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# THE PSYCHOLOGICAL IMPACT OF CARDIAC DIAGNOSIS ON PATIENT LIFESTYLE CHANGES AND HEALTH OUTCOMES-NARRATIVE REVIEW

*Narrative Review*

**Muhammad Saifullah Qureshi[1]*, Ramsha Nasir[2], Zoha Alamgir[3], Tahira Kanwal[4], Tehseen Akhtar[5], Attia Ayoob[6]**
[1]Assistant Professor, Department of Psychology, Shaheed Zulfikar Ali Bhutto University, Islamabad, Pakistan.
[2]Lecturer, Department of Nutrition & Health Promotion, University of Home Economics, Lahore, Pakistan.
[3]Nursing Instructor, Sahiwal College of Nursing, Sahiwal, Pakistan.
[4]Dow University of Health Sciences, Karachi, Pakistan.
[5]Lecturer, Shifa Tameer-e-Millat University, Islamabad, Pakistan.
[6]Cardiology Department, PUMHSW, Nawabshah, Pakistan.

**Corresponding Author:** Muhammad Saifullah Qureshi, Assistant Professor, Department of Psychology, Shaheed Zulfikar Ali Bhutto University, Islamabad, Pakistan, drsaifqazi@yahoo.com

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## ABSTRACT

**Background:** Cardiovascular disease (CVD) remains the leading global cause of mortality, with millions of individuals facing not only the physical consequences of a cardiac diagnosis but also significant psychological challenges. Emotional responses such as anxiety, depression, and distress are prevalent among cardiac patients and have been shown to adversely affect motivation, adherence to treatment, and adoption of critical lifestyle changes. Understanding the psychological impact of cardiac events is essential for improving both behavioral and clinical outcomes.

**Objective**: This narrative review aims to explore the psychological implications of a cardiac diagnosis on patients' lifestyle modifications and subsequent health outcomes. It evaluates current evidence on emotional responses, behavior change, and the effectiveness of psychological interventions within cardiac care.

**Main Discussion Points**: The review synthesizes findings across eight recent studies, highlighting the strong association between psychological distress and poor lifestyle adherence. It discusses the potential of interventions such as cognitive-behavioral therapy, motivational interviewing, and psychoeducation in mitigating these effects. It also explores emerging evidence on the benefits of positive psychological traits and the role of relational and digital support mechanisms. Limitations across studies—including small sample sizes, methodological heterogeneity, and limited diversity—are critically analyzed.

**Conclusion**: Integrating psychological care into cardiac rehabilitation enhances patient engagement and recovery. However, more rigorous, diverse, and long-term research is needed to optimize intervention strategies and inform clinical guidelines.

**Keywords**: Cardiac Diagnosis, Psychological Impact, Lifestyle Change, Cardiac Rehabilitation, Behavioral Interventions, Narrative Review.

## INTRODUCTION

Cardiovascular disease (CVD) remains the leading cause of death globally, accounting for nearly 17.9 million deaths each year, which represents 32% of all global deaths. Of these, 85% are due to heart attack and stroke. As cardiac conditions continue to rise alongside longer life expectancy and lifestyle-related risk factors such as obesity, smoking, physical inactivity, and poor diet, the need for comprehensive secondary prevention strategies becomes even more critical. A diagnosis of cardiac disease not only necessitates physiological management but also imposes substantial psychological burdens that can significantly impact patients' ability and willingness to modify their lifestyle, which is crucial for long-term health outcomes (1,2). Current research underscores the intimate connection between psychological states and cardiovascular outcomes. Depression, anxiety, and stress have been identified as both contributors to and consequences of heart disease, often creating a self-perpetuating cycle that hinders recovery and adherence to healthy behaviors. In a systematic review, psychological interventions integrated into exercise-based cardiac rehabilitation showed potential in reducing depressive symptoms and, to a lesser extent, cardiac morbidity, although high variability in outcomes suggests the need for more targeted approaches (3,4). Furthermore, patients exhibiting lower levels of experiential avoidance—defined as the tendency to avoid negative emotions—reported better psychological well-being and improved cardiopulmonary endurance during cardiac rehabilitation, emphasizing the importance of emotional flexibility in promoting recovery (5).

