2026, Volume 3, Number 1

Functional Research in
Sport Psychology

Effect of Yoga Exercises on Adaptive and Maladaptive Cognitive Emotion Regulation Strategies and the Need for Cognition in Female Students

Hassan Bagheri Nia[1], Mohammadreza Shahabi kaseb[2], Soheila Shahramian[3], Arezou Mehranian[4], Mahya Mohamadtaghi[5]

1. Assistant professor, Department of Educational Science, Hakim Sabzevari University, Sabzevar, Iran.
2. Associate Professor of Motor Control and Learning, Faculty of Physical Education and Sports Science, Hakim Sabzevari University, Sabzevar. Iran.
3. Master of Counseling, Islamic Azad University, Quchan Branch, Iran.
4. Postdoctoral of Motor Control and Learning, Faculty of Physical Education and Sports Science, Hakim Sabzevari University, Sabzevar. Iran.
5. Department of Physical Education, Technical and Vocational University (TVU), Tehran, Iran

Article Info

Article type:
Research Article

Article history:
Received 28 April 2025
Received in revised form 27 May 2025
Accepted 28 September 2026
Available online 21 March 2026

Keywords:
Yoga,
Cognitive emotion regulation,
adaptive strategies,
maladaptive strategies,
need for cognition.

ABSTRACT

Objective: Attention to mental and psychological well-being in educational settings, particularly among students navigating critical and challenging developmental phases such as adolescence, is highly important. The purpose of this study was to examine the impact of yoga interventions on adaptive and maladaptive cognitive emotion regulation strategies and the need for cognition in female adolescent students.

Methods: This study employed a quasi-experimental design with a pretest–posttest framework. A total of 21 female students were randomly assigned to either a control group (n = 10) or an experimental group (n = 11). All participants completed the Cognitive Emotion Regulation Questionnaire and the Need for Cognition Scale during the pretest phase. The experimental group underwent yoga training for 4 weeks, consisting of three 60-minute sessions per week under the supervision of a yoga instructor, whereas the control group did not engage in any physical activity. In the posttest phase, both groups completed the questionnaires again.

Results: The results of the analysis of covariance (ANCOVA) revealed a statistically significant difference between the groups in the variables of cognitive emotion regulation strategies and need for cognition ($p < 0.05$).

Conclusion: These findings suggest that yoga practices can contribute to positive modulation of emotions and enhanced cognitive engagement in female adolescent students.

Cite this article: Bagheri Nia, H., Shahabi kaseb, M., Shahramian, S., Mehranian, A., Mohamadtaghi, M. Effect of Yoga Exercises on Adaptive and Maladaptive Cognitive Emotion Regulation Strategies and the Need for Cognition in Female Students. *Functional Research in Sport Psychology*, 2026:3(1):5-17.10.22091/frs.2025.13242.1068

Publisher: University of Qom.
DOI:10.22091/frs.2025.13242.1068

Introduction

In recent decades, amidst the growing complexities of modern life, mental health and well-being have emerged as critical indicators of societal development. Consequently, in recent years, the World Health Organization has designated mental health as a priority in the health policy frameworks of nations (1). Compared with their male counterparts, the mental health of girls is more vulnerable to adverse impacts due to biological, social, and environmental factors. Consequently, examining mental health during the critical period of adolescence, particularly in girls, is of significant interest (2) and can provide a robust foundation for fostering a healthy society across political, cultural, social, and economic dimensions (3).

One of the critical components in enhancing adolescent mental health is emotion regulation, recognized as a fundamental aspect of personality and psychological adjustment (4). The emotion and the strategies individuals employ to manage it, referred to as emotion regulation, are considered essential to personality and psychological adaptation (5). A study by Janjhua et al. (2020) revealed that, compared with a control group, adolescents who practiced yoga demonstrated significantly improved emotion regulation, higher self-esteem, and more positive emotions (6).

