

# Effect of Emotion Regulation Training Based on Gross Model on Psychological Well-being and Sleep Quality in Women with Psychosomatic Disorders (Rheumatic and Joint Pain)

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## Abstract

**Background:** Rheumatoid arthritis is a chronic, systemic, inflammatory disease classically affecting the small joints of the hands and feet.

**Objectives:** The purpose of this research was to investigate the effect of emotion regulation training based on the Gross model on the psychological well-being and sleep quality of women with psychosomatic disorders (rheumatic and joint pains).

**Methods:** This semi-experimental study used a pretest-posttest design and a control group. The statistical population of this study consisted of all women with psycho-physical disorders in Farahan City, among which 40 individuals were selected through the convenience sampling method and then randomly allocated to either the experimental or control group (n=20 each). The required data were collected using the Ryff Psychological Well-Being and Pittsburgh Sleep Quality Index. Emotion regulation techniques were taught using Gross's standard training protocol in eight 90-minute sessions while the control group was on the waiting list. The data were analyzed using the analysis of covariance in SPSS-23 software.

**Results:** The study's results indicate that instructing women with psychosomatic disorders on how to handle their emotions using the Gross model can significantly enhance their mental health ( $P < 0.01$ ). Moreover, the findings from the analysis of covariance revealed that Emotion Regulation Training based on the Gross model enhanced sleep quality in women with psychosomatic disorders ( $P < 0.01$ ).

**Conclusion:** The outcomes of this study can potentially enhance the overall well-being and sleep quality of individuals experiencing rheumatic and joint pains.

**Keywords:** Emotion regulation training, Gross model, Psychological well-being, Sleep quality

## 1. Background

Psychosomatic disorders are a collection of disorders that develop due to mental factors; essentially, they manifest in the body due to mental strain, stress, and chronic pressure (1). These disorders vary in presentation from person to person of any age or circumstance; however, they are most commonly seen in individuals aged 20 to 45. Experiencing various

mental stresses and issues can lead these individuals to exhibit psychosomatic symptoms and experience uncomfortable bodily pains known as psychosomatic pains (2). Among the psychosomatic pains prevalent today are rheumatic and joint pain. The onset of rheumatic and joint pain typically involves episodes of joint inflammation, leading to swelling and discomfort. This disease causes gradual harm to the musculoskeletal system

and results in pain and permanent damage to bone and cartilage, which elicits various responses. Pain experienced by these patients can lead to emotions of inadequacy, worry, anxiety, and stress, especially when it continues for an extended period (3). As stated in a study by Aslund et al. (2014), one of the mental factors affected by chronic pain in individuals is their psychological well-being (4). Mental well-being refers to the level of personal and positive functioning and represents the dimensions of assessment regarding satisfaction with life (5).

According to a study, individuals with chronic pain experience a decline in their psychological well-being as a result of the psychological stress they endure, with women being more affected than men. This phenomenon is more prevalent among younger individuals and those living in disadvantaged areas (6). Conversely, findings from the research suggest that chronic joint pain can impact individuals' sleep quality (7). Sleep quality refers to the ability to remain in a state of sleep while exhibiting all the characteristics of a particular stage of sleep (8). Sleep disorders are correlated to specific abnormalities in cognitive function and the processing of emotional information, serving as a primitive sign of mental disorder. These problems may arise from a physical ailment or high levels of stress and depression. It is common in society to see individuals with demanding routines experiencing difficulties with sleep. Persistent sleep disruptions that interfere with daily activities can result in a decline in sleep quality (9).

Given the negative impact of psychosomatic disorders on individuals, it is crucial to focus on their treatment. The results of various studies, such as Galbiati et al. (10), examining the impact of metacognitive therapy on insomnia, and Vandekerckhove and Wang (2018), investigating the significance of emotion regulation on sleep quality, have all confirmed the importance of emotion regulation in enhancing psychological

well-being. Strengthening emotion regulation skills can improve individuals' psychological characteristics by being aware of, accepting, and effectively controlling emotions in oneself and others (11).