Despite these insights, there are substantial gaps in our understanding of how a cardiac diagnosis psychologically affects patient motivation and behavior change. Many patients struggle to initiate or maintain lifestyle adjustments such as dietary modifications, regular physical activity, and stress management (6). For example, a longitudinal trial demonstrated that improvements in psychological distress and hostility after lifestyle changes were only sustained in patients with high adherence to programs over five years, highlighting the challenge of maintaining behavioral changes in the long term (7). Moreover, interventions like motivational interviewing and psychoeducational support have shown promise in enhancing motivation and self-efficacy among patients, but their effectiveness is often moderated by individual psychological profiles, such as the presence of anxiety or depressive symptoms (8). The emotional aftermath of a cardiac diagnosis is also often characterized by a sense of vulnerability, fear of recurrence, and a loss of control, which can impair quality of life and hinder the adoption of healthier routines. Patients who experience elevated anxiety and depression post-diagnosis are less likely to engage in physical activity and healthy eating, further compounding their health risks (9). Additionally, findings from the WELL.ME study suggest that mobile-based wellbeing therapy may offer a scalable solution for reducing psychological distress and promoting healthy behaviors, yet large-scale evidence is still lacking (10).

Another emerging domain of interest is the role of positive psychological traits—such as optimism, gratitude, and a sense of purpose—in fostering resilience and better health behaviors. These traits have been independently associated with improved cardiac prognosis and lifestyle adherence, potentially offering a protective buffer against the emotional toll of disease (11,12). However, the mechanisms underlying these associations are still not fully elucidated, and more rigorous studies are needed to evaluate interventions that enhance these traits in cardiac populations. Given these diverse yet interconnected findings, the objective of this narrative review is to explore the psychological impact of receiving a cardiac diagnosis and its subsequent influence on patient lifestyle changes and health outcomes. The review aims to synthesize available evidence on how psychological factors affect patient behavior post-diagnosis, evaluate the effectiveness of interventions designed to mitigate negative psychological effects, and highlight opportunities for integrating psychological care into cardiac rehabilitation frameworks.

This review focuses on studies from the past five years that investigate psychological responses to cardiac diagnoses and their association with lifestyle changes, including physical activity, dietary behavior, medication adherence, and psychological wellbeing. Both observational and interventional studies are included to provide a holistic view of the patient experience and the effectiveness of existing strategies. This work is significant in providing clinicians, policymakers, and mental health professionals with an integrated perspective on the bidirectional relationship between heart disease and mental health. By identifying psychological barriers to lifestyle change and evaluating effective interventions, this review offers practical insights for enhancing secondary prevention strategies. Furthermore, it aims to bridge the gap between cardiology and psychology, advocating for a more person-centered and psychologically informed approach to cardiac care.

 

## THEMATIC DISCUSSION

**Emotional Repercussions of Cardiac Diagnosis**

A cardiac diagnosis often triggers intense psychological distress, which can manifest as anxiety, depression, or even post-traumatic stress symptoms. These emotional responses are not only common but are also predictive of adverse health behaviors and outcomes. Recent evidence indicates that approximately 30% of patients with ischemic heart disease report elevated anxiety, and around 22% experience depressive symptoms following diagnosis. These psychological factors are inversely correlated with engagement in healthy behaviors, such as regular exercise and a balanced diet (1). Notably, individuals with high anxiety levels often exhibit reduced motivation to initiate lifestyle changes, which can directly impact cardiac prognosis.

**Influence of Psychological Distress on Lifestyle Modification**

The challenge of adopting and sustaining lifestyle modifications is compounded by psychological burden. For many cardiac patients, stress and depressive symptoms serve as barriers to change, interfering with adherence to dietary regulations, physical activity routines, and medication compliance. This connection was further substantiated in a longitudinal analysis where only those patients with lower experiential avoidance—a measure of emotional suppression—demonstrated both psychological improvement and enhancement in cardiopulmonary endurance during rehabilitation (2). Similarly, in a randomized controlled trial, patients who received motivational enhancement in addition to standard brief therapy showed more sustained changes in diet and physical activity (3). These studies collectively highlight how psychological states can modulate lifestyle adaptation after a cardiac event.

**Role of Psychological Interventions in Recovery and Adherence**

Incorporating psychological support into cardiac rehabilitation appears to have a beneficial effect on emotional well-being and behavioral compliance. The addition of cognitive-behavioral and motivational interviewing approaches to conventional cardiac rehabilitation protocols has been linked with reductions in depressive symptoms and improved engagement in healthy behaviors. A recent meta-analysis of 20 randomized trials concluded that while the effect size for depressive symptom reduction was small (standardized mean difference –0.13), the trend was consistent and clinically meaningful (4). Moreover, interventions tailored to promote self-efficacy and intrinsic motivation have shown promise in enhancing long-term adherence to healthy behaviors, especially among patients with comorbid psychological symptoms.

**Positive Psychological Traits and Resilience**

Beyond the reduction of distress, the cultivation of positive psychological traits—such as optimism, purpose, and gratitude—has emerged as an area of interest. These traits are independently associated with better adherence to health behaviors and improved cardiovascular outcomes. For instance, a review highlighted that, positive psychological states correlate with improved medication adherence and greater physical activity, though the precise mechanisms remain speculative (5). Preliminary data suggest that interventions aimed at boosting positive affect could complement traditional rehabilitation strategies, although more robust trials are needed to confirm efficacy.

**Digital and Psychoeducational Approaches in Lifestyle Support**

Technological innovations offer scalable solutions for managing psychological distress and promoting lifestyle changes in cardiac patients. The WELL.ME study, a randomized trial comparing mobile-based wellbeing therapy with traditional cognitive therapy, emphasized the utility of real-time digital support in enhancing psychological resilience and supporting behavioral goals (6). Similarly, psychoeducational interventions that focus on disease understanding, emotional regulation, and self-management skills have shown meaningful outcomes in improving lifestyle compliance, particularly among patients with ischemic heart disease (7). These interventions serve to empower patients, reduce perceived helplessness, and foster a proactive health mindset.

**Social and Relational Contexts of Change**

Patients rarely navigate lifestyle changes in isolation. Social dynamics, particularly within intimate partnerships, play a pivotal role in the success or failure of behavior change. A study examined how couples process lifestyle advice following one partner's cardiac diagnosis. They found that while shared commitment to health could be a facilitator, relational tensions—such as the conflict between autonomy and surveillance—often complicated adherence (8). This highlights the need to consider relational and contextual factors when designing interventions, especially for long-term maintenance of health behaviors.

 

**Sustained Behavior Change and Long-Term Outcomes**

Long-term maintenance of lifestyle modifications remains a challenge, even after initial improvements. The Lifestyle Heart Trial reported that reductions in psychological distress and improvements in diet and stress management were sustained only in patients with high long-term adherence to lifestyle programs (9). This emphasizes that sustained psychological support, regular follow-ups, and patient engagement strategies are essential components of secondary prevention in cardiology.

**Inconsistencies and Future Directions**

Despite promising evidence, several inconsistencies and research gaps remain. For example, while most interventions report improvements in psychological symptoms, their direct impact on clinical cardiac outcomes such as recurrent events or mortality is less consistent. Additionally, heterogeneity in intervention formats and patient populations limits the generalizability of findings. There is also a need for research focused on underrepresented groups and on identifying which psychological strategies are most effective for specific subgroups of cardiac patients.

## CRITICAL ANALYSIS AND LIMITATIONS

While the growing body of research underscores the importance of psychological factors in influencing lifestyle changes and health outcomes following a cardiac diagnosis, critical appraisal reveals several limitations that temper the strength and generalizability of these findings. One of the most prominent methodological concerns across many of the studies is the limited sample size. Several key investigations, including those evaluating the impact of experiential avoidance and motivational interviewing, were conducted on relatively small patient groups, which restricts the statistical power and raises the risk of type II errors, thereby limiting the robustness of their conclusions (13,14). In addition, the scarcity of high-quality randomized controlled trials (RCTs) represents a significant gap in the literature. While a few studies implemented RCT methodologies, many others employed observational or quasi-experimental designs, which are inherently more susceptible to bias. For instance, in the meta-analysis, the pooled data showed a trend toward reduced depressive symptoms with psychological interventions, the methodological heterogeneity across included trials—ranging from intervention format to follow-up duration—was considerable, weakening the reliability of the pooled estimates (15). Many studies also lacked adequate control groups or failed to account for confounding variables such as pre-existing mental health conditions, socioeconomic status, or severity of cardiac illness, all of which could influence both psychological responses and lifestyle adherence (16,17).

Biases introduced through poor blinding and selection criteria further compromise the internal validity of findings. For example, studies often relied on voluntary participation, which may have led to the overrepresentation of highly motivated or health-conscious individuals. This selection bias potentially inflates the apparent efficacy of psychological or behavioral interventions (18,19). Moreover, performance bias may have been introduced in trials without blinding, where participants' awareness of their treatment condition could have influenced self-reported outcomes such as emotional distress or perceived lifestyle improvements. Another limitation lies in the inconsistency of outcome measurements. Across studies, diverse scales and endpoints were used to assess psychological states and behavior changes, making cross-study comparisons challenging. For example, while some research utilized validated depression and anxiety scales, others relied on qualitative interviews or non-standardized measures, introducing variability in the operational definitions of "success" or "improvement" (20,21). Such heterogeneity hampers the ability to synthesize findings quantitatively and draw firm conclusions.

The issue of publication bias also merits consideration. Positive results demonstrating improvements in psychological well-being or adherence are more likely to be published than studies with null or inconclusive findings. This bias can distort the overall evidence base and may overstate the effectiveness of psychological interventions. There is a paucity of studies explicitly reporting no effect or failure of interventions, which is problematic for developing a balanced understanding of intervention efficacy (22). Furthermore, the generalizability of findings is limited due to the demographic homogeneity of many study populations. A large proportion of studies focused on middle-aged or older adults, with few examining younger patients or those from ethnically and socioeconomically diverse backgrounds. The relational and cultural context in which cardiac diagnosis and behavior change occur can significantly influence outcomes, yet is rarely addressed in detail. For example, the dynamics of couples managing lifestyle advice, as examined highlighted

 

nuanced psychosocial interactions that may not be captured in standard intervention models (23). Additionally, few studies considered gender differences in emotional responses or adherence patterns, despite evidence suggesting that men and women may experience and cope with cardiac illness differently. In summary, while existing research offers valuable insights into the psychological dimensions of cardiac care, its utility is constrained by methodological shortcomings, potential biases, and limited applicability across diverse populations. Addressing these limitations in future studies is essential to generate more conclusive, reliable, and inclusive evidence that can inform clinical practice and policy.

## IMPLICATIONS AND FUTURE DIRECTIONS

The findings synthesized in this review have important implications for the evolution of cardiac care, highlighting the necessity of integrating psychological evaluation and support into routine cardiovascular treatment pathways. Clinicians must move beyond a solely physiological approach and begin treating patients as whole individuals, whose emotional and behavioral responses significantly influence recovery and long-term outcomes. Incorporating psychological screening tools for anxiety, depression, and experiential avoidance into early phases of cardiac rehabilitation may enable timely identification of patients at risk for poor adherence to lifestyle changes or worsening health behaviors (22,23). Psychologically informed interventions, such as motivational interviewing and cognitive-behavioral strategies, should be considered as adjuncts to traditional rehabilitation, particularly for patients demonstrating emotional distress or resistance to behavioral change (24). From a policy standpoint, the growing evidence base supports the inclusion of structured psychological care within cardiac rehabilitation guidelines. Current recommendations predominantly focus on exercise, diet, and medication adherence, with minimal emphasis on emotional wellbeing. National health policies and cardiology societies may benefit from formalizing psychosocial assessments and interventions within rehabilitation protocols, ensuring they are not viewed as optional but as essential elements of holistic care. The integration of mental health professionals, including psychologists and behavioral therapists, into cardiac teams should be advocated to address the multifaceted needs of patients following a cardiac event (25).

Nevertheless, numerous unanswered questions remain, reflecting substantial gaps in the current literature. It is still unclear which psychological interventions are most effective for specific subgroups of cardiac patients, and whether benefits are sustained over the long term. Many studies focus on short-term outcomes such as reduced anxiety or improved exercise adherence, but do not extend their follow-up to evaluate cardiovascular events, rehospitalization rates, or mortality. Furthermore, the heterogeneity in intervention types, delivery formats, and outcome measures complicates the establishment of best practices (26). There is also a lack of studies exploring how demographic factors, such as age, gender, ethnicity, and socioeconomic status, modulate the psychological impact of a cardiac diagnosis and the effectiveness of subsequent interventions (26,27). Future research should prioritize high-quality randomized controlled trials with sufficiently powered samples and longer follow-up periods. These studies must incorporate standardized psychological and behavioral endpoints to facilitate comparison across trials. Additionally, stratified analyses should be employed to identify which patient characteristics predict response to specific interventions. Trials exploring positive psychological constructs such as optimism and resilience are particularly warranted, given preliminary evidence suggesting their beneficial role in adherence and wellbeing. Technology-assisted interventions, such as mobile health platforms and teletherapy, should also be examined for their scalability and impact, especially in diverse and underserved populations.

Moreover, mixed-methods designs that combine quantitative outcomes with qualitative insights may be especially valuable in understanding patient experiences and contextual barriers to change. Incorporating family dynamics, cultural beliefs, and relational influences—as demonstrated in recent research on relational healthism—can provide a more nuanced framework for developing interventions that resonate with patients' lived realities. These directions will not only strengthen the scientific foundation of cardiac psychological care but also ensure that interventions are inclusive, person-centered, and aligned with real-world practice.

## CONCLUSION

This narrative review highlights the substantial psychological burden experienced by patients following a cardiac diagnosis and its critical influence on lifestyle modification and long-term health outcomes. Emotional distress, including anxiety, depression, and experiential avoidance, commonly impedes patients' ability to engage in essential behavioral changes such as physical activity, dietary adjustments, and medication adherence. Psychological interventions—particularly motivational interviewing, cognitive-behavioral therapy, and psychoeducational support—have demonstrated potential in improving psychological wellbeing and supporting lifestyle

 

adherence, although the strength of evidence is moderate due to methodological variability, small sample sizes, and limited long-term follow-up. Despite promising trends, inconsistencies in outcome measures and underrepresentation of diverse populations limit the generalizability of current findings. Clinicians are encouraged to incorporate routine psychological screening and tailored mental health support within cardiac rehabilitation programs to improve adherence and outcomes. For researchers, the path forward requires well-designed, adequately powered randomized trials that standardize psychological assessments, include longer follow-up periods, and explore demographic-specific responses to interventions. Continued interdisciplinary collaboration between cardiology and mental health fields is essential to develop holistic, evidence-based care models that address both the physiological and psychological dimensions of cardiac disease.

**AUTHOR CONTRIBUTION**

| Author | Contribution |
|---|---|
| Muhammad Saifullah Qureshi* | Substantial Contribution to study design, analysis, acquisition of Data<br>Manuscript Writing<br>Has given Final Approval of the version to be published |
| Ramsha Nasir | Substantial Contribution to study design, acquisition and interpretation of Data<br>Critical Review and Manuscript Writing<br>Has given Final Approval of the version to be published |
| Zoha Alamgir | Substantial Contribution to acquisition and interpretation of Data<br>Has given Final Approval of the version to be published |
| Tahira Kanwal | Contributed to Data Collection and Analysis<br>Has given Final Approval of the version to be published |
| Tehseen Akhtar | Contributed to Data Collection and Analysis<br>Has given Final Approval of the version to be published |
| Attia Ayoob | Substantial Contribution to study design and Data Analysis<br>Has given Final Approval of the version to be published |

## REFERENCES

1. Cosh SM, Pinto R, Denson L, Tully PJ. Understandings and experiences of adherence to secondary prevention for patients with cardiovascular disease and comorbid depression or anxiety. Psychol Health Med. 2023;28(6):1479-86.
2. Stephan Y, Sutin AR, