality of the data was assessed using the Kolmogorov–Smirnov test. To evaluate the main research hypothesis and determine the effectiveness of mindfulness training on anxiety reduction, analysis of covariance (ANCOVA) was employed. This statistical method was used to control the effect of pretest scores on posttest outcomes and to provide a more accurate comparison between the experimental and control groups. The significance level for all statistical analyses was considered at  $p < .05$ .

## Findings and Results

The demographic characteristics of the participants indicated that the mean age of the participants in the experimental group was 27.80 years (SD = 5.14), while the mean age in the control group was 28.40 years (SD = 4.87). Most participants had completed at least a high school diploma, and all participants were in the preoperative stage of gender affirmation surgery at the time of the study. No significant differences were observed between the experimental and control groups regarding age, educational level, or baseline anxiety scores, indicating that the groups were relatively homogeneous before the intervention.

**Table 1. Means and Standard Deviations of Anxiety Scores in the Experimental and Control Groups at Pretest and Posttest**

Group	Stage	Mean Anxiety Score	Standard Deviation
Experimental	Pretest	24.60	3.91
Experimental	Posttest	15.20	2.87
Control	Pretest	24.20	3.50
Control	Posttest	23.90	3.40

As presented in Table 1, the mean anxiety score in the experimental group decreased from 24.60 (SD = 3.91) in the pretest stage to 15.20 (SD = 2.87) in the posttest stage following mindfulness training. In contrast, the control group demonstrated only a minimal change in anxiety scores, with the mean score decreasing slightly from 24.20 (SD = 3.50) at pretest to 23.90 (SD = 3.40) at posttest. These findings suggest that participation in the mindfulness-based intervention was associated with a substantial reduction in anxiety symptoms among male-to-female transgender individuals prior to gender affirmation surgery.

Before conducting the main inferential analyses, the assumptions underlying parametric statistical tests were examined. The normality of data distribution was assessed using the Kolmogorov–Smirnov test. The results indicated that the anxiety variable was normally distributed ( $K-S = 0.14$ ,  $p = .200$ ). Since the significance value was greater than .05, the assumption of normality was not violated, and the use of parametric statistical methods, including analysis of covariance, was considered appropriate. In addition, preliminary analyses demonstrated homogeneity of variance and the absence of extreme outliers in the data.

**Table 2. Analysis of Covariance (ANCOVA) Results for Anxiety Scores**

Source of Variation	Sum of Squares (SS)	df	Mean Square (MS)	F	Sig.
Pretest	184.22	1	184.22	21.87	.001
Group (Experimental/Control)	248.63	1	248.63	29.53	.001
Error	367.70	26	14.14	—	—

The results of the analysis of covariance presented in Table 2 demonstrated that after controlling for pretest anxiety scores, there was a statistically significant difference between the experimental and control groups in posttest anxiety levels ( $F = 29.53$ ,  $p = .001$ ). Furthermore, the effect of the pretest variable was also significant ( $F = 21.87$ ,  $p = .001$ ). These findings indicate that mindfulness training had a significant effect on reducing anxiety among male-to-female transgender individuals prior to gender affirmation surgery. The reduction in anxiety observed in the experimental group can therefore be attributed to participation in the mindfulness-based stress reduction program.

## Discussion and Conclusion

The present study aimed to investigate the effectiveness of mindfulness training on reducing anxiety among male-to-female (MtoF) transgender individuals prior to gender affirmation surgery in Isfahan Province. The findings demonstrated that mindfulness-based stress reduction significantly reduced anxiety levels in the experimental group compared with the control group. After controlling for pretest scores, the results of the analysis of covariance indicated a statistically significant difference between the two groups in posttest anxiety scores. These findings suggest that mindfulness training can be considered an effective psychological intervention for reducing preoperative anxiety among transgender women preparing for gender affirmation surgery.

The reduction in anxiety observed in the experimental group may be explained through the core mechanisms of mindfulness-based interventions. Mindfulness training encourages individuals to develop nonjudgmental awareness of present-moment experiences, including distressing thoughts, bodily sensations, fears, and emotions. Instead of engaging in avoidance, rumination, or catastrophic thinking, participants learn to observe internal experiences with greater acceptance and emotional flexibility. This process may reduce emotional reactivity and help individuals manage anticipatory fears associated with surgery, social judgment, and uncertainty regarding transition outcomes. Previous theoretical and clinical literature has similarly emphasized that mindfulness promotes adaptive emotional regulation and reduces maladaptive cognitive patterns associated with anxiety disorders (9, 10).