Emotion regulation, in simpler terms, refers to the skill of managing one's emotions (12). Gross's model (2002) suggests that emotion regulation consists of conscious and unconscious techniques to improve, maintain, or lessen the emotional, behavioral, and cognitive components of an emotional response (13). The gross model comprises five stages, each with compatible and incompatible strategies. Incompatible strategies provide temporary relief but can cause more harm in the long run (14). The presence of emotion regulation skills helps individuals control impulsive behaviors, such as self-injury, risky actions, and physical aggression, in times of emotional distress (15). Hence, Emotion Regulation Training could be a beneficial method in treating psychosomatic disorders and enhancing the overall quality of life for those affected. To our knowledge, there has been limited research on this topic. Yang et al. (2023) conducted a study on Emotion Regulation Training and its impact on sleep quality (16), while Kraiss et al. (2020) separately confirmed the connection between emotion regulation and psychological well-being (17).

## 2. Objectives

On the whole, this educational method, which emphasizes emotional regulation and positive coping strategies, assists women in better managing the stress and emotions brought on by their chronic diseases. Improving their ability to identify, understand, and manage emotions will probably improve their mental well-being. Furthermore, by lessening the stress and anxiety triggered by chronic pain and enhancing coping skills, the quality of sleep may also see an improvement in these patients. Improved sleep quality not only affects the patient's physical well-being but can also help reduce their mental stress

and enhance their overall well-being. This study aims to investigate whether utilizing the Gross model for emotion regulation is beneficial for the psychological well-being and sleep quality of women suffering from psychosomatic disorders, such as rheumatic and joint pains, taking into account the current research gap.

### 3. Methods

The research methodology utilized in this study involved a semi-experimental approach, focusing on pre-test and post-test comparisons with a control group. The study included all women with psychosomatic

disorders in Farahan City who sought treatment at the city hospital for rheumatic or joint pains during the first half of 2022 and were diagnosed with conditions such as rheumatism, arthritis, or pseudo-rheumatism. A total of 40 women with psychosomatic disorders related to rheumatic or joint pains were conveniently selected to participate in the study. The sample size was determined according to the research design, with two groups of 20 individuals each, resulting in 40 participants (Figure 1). The group size included 20 women per group, determined using the G-Power software with an effect size of 0.95, an alpha value of 0.05, and a test power of 0.90.