Given that cognition (what we think) and behavior (what we do) are distinct domains, researchers place significant emphasis on differentiating between behavioral and cognitive emotion regulation strategies. Cognitive emotion regulation encompasses strategies through which individuals interpret and reframe emotional information. These strategies enable individuals to adaptively make sense of negative experiences, thereby mitigating their psychological impact (7). Cognitive emotion regulation strategies can be broadly categorized into two types: adaptive (positive) strategies, such as acceptance, reappraisal, positive refocusing, positive reappraisal, and perspective-taking, and maladaptive (negative) strategies, including self-blaming, blaming others, rumination, and catastrophizing (8). The selection of emotion regulation strategies in response to stressful situations significantly influences individuals' psychological outcomes (9). Consequently, focusing on cognitive emotion regulation strategies, particularly among adolescent girls, not only aids in preventing mental health disorders but also fosters personal growth, psychological well-being, and improved adaptation to life challenges (10).

Another critical component in the domain of mental health is the need for cognition. The need for cognition reflects a stable tendency among individuals to engage in and enjoy complex cognitive activities (11). Individuals with a high need for cognition are not only intrinsically motivated to analyze, evaluate,

and interpret information but also demonstrate superior performance in learning, information recall, and active participation in academic activities. This trait can play a significant role in enhancing academic performance and mental health by fostering mental focus, intrinsic motivation, and critical thinking (12).

Therefore, prioritizing strategies that enhance psychological components such as emotion regulation and the need for cognition is of paramount importance. In recent years, mind-body practices, particularly yoga, have been recognized as effective interventions for improving mental health (13). Yoga, with its emphasis on harmonizing the mind and body, facilitates emotion regulation, stress reduction, enhanced focus, and calming of the nervous system (14). Furthermore, research has indicated that regular yoga practices promote self-regulation, psychological balance, and relaxation of the central nervous system (15).

Empirical studies have also supported the positive impact of yoga on adolescent mental health. For example, Da Silva et al. (2009) demonstrated that yoga practices can regulate autonomic nervous system activity and reduce negative emotional responses in high-stress conditions (16). Additionally, Büssing et al. (2012) reported that yoga can enhance self-confidence, emotional stability, positive self-image, and constructive thinking in adolescents (17). Lin, S. L., et al. (2015) also demonstrated that yoga contributes to increased emotional stability by reducing stress and improving emotional regulation (18).

The findings of various studies indicate that yoga practices positively impact self-regulation, cognitive symptoms, behavioral control, behavior restructuring, balance, flexibility, and the enhancement of focus and relaxation (19, 20). Gonçalves et al. (2011) demonstrated that yoga exercises reduce central and autonomic nervous system activity under stressful conditions, promoting relaxation and emotional regulation, which contribute to a sense of well-being (21). Similarly, DaSilva et al. (2009) reported that yoga practices enhance mental health (16).

Given the existing evidence supporting the positive effects of yoga on cognitive emotion regulation and the need for cognition, these practices could foster improved mental health, academic motivation, and cognitive flexibility, particularly among adolescent girls. However, it remains unclear whether yoga exercises can effectively enhance cognitive emotion regulation strategies and increase cognitive motivation and mental effort in female students. These questions underscore the need for further scientific investigation in this area, as addressing them could provide a foundation for developing effective intervention programs within the educational system to increase students' psychological well-being. Therefore, the aim of the present study was to investigate the effects of yoga practices on adaptive and maladaptive cognitive emotion regulation strategies and the need for cognition in female students.

Materials and Methods

The present study was applied in nature and conducted via a quasi-experimental design with a pretest–posttest framework.

Population and Sample

The target population consisted of female high school students (grades 10–11) at the Alavi Educational Institution in Sabzevar, Iran. The required sample size for the present study was calculated using G*Power software (version 3.1.9.7) (22). Based on an assumed medium to large effect size (f = 0.28, approximately equivalent to Cohen's d = 0.56), a significance level of α = 0.05, statistical power of 0.80, and an ANCOVA design with two independent groups and one covariate, the estimated total sample size was 20 participants (10 per group) (23-25).

Inclusion criteria were as follows: (1) female students aged 15–17, (2) currently enrolled at the Alavi Educational Institution, (3) medically cleared for physical activity through a health screening questionnaire, and (4) no history of regular sports participation in the six months preceding the study.

Exclusion criteria included: (1) chronic medical conditions such as cardiovascular or orthopedic disorders, (2) use of medications affecting cognitive or emotional function, (3) irregular menstrual cycles, and (4) prior engagement in structured yoga or exercise programs within the last six months.