The findings of the present study are consistent with previous research demonstrating the effectiveness of mindfulness interventions in reducing anxiety symptoms across various populations. Bose reported that mindfulness-based interventions significantly improve anxiety symptoms among young adults by reducing cognitive rumination and increasing emotional awareness (12). Similarly, Hazlett-Stevens found that mindfulness-based stress reduction produced significant improvements in generalized anxiety symptoms in clinical settings (13). Xu also concluded that mindfulness-based cognitive therapy improved mental health and reduced psychological distress among university students experiencing heightened stress and uncertainty (14). The consistency between these findings and the present study suggests that mindfulness may effectively reduce anxiety regardless of population differences by targeting universal cognitive and emotional mechanisms underlying distress.

One of the important psychological characteristics of transgender individuals during the preoperative stage is persistent anticipatory anxiety related to body image, social identity, and future acceptance. Many transgender women experience chronic stress resulting from fear of discrimination, rejection, or dissatisfaction with physical appearance. According to Li and colleagues, appearance anxiety plays a significant mediating role in the relationship between gender dysphoria and suicidality among transgender and gender-diverse youth (5). Moreover, Bird and colleagues identified multiple risk factors for psychological distress and self-harm among transgender individuals, including social rejection, stigma, and emotional dysregulation (3). Mindfulness training may help reduce the intensity of these concerns by encouraging emotional acceptance and decreasing automatic negative evaluations related to appearance and identity.

The present findings also align with studies emphasizing the role of mindfulness interventions in populations experiencing chronic medical or treatment-related stress. Individuals preparing for gender

affirmation surgery often experience emotional reactions similar to those observed in patients awaiting major medical procedures. Anxiety regarding treatment outcomes, bodily changes, and future functioning may increase psychological vulnerability. Previous studies conducted among oncology populations have demonstrated that mindfulness-based interventions effectively reduce anxiety, depression, emotional exhaustion, and stress-related symptoms (15-19). Likewise, Marinovic and Hunter found that mindfulness interventions may positively influence both psychological well-being and physiological functioning among individuals with cancer (20). These findings support the idea that mindfulness can improve emotional adaptation during periods of uncertainty and medical stress, which may explain its effectiveness among transgender individuals awaiting surgery.

Another possible explanation for the effectiveness of mindfulness training in the present study is its influence on cognitive processing and emotional regulation. Anxiety is often associated with repetitive negative thinking, catastrophic anticipation, and excessive focus on feared future events. Mindfulness-based interventions reduce these maladaptive cognitive processes by directing attention toward present-moment awareness rather than future-oriented worry. This mechanism may be especially beneficial for transgender individuals who experience persistent concerns regarding surgical outcomes, social relationships, and identity validation. Research by Rodríguez and colleagues suggested that mindfulness positively affects emotional and relational aspects of sexuality and body awareness by promoting acceptance and reducing self-critical thinking (31). These psychological changes may contribute to greater emotional stability and reduced anxiety in transgender women undergoing identity transition.

The findings of the present study are also consistent with evidence supporting mindfulness interventions in populations facing social stigma and chronic psychosocial stress. Maroney and colleagues reported positive psychological outcomes of mindfulness-based cognitive therapy among incarcerated individuals, highlighting improvements in emotional self-regulation and psychological resilience (28). Similarly, mindfulness interventions have demonstrated effectiveness in improving psychological well-being among infertile women, elite athletes, and healthcare professionals exposed to high levels of stress and emotional pressure (10, 29, 30). Since transgender individuals frequently experience minority stress and chronic emotional strain, mindfulness training may serve as an adaptive coping strategy that enhances resilience and psychological flexibility.

The observed reduction in anxiety may additionally be related to the group-based nature of the mindfulness intervention. Participation in a structured therapeutic group may provide transgender individuals with a sense of emotional safety, social support, and validation. Many transgender individuals experience loneliness and social isolation due to societal stigma and limited access to supportive environments. Group mindfulness sessions may therefore not only teach coping skills but also create opportunities for emotional connection and normalization of shared experiences. Such supportive interactions may reduce feelings of alienation and psychological vulnerability during the transition process.