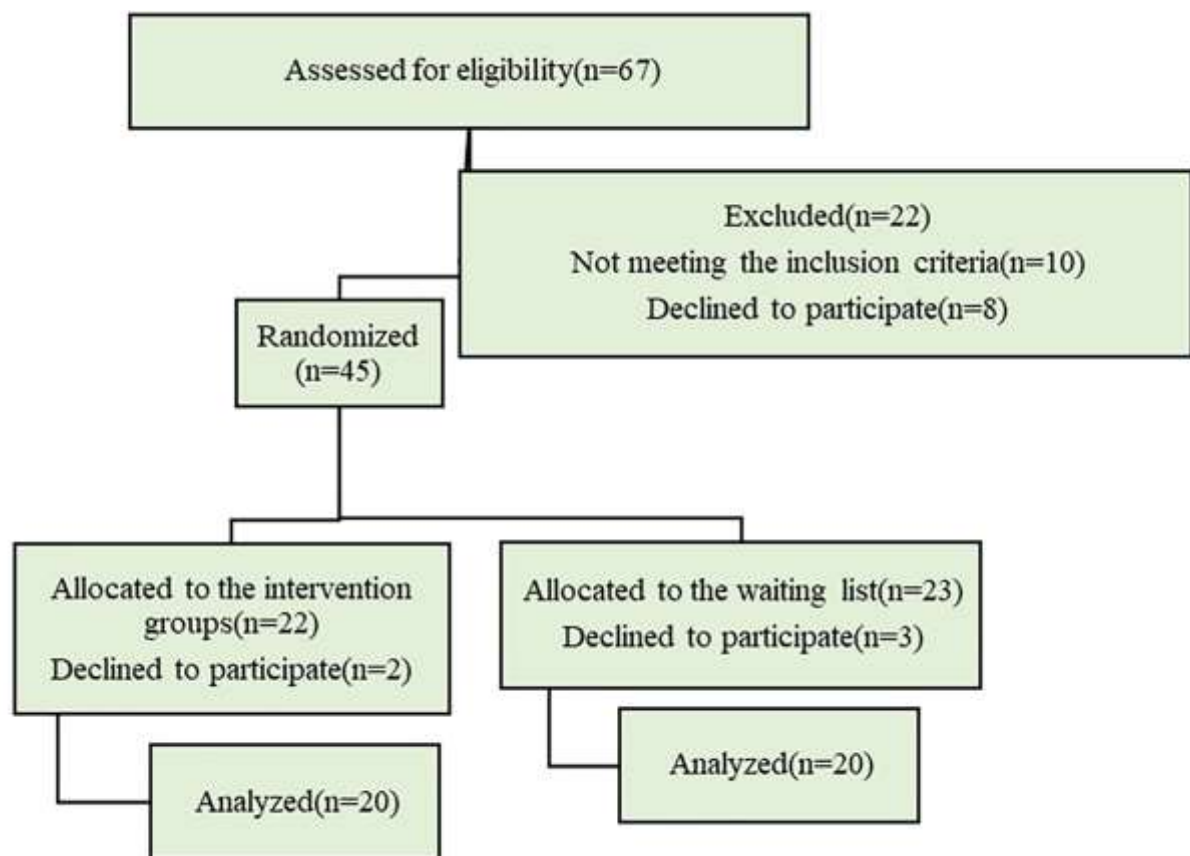


Figure 1. CONSORT diagram

Individuals eligible to participate in the study were those who were suffering from psychosomatic disorders and currently receiving treatment from a psychiatrist. Additionally, they had to be women aged 18 and above with basic literacy skills in reading

and writing. Participants must not have any other mental illnesses in their medical records and must provide consent to take part in the research. The exclusion criteria for the study included missing more than three therapy sessions, a history of substance abuse, lack of

motivation to continue participation, presence of psychiatric disorders other than psychosomatic disorders, and mistakes in completing initial questionnaires. Non-compliance with the prescribed exercises and homework after therapy sessions was also grounds for exclusion.

Patients with psychosomatic disorders from Farahan Hospital, Arak City, were chosen based on recommendations from the hospital psychiatrist. After meeting the criteria for participation, 22 out of the initial 67 male patients were excluded through administrative procedures, resulting in a final group of 45 patients. From this group, three individuals were taken out of the control group. In order to ensure equality between the two groups, the researcher removed two more participants to make them identical in number. Following the selection process, the subjects were

divided into experimental and control groups using a random and arbitrary method. It is important to note that odd numbers were assigned to the control group, while even numbers were assigned to the experimental group. Participants in both groups completed a pre-test before being randomly divided into experimental and control groups. The experimental group underwent emotion regulation intervention sessions based on the Gross model for eight 90-minute sessions. The control group did not receive any intervention. After the experimental period, both groups completed a post-test. The intervention was conducted by the researcher at Farahan City Hospital. An Emotion Regulation Training program consisting of 8 sessions was conducted following the standard protocol developed by Gross (13). Details of the intervention sessions are provided in [Table 1](#).