Cultural, social, and economic variables were also carefully controlled. All participants were recruited from the same educational institution, which provided a relatively uniform context. A demographic survey confirmed similar parental education levels (average: high school diploma or above) and household income levels (classified as middle-income by regional standards).

Data collection instrument

Cognitive Emotion Regulation Questionnaire (CERQ)

The Cognitive Emotion Regulation Questionnaire (CERQ) is a multidimensional self-report instrument developed by Garnefski et al. in 1999 and published in 2001. It is designed to assess the cognitive coping strategies employed in response to stressful or negative events. Compared with 36 items, the CERQ is suitable for individuals aged 12 years and older and is applicable to both clinical and nonclinical populations. The questionnaire is grounded in robust theoretical and empirical foundations and consists of nine subscales. These subscales are divided into maladaptive strategies (self-blaming, blaming others, rumination, and catastrophizing) and adaptive strategies (acceptance, refocusing on planning, positive refocusing, positive reappraisal, and putting into perspective). Each subscale contains four items, which are scored on a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always). The total score for each subscale, obtained by summing the item scores, ranges from 4-20. Higher scores indicate greater use of the respective coping strategy in response to stressful or negative events (26).

The Persian version of the CERQ was validated by Besharat (2016) and Hasani (2010). Psychometric evaluations reported Cronbach's alpha coefficients for the subscales ranging from 0.67--0.92, test–retest reliability coefficients ranging from 0.51--0.77, and internal correlations between subscales ranging from 0.32--0.67. Content validity was established via Kendall's coefficient of concordance, which ranged from 0.81--0.92. The item–total subscale correlations ranged from 0.46 to 0.75, and a principal component analysis confirmed a nine-factor structure, accounting for 74% of the variance (27, 28).

Need for Cognition Scale

The NFC scale, developed by Cacioppo, Petty, and Kao (1984), measures an individual's tendency to engage in and enjoy effortful cognitive processing (29). The scale consists of 34 items scored on a 5-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Specifically, the response options are as follows: "strongly disagree" (1), "disagree" (2), "neutral" (3), "agree" (4), and "strongly agree" (5). Items 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 18, 20, 21, 22, 24, 25, 26, 31, 32, and 33 are reverse-scored. The total score, which is calculated by summing the item scores, ranges from 34--170. Scores are interpreted as follows: 34–68 indicate a low need for cognition, 68–102 indicate a moderate need for cognition, and scores above 102 indicate a high need for cognition. In the Iranian sample, the construct validity of the short form of the Need for Cognition Scale (NCS) was confirmed through confirmatory factor analysis, which demonstrated good fit. Reliability was assessed via Cronbach's alpha coefficient, which indicated acceptable consistency(30).

Implementation

For the present study, Participants were randomly assigned to either the control group (n = 10) or the experimental group (n = 11) using a simple randomization method. All participants completed the Cognitive Emotion Regulation Questionnaire and the Need for Cognition Scale during the pretest phase. The experimental group subsequently underwent a 4-week yoga intervention consisting of three 60-minute sessions per week conducted under the supervision of a yoga instructor. Each session followed a standardized structure: 10 minutes of mindful breathing and body awareness (Pranayama), 30 minutes of physical yoga postures (Asanas), including movements like Warrior pose, Triangle pose, and Child's pose, 10 minutes of deep relaxation (Yoga Nidra or body scan meditation) and 10 minutes of journaling or reflective discussion. (31). To ensure that external physical activity did not confound the results, participants were asked to refrain from engaging in any structured exercise or sports activities beyond the study protocol during the 4-week intervention. Their compliance was monitored through weekly self-reported activity logs, which were carefully reviewed by the research team. the control group did not engage in any physical activity during these 12 sessions. At the conclusion of the final session, the participants in both groups completed the

Cognitive Emotion Regulation Questionnaire and the Need for Cognition Scale again.

Data analysis

Descriptive statistics, including means, standard deviations, and graphical representations, were employed to summarize the data. The Shapiro–Wilk test was used to assess the normality of the data distribution. Inferential statistical analysis of the study's findings was performed via analysis of covariance (ANCOVA) at a significance level of α=0.05, conducted in SPSS version 23.