The present findings further support previous research indicating that mindfulness interventions can contribute to reducing severe psychological outcomes such as self-harm and suicidal ideation. Aguiar and colleagues concluded that mindfulness interventions may reduce suicidal behavior by increasing emotional awareness and reducing impulsive reactions to distress (27). This issue is particularly important for transgender populations because prior studies have demonstrated elevated rates of suicidal thoughts and

suicide attempts among transgender individuals worldwide (4). Therefore, interventions that effectively reduce anxiety and emotional dysregulation may also indirectly decrease vulnerability to more severe mental health outcomes.

The effectiveness of mindfulness interventions observed in the present study is also supported by broader evidence demonstrating their positive effects on physical and psychological health conditions. Previous meta-analyses and systematic reviews have shown that mindfulness interventions improve emotional well-being in individuals with cardiovascular disease, hypertension, diabetes, and chronic pain conditions (22-26). These findings suggest that mindfulness may influence stress-related physiological processes alongside psychological functioning. Since anxiety before surgery is often accompanied by heightened physiological arousal, mindfulness techniques such as breathing exercises and body awareness practices may help regulate autonomic nervous system activation and reduce stress-related bodily symptoms.

Another important aspect of the current findings relates to the increasing applicability of mindfulness interventions in diverse healthcare contexts. Senthilnathan and colleagues emphasized that online and accessible mindfulness interventions have become increasingly important in supporting individuals with physical and mental health conditions (11). Given that transgender individuals may face barriers to accessing affirming psychological care, mindfulness-based interventions may provide a flexible and culturally adaptable approach for promoting mental health in this population. Additionally, mindfulness interventions are generally low-cost, non-invasive, and compatible with various healthcare settings, making them suitable for integration into preoperative psychological support programs.

Although the present study demonstrated promising findings, it should be noted that the psychological experiences of transgender individuals are multidimensional and influenced by numerous social, cultural, interpersonal, and medical factors. Anxiety among transgender women cannot be fully understood solely as an individual psychological issue but must also be considered within the broader context of social discrimination, minority stress, and limited social acceptance. Therefore, mindfulness training should be viewed as one component of a comprehensive psychological support system for transgender populations rather than a standalone solution.

One limitation of the present study was the relatively small sample size, which may reduce the generalizability of the findings to broader transgender populations. Additionally, the use of convenience sampling and restriction of participants to one geographic region may limit external validity. Another limitation was the absence of a long-term follow-up period to determine whether the observed reductions in anxiety were maintained over time after surgery or during later stages of gender transition. Furthermore, reliance on self-report measures may have increased the possibility of response bias or socially desirable responding.

Future research is recommended to investigate the long-term effectiveness of mindfulness-based interventions among transgender populations using larger and more diverse samples. Researchers may also compare mindfulness interventions with other therapeutic approaches such as cognitive-behavioral therapy, acceptance and commitment therapy, or compassion-focused therapy. Examining the effectiveness of online mindfulness programs and culturally adapted interventions for transgender individuals in different social contexts may also provide valuable insights. In addition, future studies could investigate the effects of

mindfulness training on other psychological outcomes such as depression, self-esteem, body image satisfaction, resilience, and quality of life.

From a practical perspective, the findings of the present study suggest that mindfulness-based interventions may be incorporated into psychological support services for transgender individuals preparing for gender affirmation surgery. Mental health professionals working in transgender healthcare settings may benefit from integrating mindfulness techniques into counseling and preoperative preparation programs. Clinics and healthcare centers providing gender affirmation services may also develop structured psychological intervention programs to reduce anxiety and improve emotional well-being before surgery. Expanding access to affirming psychological support may ultimately contribute to better mental health outcomes, improved adjustment during transition, and enhanced quality of life among transgender individuals.

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### **Authors' Contributions**

All authors equally contributed to 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.

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### **References**

1. Farah S, Rizk Y, Azar M. Transgender Health in the Middle East Region: What Do We Know So Far? A Literature Review. *Transgender Health*. 2024;9(5):375-88. doi: 10.1089/trgh.2022.0080.
2. Tatton-Schiff J. Trans Issues? Beyond a Hermeneutic of Mutilation. *Feminist Theology*. 2022;30(3):293-311. doi: 10.1177/09667350221085168.