**Table 1. The standard protocol of Gross's Emotion Regulation Training (13)**

Session	Subject	Objectives
1	Getting to know and communicate with each other	1. Establishing relationships among group members and initiating a mutual connection between the group leader (psychologist) and the members. 2. Presenting the primary and secondary objectives of the group and engaging members in discussions about collective and secondary goals. 3. Clarifying the rationale and steps involved in the intervention process. 4. Outlining the structure and guidelines for participation in the group.
2	Select position	Providing emotional training
3	Select position	Evaluating an individual's emotional vulnerability and emotional skills through the following steps: 1. Self-evaluate to recognize one's emotional experiences. 2. Self-evaluate to determine one's level of emotional vulnerability. 3. Self-evaluate to identify strategies for self-regulation.
4	Correct position	Making a change in the exciting situation
5	Expand attention	Teaching skills to change focus
6	Cognitive assessment	Changing cognitive assessments
7	Response adjustment	Changing the behavioral and physiological consequences of emotion
8	Evaluation and application	Re-evaluation and planning for implementing training programs

### **Ryff Scale of Psychological Well-Being:**

The questionnaire was developed by Ryff in 1989 and updated in 2002 (18). This revised version includes six factors, with the total score of these factors serving as the overall psychological well-being score. The replies to this scale are rated on a 5-point Likert scale, with a higher score indicating better

psychological well-being. Items 1, 3, 4, 5, 9, 10, 13, and 17 receive reverse scoring. The correlation between the short version of the Ryff Psychological Well-Being Scale and the original scale has varied between 0.70 and 0.89, as reported (18). Khanjani et al. (2013) confirmed the validity and reliability of the questionnaire in Iran. Their research reported

reliability coefficients for the questionnaire's subscales ranging from 0.71 to 0.76 using Cronbach's alpha method, with a total reliability of 0.71 (19). The coefficients for the six factors, namely self-acceptance, environmental mastery, positive relationship with others, purpose in life, personal growth, and autonomy, were found to be 0.51, 0.76, 0.75, 0.52, 0.73, 0.72, respectively, and 0.71 for the entire scale.

#### **Pittsburgh Sleep Quality Index:**

This 17-item instrument was designed in 2004 to assess sleep quality and disturbances over the previous month (20). Four of these items are open-ended and not used in statistical analysis. Responses to the questionnaire fall in the range from 1 (not experienced at all) to 4 (three or more times a week), with total scores ranging between 13 (healthy sleep quality) and 52 (impaired sleep quality). Research by Castro et al. (2004) found the questionnaire to have a reliability of 0.83 based on Cronbach's alpha method (20). In Iran, Ghassemzadeh et al. analyzed the psychometric characteristics of this survey. The face validity and reliability of the questionnaire were assessed using the split-half method, resulting in a Cronbach's alpha coefficient of 0.79 (21).

To conduct MANCOVA and ANCOVA, it was crucial to validate the assumptions of these tests. So, this process included checking the normality of data distribution using the Kolmogorov-Smirnov and Shapiro-Wilk tests. It was also important to ensure no significant difference in the two-group test with one-way ANOVA, assess the sphericity with Bartlett's test, evaluate the linearity with scatter diagrams, and assume the homogeneity of the covariance matrix with the Box-M test. Finally, the homogeneity of variances was confirmed through Levene's test. The researchers used Wilks's lambda multivariate statistic to analyze the importance of the mean difference in variables related to psychological well-being. Wilks's lambda is a type of multivariate test,

along with Pillai's Trace, Roy's Largest Root, and Hotelling's Trace, that helps determine if there is a statistically significant difference between groups in the linear combination of specific subscales.

#### **4. Results**

In this study, the control group consisted of 5% of individuals aged 18 to 20, 15% between 20 and 30, 55% in the 30-40 age group, and 25% between 40 and 50. In contrast, the experimental group was formed by 25% of individuals aged between 20 and 30, 30% in the 30-40 age group, 40% between 40 and 50, and 5% over 50 years old. Additionally, considering educational background, 15% of the participants in the control group had a bachelor's degree, 30% a diploma, and 25%. On the other hand, the experimental group had 35% below the diploma level, 30% with a diploma, 25% with a bachelor's degree, and 10% with a post-graduate degree.

The data in [Table 2](#) indicates that the experimental group improved psychological well-being and its components in the post-test compared to the pre-test. Furthermore, the sleep quality scores of the experimental group decreased in the post-test compared to the pre-test.

The findings of the test are presented in [Table 3](#) (Wilks's lambda=0.209;  $F_{27,6}=16.988$ ;  $P<0.05$ ), demonstrating a variance in psychological well-being aspects between the control and experimental groups. According to the eta coefficient, the Gross model's Emotion Regulation Training has a significant effect of 0.79 on enhancing the psychological well-being of women suffering from psychosomatic disorders ( $F=0.209$ ,  $P<0.01$ ,  $\eta^2=0.79$ ,  $\eta^2=16.988$ ).

The analysis results from [Table 4](#) demonstrate that the Emotion Regulation Training using the Gross model significantly impacts personal growth in women with psychosomatic disorders, with an effect



size of 0.40. The F value for the mean difference in self-acceptance is 60.73, indicating a significant impact of 0.65 on self-acceptance in this population ( $F=60.73$ ;  $P<0.01$ ,  $\eta^2=0.65$ ,  $\eta^2=60.73$ ). Furthermore, the adjusted mean scores for personal growth (8.91 and 10.59) and self-acceptance (7.58 and 10.36) in the experimental group are higher compared to the control group, demonstrating the effectiveness of Emotion Regulation Training based on the Gross model in improving psychological well-being among women with psychosomatic disorders.

The information in Table 5 demonstrates a significant difference in mean sleep quality due to Emotion Regulation Training using the Gross model ( $F_{39.1}=17.34$ ;  $P=0.001$ ). The impact of this training on sleep quality in women with psychosomatic disorders is significant at 0.32 ( $P<0.01$ ,  $\eta^2=0.32$ ,  $\eta^2=17.34$  ( $F, 39.1$ )). Additionally, the control group had higher mean sleep quality scores (25.73 and 30.22) than the experimental group, suggesting that Emotion Regulation Training based on the Gross model effectively enhances sleep quality in women with psychosomatic disorders.

Table 2. Descriptive statistics of the scores of research variables by pre-test and post-test

Variable		Control		Test	
		Mean	SD	Mean	SD
Independence	Pre-test	8.20	2.04	8.15	1.60
	Post-test	8.30	2.03	8.55	1.19
Personal growth	Pre-test	8.10	1.80	8.55	2.35
	Post-test	8.70	1.75	10.80	1.67
Environmental mastery	Pre-test	9.25	1.33	9.00	1.38
	Post-test	8.90	1.37	9.25	0.91
Positive communication with others	Pre-test	10.00	1.92	9.80	1.24
	Post-test	9.90	1.65	9.90	1.21
Purposefulness	Pre-test	9.70	1.63	9.55	1.64
	Post-test	9.45	1.28	9.70	1.22
Self-acceptance	Pre-test	6.95	1.85	7.45	1.05
	Post-test	7.45	1.50	10.50	1.61
Psychological well-being	Pre-test	52.20	5.07	52.50	5.55
	Post-test	52.75	5.95	58.70	4.81
Sleep Quality	Pre-test	37.00	4.24	31.40	2.98
	Post-test	32.0	4.18	23.90	2.85

Table 3. Results of multivariate tests investigating the effect of Emotion Regulation Training

Test	Value	F	d.f	Df	P	$\eta^2$
Pillai	0.791**	16.988	6	27	0.001	0.791
Wilks's Lambda	0.209**	16.988	6	27	0.001	0.791
Hotelling	3.775**	16.988	6	27	0.001	0.791
Roy's Largest Root	3.775**	16.988	6	27	0.001	0.791

$P<0.001$ \*\*,  $P<0.05$ \*

Table 4. ANOVA analysis results to investigate the difference in psychological well-being scores

Variable		SS	MS	F	Sig	$\eta$
Group	Independence	0.840	0.840	1.47	0.234	0.044
	Personal growth	26.565	26.565	21.47	0.000	0.402
	Environmental mastery	1.752	1.752	3.50	0.070	0.099

	Positive communication with others	0.122	0.122	0.20	0.660	0.006
	Purposefulness	0.718	0.718	1.01	0.322	0.031
	Self-acceptance	73.167	73.167	60.73	0.000	0.655
Error	Independence	18.302	0.572			
	Personal growth	39.589	1.237			
	Environmental mastery	16.011	0.500			
	Positive communication with others	19.789	0.618			
	Purposefulness	22.703	0.709			
	Self-acceptance	38.553	1.205			
Modified Total	Independence	105.775				
	Personal growth	155.500				
	Environmental mastery	52.775				
	Positive communication with others	79.600				
	Purposefulness	59.775				
	Self-acceptance	184.975				

Table 5. ANOVA analysis results to investigate the difference in sleep quality scores

Variable		SS	df	MS	F	Sig	η
Sleep Quality	Group	124.939	1	124.939	17.34	0.001	0.319
	Error	266.617	37	7.206	-	-	-
	Modified Total	1148.975	39	-	-	-	-

## 5. Discussion

This research aimed to examine the impact of Emotion Regulation Training using the Gross model on the psychological well-being and sleep quality of women experiencing psychosomatic disorders, such as rheumatic and joint pains. The findings from the analysis indicated that the Gross model-based Emotion Regulation Training had a positive effect on enhancing the psychological well-being of women with psychosomatic disorders. The results of a study conducted by Hasanzadeh Namin et al. (22), Kazemi Rezaei et al. (23), and Kraiss et al. (17) are in agreement with this finding. According to Karbalai et al.'s study (2021), emotion regulation, cognitive flexibility, and mindfulness are positively and significantly related to psychological well-being. However, the suppression component of emotion regulation has a negative and significant relationship with psychological well-being (24). The findings of research by Hasanzadeh Nemin et al. (2018) suggest that positive and negative cognitive strategies for regulating emotions directly and indirectly impact the psychological well-being of female students

(22). According to Kazemi Rezaei et al. (2018), training in emotional regulation skills based on dialectical behavior therapy influences the cognitive regulation of emotions and the quality of life among cardiovascular patients (23). Based on the results of a study by Kraiss et al. (2020), there is a connection between emotion regulation and the psychological well-being of individuals with mental disorders (17). It can be inferred from the above explanation that individuals' capacity to regulate their emotions may aid in recognizing their and others' emotions in various scenarios, understanding how emotions influence behavior, and ultimately responding appropriately (25).

Emotion Regulation Training has the potential to benefit individuals with psychosomatic disorders, where physical symptoms stem from underlying mental health issues. By learning how to regulate their emotions, particularly negative ones, patients may achieve a greater sense of mental serenity and subsequently alleviate their physical and emotional distress (26). Addressing the discomfort and challenges associated with these conditions could ultimately enhance the

psychological well-being of women affected by psycho-physical disorders. Furthermore, many individuals grappling with both physical and mental health issues often experience heightened levels of stress and anxiety due to their conditions, underscoring the importance of interventions aimed at restoring emotional equilibrium and promoting psychological healing. Improving patients' capacity to manage pain and difficulties, along with acquiring skills for regulating emotions, can assist them in dealing more effectively with the illness, treatment, and psychological strain that may arise (27). If emotions are not effectively managed, they can impact relationships and overall well-being, leading to potential disruptions in both physical and mental health. Therefore, providing emotional regulation training for individuals with psychosomatic disorders can enhance their control over emotional experiences and expression, ultimately improving mood, emotions, and psychological well-being through the Gross model (28).

Additionally, the findings from a univariate covariance analysis indicated that Gross model-based Emotion Regulation Training had a 0.32 impact on enhancing the sleep quality of women experiencing psychosomatic disorders. The results of studies by Vandekerckhove et al. (11) support this finding. Similarly, Vanderkercho et al. (2018) discovered that effective emotion regulation could improve sleep quality by reducing negative emotions stemming from daily stress (11). In summary, it can be inferred that poor emotion regulation can result in disorders, strained relationships, and a lack of life skills. Emotional dysregulation patterns that hinder people's competence can lead to suffering from various mental disorders. Conversely, effective and appropriate emotional regulation can contribute significantly to the overall well-being and physical health of individuals (29).

Gross's (2002) model of emotion

regulation suggests that strategies for managing emotions play a critical role in how individuals evaluate and respond to emotional situations. Emotion Regulation Training helps individuals learn how to navigate their emotional experiences, express their feelings, choose appropriate coping strategies, and interact with others effectively. This training can help individuals cultivate a sense of mental calmness during challenging situations. Furthermore, emotional dysregulation can result in pain and an inability to cope with emotions (13). Training on effective emotional regulation can decrease anxiety and stress levels. Feelings of anxiety and worry can disrupt sleep patterns. Managing emotions can also help control negative thoughts and images that might interfere with sleep. These negative thoughts are often the root cause of sleep disorders (11).

Additionally, the mindfulness techniques taught in emotional regulation training can help create a peaceful state of mind and body, promoting better sleep. As a result, the mental and emotional resilience gained from such training can boost overall mental health and well-being, leading to improved sleep quality (30). Therefore, enhancing emotional control through various psychological and mental strategies could indirectly improve the sleep quality of women experiencing psychosomatic disorders. It can be argued that mishandling negative emotions, such as sorrow, rage, and worry, can negatively impact physical and mental well-being (11). Recognizing stressors and their impact on individuals can facilitate appropriate responses, ultimately reducing stress levels. Furthermore, emotions play a significant role in the development and perpetuation of mental disorders. Educating individuals on emotional regulation techniques can significantly alleviate symptoms associated with mental disorders (28).

The research had limitations, as it only focused on a sample of 40 women in Farahan



City with psychosomatic disorders complaining of rheumatic and joint pains in 2022. Therefore, caution should be taken when applying the findings to men and other samples with psychosomatic diseases. It is recommended that similar studies be carried out in various cities and also on male subjects to allow for a broader and more accurate generalization. Furthermore, it is advised to include a follow-up period of 6 or 12 months for research conducted on this topic. Healthcare professionals can also incorporate psychological and emotion-focused therapies, such as emotion regulation based on the Gross model, to enhance the sleep quality of psychosomatic patients alongside medical treatments.

## 6. Conclusion

Research and training in managing emotions can assist patients in enhancing their emotional well-being and mental health by effectively utilizing their emotions and displaying caring behaviors, leading to improved physical and mental health. Consequently, individuals will likely experience improved sleep quality, better overall physical health, and more stable emotions.

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**Availability of data and materials:** Upon reasonable request to the corresponding author.

**Conflicts of interest:** The researchers state that the study was carried out without affiliations or financial interests that could be seen as a possible conflict of interest.

**Consent for publication:** Not applicable

## Ethics approval and consent to participate:

The ethics committee at Alzahra University has approved this study (IR.ALZAHRA.REC.1401.191), aligning with the Declaration of Helsinki. Subjects have provided their informed consent. Written informed consent was secured from all participants before their involvement in the research.

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**Author contributions:** M. D. F.: Contributed to the conception of the work, revising the draft, approving the final version of the manuscript, and agreeing on all aspects of the work; A. T.: Contributed to the data analysis and interpretation, critical revision, and approval of the final version of the manuscript; M. D. F.: Contributed to acquiring data, drafting the manuscript, and approving the final version; A. T. and E. M. S.: Contributed to the conception and design of the study, critical revision, and approval of the manuscript's final version; M. D. F.: Contributed to the conception and design of the study, data interpretation, drafting of the manuscript and critical revision, and approval of final version.

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