Results

The mean age of participants was 16.1 years (SD = 0.7, range: 15–17). Baseline anthropometric data were as follows: the experimental group had a mean height of 161.2 cm (SD = 5.0), weight of 56.1 kg (SD = 5.8), and BMI of 21.6 kg/m² (SD = 2.2), while the control group had a mean height of 160.4 cm (SD = 4.8), weight of 55.6 kg (SD = 5.5), and BMI of 21.6 kg/m² (SD = 2.0).

The Shapiro–Wilk test indicated that the assumption of normality was met in both groups ($p > 0.05$). The analysis of covariance (ANCOVA) results, with pretest scores of maladaptive cognitive emotion regulation strategies as the covariate, demonstrated that the covariate was statistically significant ($p = 0.007$). Additionally, a statistically significant difference was observed between the experimental and control groups in the posttest ($p = 0.028$) (Table 1).

Table 1. ANCOVA Results for Maladaptive Cognitive Emotion Regulation Strategies in the Posttest for the Experimental and Control Groups

Source	Degrees of Freedom	Mean Square	F	p	Effect Size
Pretest	1	461.74	9.12	0.007*	0.33
Group	1	287.19	5.67	0.028*	0.24

$p < 0.05$*

The ANCOVA results, with pretest scores of adaptive cognitive emotion regulation strategies as the covariate, indicated that the covariate was statistically significant ($p = 0.001$). Furthermore, a statistically significant difference was found between the groups in the posttest ($p = 0.032$) (Table 2).

Table 2. ANCOVA Results for Adaptive Cognitive Emotion Regulation Strategies in the Posttest for the Experimental and Control Groups

Source	Degrees of Freedom	Mean Square	F	p	Effect Size
Pretest	1	567.92	15.60	0.001*	0.46
Group	1	197.26	5.42	0.032*	0.23

$p < 0.05$*

The ANCOVA results, with pretest scores of needs for cognition as the covariate, revealed that the covariate was statistically significant ($p = 0.048$). Moreover, a statistically significant difference was

observed between the groups in the posttest (p = 0.031) (Table 3).

Table 3. ANCOVA Results for Need for Cognition in the Posttest for the Experimental and Control Groups

Source	Degrees of Freedom	Mean Square	F	p	Effect Size
Pretest	1	555.99	4.49	0.048*	0.20
Group	1	678.03	5.47	0.031*	0.23

p < 0.05*

Discussion

The aim of the present study was to investigate the effects of yoga exercises on cognitive emotion regulation strategies (adaptive and maladaptive) and the need for cognition among female high school students. The results of the present study demonstrate that yoga practices significantly reduce the use of maladaptive cognitive emotion regulation strategies, including catastrophizing, rumination, and self- and other-blame, among female high school students. These findings are consistent with those of Janjhua et al. (2020), who reported that yoga enhances emotional regulation in adolescents (6). Additionally, the results align with those of studies by Streeter Chris et al. (2010) and Da Silva et al. (2009), which indicate that yoga mitigates negative emotional responses under stressful conditions by regulating the autonomic nervous system (16, 32). Similarly, Gard et al. (2014) reported that regular yoga practices improve psychological balance, reduce anxiety, and enhance self-control (15). These improvements can be attributed to the strengthening of neural pathways associated with emotion regulation and increased endorphin release (33).

Additionally, at the physiological level, yoga activates the parasympathetic nervous system and suppresses the hypothalamic pituitary adrenal (HPA) axis, leading to reduced cortisol secretion and improved autonomic balance. These changes have been shown to decrease emotional reactivity and enhance resilience in stressful situations (34). The findings of the present study align with these mechanisms, demonstrating that regular yoga practice significantly increased the use of adaptive cognitive emotion regulation strategies while reducing reliance on maladaptive ones. It is plausible that the calming and regulatory effects of yoga on the nervous system created a more balanced emotional state, fostering enhanced emotional awareness and cognitive flexibility. Such improvements likely contributed to greater engagement in reflective thought processes and an increased need for cognition, particularly among female university students navigating academic and psychosocial challenges.

Neuroimaging research has shown that regular yoga and mindfulness meditation practices can increase gray matter density in key brain regions, including the prefrontal cortex, anterior cingulate cortex, and insula. These regions are closely associated with executive functions such as decision-making and cognitive flexibility, self-regulation, and emotional awareness. The article by Tang et al. (2015), confirms that mindfulness meditation is associated with increased gray matter density in these regions (35). Although the primary focus of the article is on mindfulness meditation, yoga practices can produce similar effects on brain structure due to their overlap with mindfulness. Studies indicate that yoga, through its combination of physical movements, controlled breathing, and meditation, contributes to strengthening neural connections and increasing gray matter density in these areas.

From a theoretical standpoint, mindfulness can be understood as a capacity for present-centered awareness that promotes a nonjudgmental stance toward internal experiences, including emotions. This attitude of acceptance facilitates greater emotional regulation and psychological flexibility. Given the inherently mindful nature of yoga through its emphasis on breath, bodily awareness, and intentional movement it can be posited that yoga practice cultivates conditions conducive to the development of more adaptive, flexible, and accepting perspectives toward one's emotional states (36). This view is further corroborated by studies such as Teasdale et al. (2000), Ramel et al. (2004), and Cao (2007), which demonstrate that mindfulness practices, including yoga, reduce rumination and negative emotional reactivity and enhance emotional self-regulation (37-39). Similarly, Hepner et al. (2008) concluded that mindfulness improves emotion regulation processes and diminishes the impact of threatening cognitive schemas (40).

However, notably, the positive effects of yoga on cognitive function are not uniform across all age groups. For example, Oken et al. (2004) conducted a six-month study on healthy older adults and reported no significant impact of yoga on cognitive performance (41). This inconsistency may stem from differences in age-related neuroplasticity, cognitive motivation, or other factors distinguishing adolescents from older adults, underscoring the need for further research on the effects of yoga in specific populations, such as adolescents.

The findings of the present study indicate a significant increase in the need for cognition among female high school students following yoga interventions. These results are consistent with Ostafin and Kassman (2012) and Liu and Nesbit (2024), who demonstrated that mindfulness practices, such as yoga, enhance cognitive engagement, analytical thinking, and attentional focus by reducing mental noise and fostering present-moment awareness (12, 42). This increase in need for cognition may be explained by enhanced attention control and working memory capacity, which are supported by mindfulness practices like yoga. Previous studies indicate

that Yoga may reduce cognitive interference by enhancing neurocognitive resource efficiency and improving stress regulation. These neurocognitive changes facilitate sustained attention and strengthen executive functions, thus fostering deeper analytical processing and intellectual engagement (43).

Yoga creates a calm, harmonious, and low-pressure environment conducive to enhancing complex cognitive activities and deep information processing. In line with these findings, Zerna et al. (2024) emphasized that the need for cognition is associated with a propensity for critical thinking, active mental engagement, and deep learning. It appears that the yoga practices in this study facilitated these cognitive attributes by alleviating mental barriers, promoting mental tranquility, and improving executive functioning (11). Similarly, Slagter et al. (2007) confirmed that mindfulness practices, including yoga, enhance cognitive processing capacity by reducing cognitive interference and filtering out irrelevant information (44).

A fundamental principle of yoga is conscious attention regulation, which requires individuals to focus deliberately on precise movements and breathing. Within this framework, yoga practices may improve sustained attention, concentration, and executive functions (45). Additionally, yoga enhances information processing speed, improves sensorimotor signal transmission, reduces distractibility, and increases cognitive arousal through its effects on the central nervous system. At the neurophysiological level, Mostofsky and Simonds (2008) reported that yoga stimulates the prefrontal cortex, leading to increased volume in this region and increased executive-cognitive functions, such as decision-making, behavioral regulation, and response inhibition (46).

Conclusion

The findings of this study demonstrate that yoga practices exert a significant and positive effect on various dimensions of cognitive emotion regulation and the need for cognition among female adolescent students. These effects include a reduction in maladaptive strategies, such as catastrophizing and rumination, and an increase in adaptive strategies, including cognitive reappraisal, acceptance, and perspective-taking, alongside an increased propensity for cognitive engagement and analytical thinking. By leveraging mindfulness principles and fostering present-moment focus, yoga practices have improved emotional self-regulation, enhanced information processing capacity, and elevated executive mental functions. Particularly during the critical developmental stage of adolescence, characterized by biological, cognitive, and psychological transformations, yoga has emerged as an effective intervention for enhancing emotional resilience, mental focus, intrinsic motivation, and psychological well-being.

Moreover, the results suggest that yoga can foster critical thinking, deep learning, and active cognitive engagement in educational settings by strengthening the need for cognition. These findings, supported by prior

research, underscore the importance of mind-body interventions such as yoga, particularly for adolescent girls, who may be considered more psychologically vulnerable. Consequently, it is recommended that yoga be integrated as a structured and effective approach within school educational and counseling programs. Such integration could enhance mental health, academic motivation, concentration, and cognitive performance among students. The findings of this study provide an empirical foundation for designing yoga-based educational and therapeutic interventions, which can significantly contribute to improving quality of life and fostering psychological-cognitive development in adolescents.

Author Contributions

All authors contributed equally to the conceptualization of the article and writing of the original and subsequent drafts.

Data Availability Statement

Data available on request from the authors.

Acknowledgements

The authors would like to thank all participants of the present study.

Ethical considerations

All ethical principles were considered in this study. These included obtaining informed consent from all participants, ensuring the confidentiality of information, and allowing participants the right to withdraw from the research at any time. Ethical approval was obtained from the Department of Counseling at Quchan Branch, Islamic Azad University.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest

The authors declare no conflict of interest.

References

1. Organization WH. World mental health report: Transforming mental health for all: World Health Organization; 2022. https://www.who.int/publications/i/item/9789240049338
2. Hankin BL, Snyder HR, Gulley LD. Cognitive risks in developmental psychopathology. *Developmental psychopathology*. 2016;3:312-85. https://doi.org/10.1002/9781119125556.devpsy308
3. Patel V, Saxena S, Lund C, Thornicroft G, Baingana F, Bolton P, et al. The Lancet Commission on global mental health and sustainable development. *The lancet*. 2018;392(10157):1553-98. https://doi.org/10.1016/S0140-6736(18)31612-X
4. Gross JJ. Emotion regulation: Current status and future prospects. *Psychological inquiry*. 2015;26(1):1-26. https://doi.org/10.1080/1047840X.2014.940781
5. Trudel-Fitzgerald C, Boucher G, Morin C, Mondragon P, Guimond A-J, Nishimi K, et al. Coping and emotion regulation: A conceptual and measurement scoping review. *Canadian Psychology/Psychologie canadienne*. 2024;65(3):149. https://doi.org/10.1037/cap0000377
6. Janjhua Y, Chaudhary R, Sharma N, Kumar K. A study on effect of yoga on emotional regulation, self-esteem, and feelings of adolescents. *Journal of family medicine and primary care*. 2020;9(7):3381-6. https://doi.org/10.4103/jfmpc.jfmpc_153_20
7. Ibrahim M. Applying Emotional Regulation Strategies to Manage Climate. Emotional Regulation-Theory and Application Across Clinical Settings: Theory and Application Across Clinical Settings. 2025:133. https://doi.org/10.5772/intechopen.1007813
8. Guo J, Pan Y. Latent types of cognitive emotion regulation strategies among middle school students in China and its effect on depressive symptoms. *Journal of Affective Disorders*. 2025;381:381-7. https://doi.org/10.1016/j.jad.2025.04.021
9. Ackermans M, Jonker N, de Jong P. Adaptive and maladaptive emotion regulation skills are associated with food intake following a hunger-induced increase in negative emotions. *Appetite*. 2024;193:107148. https://doi.org/10.1016/j.appet.2023.107148
10. Gross JJ. Emotion regulation. Handbook of emotions. 2008;3(3):497-513.
11. Zerna J, Strobel A, Strobel A. The role of need for cognition in well-being–review and Meta-analyses of associations and potentially underlying mechanisms. Collabra: *Psychology*. 2024;10(1). https://doi.org/10.31234/osf.io/p6gwh
12. Liu Q, Nesbit JC. The relation between need for cognition and academic achievement: A meta-analysis. *Review of Educational Research*. 2024;94(2):155-92. https://doi.org/10.3102/00346543231160474
13. Park CL, Slattery JM. Yoga as an integrative therapy for mental health concerns: An overview of current research evidence. *Psychiatry International*. 2021;2(4):386-401. https://doi.org/10.3390/psychiatryint2040030
14. Padmavathi R, Kumar AP, Dhamodhini K, Venugopal V, Silambanan S, Maheshkumar K, et al. Role of yoga in stress management and implications in major depression disorder. *Journal of Ayurveda and Integrative Medicine*. 2023;14(5):100767. https://doi.org/10.1016/j.jaim.2023.100767
15. Gard T, Noggle JJ, Park CL, Vago DR, Wilson A. Potential self-regulatory mechanisms of yoga for psychological health. *Frontiers in human neuroscience*. 2014;8:770. https://doi.org/10.3389/fnhum.2014.00770
16. Da Silva TL, Ravindran LN, Ravindran AV. Yoga in the treatment of mood and anxiety disorders: A review. *Asian Journal*