3. Bird K, Arcelus J, Matsagoura L, O'Shea B, Townsend E. Risk and Protective Factors for Self-Harm Thoughts and Behaviours in Transgender and Gender Diverse People: A Systematic Review. *Heliyon*. 2024;10(5):e26074. doi: 10.1016/j.heliyon.2024.e26074.
4. Kohnepoushi P, Nikouei M, Cheraghi M, Hasanabadi P, Rahmani H, Moradi M, et al. Prevalence of Suicidal Thoughts and Attempts in the Transgender Population of the World: A Systematic Review and Meta-Analysis. *Annals of General Psychiatry*. 2023;22(1). doi: 10.1186/s12991-023-00460-3.
5. Li J, Feng Y, Yu Y, Xu S, Wang YY. Effect of Gender Identity on the Association Between Gender Dysphoria and Suicidality via Appearance Anxiety Among Transgender and Gender-Diverse Young People: Moderated Mediation Study. *Bjpsych Open*. 2024;10(2). doi: 10.1192/bjo.2024.18.
6. Ramírez-Arroyo G, Pascual RJS, Fuentes MSD. Relevance of the Voice in the Process of Gender Affirmation in Transsexual Women: A Cross-Sectional Study. *Salud Mental*. 2022;45(3):115-23. doi: 10.17711/sm.0185-3325.2022.016.
7. Robotti C, Mozzanica F, Atzori C, Cavalot A, Cossu D, Primov-Fever A, et al. Translation, Cross-Cultural Adaptation, and Preliminary Validation of the Transsexual Voice Questionnaire for Male-to-Female Transsexuals (I-TVQMtF) Into Italian. *Journal of Voice*. 2022;36(4):587.e1-.e11. doi: 10.1016/j.jvoice.2020.07.018.
8. Schwarz K, Villas-Bôas AP, Cielo CA, Silva DCd, Silva EDD, Figuera TM, et al. Application of the Transgender Male Voice Questionnaire in a Brazilian Population Sample. *Frontiers in Public Health*. 2024;12. doi: 10.3389/fpubh.2024.1480423.
9. Shapiro SL, Carlson LE, Sawyer BA. Mindfulness-Based Interventions for Medical Populations. 2024;91-107. doi: 10.1037/0000418-007.
10. Kajee N, Montero-Marín J, Saunders K, Myall K, Harriss E, Kuyken W. Mindfulness Training in Healthcare Professions: A Scoping Review of Systematic Reviews. *Academic Medicine*. 2024;58(6):671-86. doi: 10.1111/medu.15293.
11. Senthilnathan V, Zahir S, Simpson R, Jaglal S, Craven BC, Fetterly M-J, et al. Online Mindfulness Interventions in the Care of People With Physical and Mental Health Conditions: A Scoping Review. *BMJ Open*. 2025;15(7):e086287. doi: 10.1136/bmjopen-2024-086287.
12. Bose J. Examining the Effectiveness of Mindfulness Interventions for Anxiety in Young Adults: A Narrative Synthesis. 2024. doi: 10.31234/osf.io/6mghw.
13. Hazlett-Stevens H. Generalized Anxiety Disorder Symptom Improvement Following Mindfulness-Based Stress Reduction in a General Hospital Setting. *Journal of Medical Psychology*. 2020;22(1):21-9. doi: 10.3233/jmp-170012.
14. Xu A. Research on the Enhancement Path of University Students' Mental Health Through Mindfulness-Based Cognitive Therapy in the Post-Pandemic Era. *International Journal of New Developments in Education*. 2023;5(20). doi: 10.25236/ijnde.2023.052028.
15. Shi R. Mindfulness-Based Therapy in Patients With Breast Cancer With Depression and Anxiety: A Literature Review. *Highlights in Science Engineering and Technology*. 2023;30:70-8. doi: 10.54097/hset.v30i.4955.
16. Yadav K, Jena SPK. Mindfulness Based Therapy in Cancer Patients: Meta-Analysis. *Asian Pacific Journal of Cancer Care*. 2021;6(3):329-38. doi: 10.31557/apjcc.2021.6.3.329-338.
17. Chayadi E, Baes N, Kiropoulos L. The Effects of Mindfulness-Based Interventions on Symptoms of Depression, Anxiety, and Cancer-Related Fatigue in Oncology Patients: A Systematic Review and Meta-Analysis. *Plos One*. 2022;17(7):e0269519. doi: 10.1371/journal.pone.0269519.
18. McCloy K, Hughes C, Dunwoody L, Marley J, Gracey J. Effects of Mindfulness-based Interventions on Fatigue and Psychological Wellbeing in Women With Cancer: A Systematic Review and Meta-analysis of Randomised Control Trials. *Psycho-Oncology*. 2022;31(11):1821-34. doi: 10.1002/pon.6046.
19. Chang YC, Chang YM. Immediate Impact of Mindfulness-Based Cognitive Therapy on Women With Breast Cancer: A Systematic Review and Meta-analysis. 2022. doi: 10.21203/rs.3.rs-1397576/v1.
20. Marinovic DA, Hunter R. Examining the Interrelationships Between Mindfulness-based Interventions, Depression, Inflammation, and Cancer Survival. *Ca a Cancer Journal for Clinicians*. 2022;72(5):490-502. doi: 10.3322/caac.21733.