of Psychiatry. 2009;2(1):6-16. https://doi.org/ 10.1016/j.ajp.2008.12.002
17. Büssing A, Michalsen A, Khalsa SBS, Telles S, Sherman KJ. Effects of yoga on mental and physical health: a short summary of reviews. *Evidence-Based Complementary and Alternative Medicine*. 2012;2012(1):165410. https://doi.org/10.1155/2012/165410
18. Lin SL, Huang CY, Shiu SP, Yeh SH. Effects of yoga on stress, stress adaption, and heart rate variability among mental health professionals—A randomized controlled trial. *Worldviews on Evidence-Based Nursing*. 2015;12(4):236-45. https://doi.org/10.1111/wvn.12097
19. Haffner J, Roos J, Goldstein N, Parzer P, Resch F. The effectiveness of body-oriented methods of therapy in the treatment of attention-deficit hyperactivity disorder (ADHD): results of a controlled pilot study. *Zeitschrift fur Kinder-und Jugendpsychiatrie und Psychotherapie*. 2006;34(1):37-47. https://doi.org/10.1024/1422-4917.34.1.37
20. Harrison LJ, Manocha R, Rubia K. Sahaja yoga meditation as a family treatment programme for children with attention deficit-hyperactivity disorder. C*linical Child Psychology and Psychiatry*. 2004;9(4):479-97. https://doi.org/10.1177/1359104504046155
21. Gonçalves LC, de Souza Vale RG, Barata NJF, Varejao RV, Dantas EHM. Flexibility, functional autonomy and quality of life (QoL) in elderly yoga practitioners. *Archives of gerontology and geriatrics*. 2011;53(2):158-62. https://doi.org/10.1016/j.archger.2010.10.028
22. Faul F, Erdfelder E, Buchner A, Lang A-G. Statistical power analyses using G* Power 3.1: Tests for correlation and regression analyses. *Behavior research methods*. 2009;41(4):1149-60. https://doi.org/10.3758/BRM.41.4.1149
23. Cohen J. Statistical power analysis for the behavioral sciences: routledge; 2013.
24. Lakens D. Sample size justification. Collabra: *psychology*. 2022;8(1):33267. https://doi.org/10.1525/collabra.33267
25. Shin S. Meta-analysis of the effect of yoga practice on physical fitness in the elderly. *International journal of environmental research and public health*. 2021;18(21):11663. https://doi.org/10.3390/ijerph182111663
26. Garnefski N, Kraaij V, Spinhoven P. Negative life events, cognitive emotion regulation and emotional problems. *Personality and Individual differences*. 2001;30(8):1311-27. https://doi.org/10.1016/S0191-8869(00)00113-6
27. Besharat MA. Cognitive emotion regulation questionnaire: instruction and scoring. 2016.
28. Hasani J. The psychometric properties of the cognitive emotion regulation questionnaire (CERQ). *Journal of clinical psychology*. 2010;2(3):73-84. https://doi.org/10.22075/jcp.2017.2031
29. Cacioppo JT, Petty RE, Kao CF, Rodriguez R. Central and peripheral routes to persuasion: An individual difference perspective. *Journal of personality and social psychology*. 1986;51(5):1032. https://doi.org/10.1037/0022-3514.51.5.1032
30. zare h, Rasteghar A. Examining the Psychometric Features of the Short Form of Need for Cognition Scale (NFS) in High School Students. *Social Cognition*. 2015;4(1):53-66. https://sc.journals.pnu.ac.ir/article_2921.html
31. Csala B, Szemerszky R, Körmendi J, Köteles F, Boros S. Is weekly frequency of yoga practice sufficient? Physiological effects of hatha yoga among healthy novice women. *Frontiers in public health*. 2021;9:702793. https://doi.org/10.3389/fpubh.2021.702793
32. Streeter CC, Whitfield TH, Owen L, Rein T, Karri SK, Yakhkind A, et al. Effects of yoga versus walking on mood, anxiety, and brain GABA levels: a randomized controlled

MRS study. *The journal of alternative and complementary medicine*. 2010;16(11):1145-52. https://doi.org/10.1089/acm.2010.0007
33. Weinberg RS, Gould D. Foundations of sport and exercise psychology: Human kinetics; 2023.
34. Chiarpenello C, Brodmann K. What can the psychoneuroimmunology of yoga teach us about depression's psychopathology? *Brain, Behavior, & Immunity-Health.* 2024;42:100877. https://doi.org/10.1016/j.bbih.2024.100877
35. Tang Y-Y, Hölzel BK, Posner MI. The neuroscience of mindfulness meditation. *Nature reviews neuroscience.* 2015;16(4):213-25. https://doi.org/10.1038/nrn3916
36. Lynch TR, Chapman AL, Rosenthal MZ, Kuo JR, Linehan MM. Mechanisms of change in dialectical behavior therapy: Theoretical and empirical observations. *Journal of clinical psychology.* 2006;62(4):459-80. https://doi.org/10.1002/jclp.20243
37. Kao C-M. The effect of rumination on social problem-solving and autobiographical memory retrieval in depression: a cross-cultural perspective: *University of St Andrews*; 2007.
38. Ramel1 W, Goldin PR, Carmona PE, McQuaid JR. The effects of mindfulness meditation on cognitive processes and affect in patients with past depression. *Cognitive therapy and research.* 2004;28:433-55. https://doi.org/10.1023/B:COTR.0000045557.15923.96
39. Teasdale JD, Segal ZV, Williams JMG, Ridgeway VA, Soulsby JM, Lau MA. Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of consulting and clinical psychology*. 2000;68(4):615. https://doi.org/10.1037/0022-006X.68.4.615
40. Heppner WL, Kernis MH, Lakey CE, Campbell WK, Goldman BM, Davis PJ, et al. Mindfulness as a means of reducing aggressive behavior: Dispositional and situational evidence. Aggressive Behavior: *Official Journal of the International Society for Research on Aggression.* 2008;34(5):486-96. https://doi.org/10.1002/ab.20258
41. Oken BS, Kishiyama S, Zajdel D, Bourdette D, Carlsen J, Haas M, et al. Randomized controlled trial of yoga and exercise in multiple sclerosis. *Neurology*. 2004;62(11):2058-64. 10.1212/01.WNL.0000129534.88602.5C
42. Ostafin BD, Kassman KT. Stepping out of history: Mindfulness improves insight problem solving. *Consciousness and cognition.* 2012;21(2):1031-6. https://doi.org/10.1016/j.concog.2012.02.014
43. Voss S, Cerna J, Gothe NP. Yoga impacts cognitive health: neurophysiological changes and stress regulation mechanisms. *Exercise and sport sciences reviews.* 2023;51(2):73-81. https://doi.org/10.1249/JES.0000000000000311
44. Slagter HA, Lutz A, Greischar LL, Francis AD, Nieuwenhuis S, Davis JM, et al. Mental training affects distribution of limited brain resources. *PLoS Biol.* 2007;5(6):e138. https://doi.org/10.1371/journal.pbio.0050138
45. Tucha O, Prell S, Mecklinger L, Bormann-Kischkel C, Kübber S, Linder M, et al. Effects of methylphenidate on multiple components of attention in children with attention deficit hyperactivity disorder. *Psychopharmacology (Berl).* 2006;185(3):315-26. https://doi.org/10.1007/s00213-006-0318-2
46. Mostofsky SH, Simmonds DJ. Response inhibition and response selection: two sides of the same coin. *Journal of cognitive neuroscience.* 2008;20(5):751-61. https://doi.org/10.1162/jocn.2008.20500