21. Pilafas G, Lyrakos G. Mindfulness-Based Cognitive Theory on Cancer Pain Management: Comments on the Outcomes of the Aarhus University Hospital Research Protocol. *Health & Research Journal*. 2022;8(1):4. doi: 10.12681/healthresj.29189.
22. Chen Q, Liu H, Du S. Effect of Mindfulness-Based Interventions on People With Prehypertension or Hypertension: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *BMC Cardiovascular Disorders*. 2024;24(1). doi: 10.1186/s12872-024-03746-w.
23. chen q, Du S, Liu H. Effect of Mindfulness-Based Interventions on People With Prehypertension or Hypertension-a Systematic Review and Meta-Analysis of Randomized Controlled Trials. 2023. doi: 10.21203/rs.3.rs-3075871/v1.
24. Al-Saber A, May A-N. Effect of Mindful Meditation, Physical Activity, and Diet to Reduce the Risk to Develop or Reduce Severity of Cardiovascular Diseases in Saudi Arabia: A Systematic Review. *World Journal of Cardiovascular Diseases*. 2023;13(01):46-72. doi: 10.4236/wjcd.2023.131005.
25. Fisher V, Li W, Malabu UH. The Effectiveness of Mindfulness-based Stress Reduction (MBSR) on the Mental Health, HbA1C, and Mindfulness of Diabetes Patients: A Systematic Review and Meta-analysis of Randomised Controlled Trials. *Applied Psychology Health and Well-Being*. 2023;15(4):1733-49. doi: 10.1111/aphw.12441.
26. Gascón EMP, Narambuena L, Leal-Costa C, Carlos Jv-dHR. Differential Efficacy Between Cognitive-Behavioral Therapy and Mindfulness-Based Therapies for Chronic Pain: Systematic Review. *International Journal of Clinical and Health Psychology*. 2021;21(1):100197. doi: 10.1016/j.ijchp.2020.08.001.
27. Aguiar KRd, Bilhalva JB, Cabelleira MD, Guimarães GO, Madureira T, Agako A, et al. The Impact of Mindfulness on Suicidal Behavior: A Systematic Review. *Trends in Psychiatry and Psychotherapy*. 2022. doi: 10.47626/2237-6089-2021-0316.
28. Maroney M, Luthi A, Hanney J, Mantell A, Johnson D, Barclay N, et al. Audit of a Mindfulness-Based Cognitive Therapy Course Within a Prison. *Journal of Correctional Health Care*. 2021;27(3):196-204. doi: 10.1089/jchc.18.09.0048.
29. Myall K, Montero-Marín J, Gorczynski P, Kajee N, Sheriff RS, Bernard R, et al. Effect of Mindfulness-Based Programmes on Elite Athlete Mental Health: A Systematic Review and Meta-Analysis. *British Journal of Sports Medicine*. 2022;57(2):99-108. doi: 10.1136/bjsports-2022-105596.
30. Kundarti FI, Titisari I, Rahayu DE, Kiswati K, Jamhariyah. Mindfulness Improves the Mental Health of Infertile Women: A Systematic Review. *Journal of Public Health Research*. 2023;12(3). doi: 10.1177/22799036231196693.
31. Rodríguez MFV, Sánchez-Sánchez LC, García-Montes JM, Petisco C. A Scoping Review of the Influence of Mindfulness on Men's Sexual Activity. *International Journal of Environmental Research and Public Health*. 2023;20(4):3739. doi: 10.3390/ijerph20043739.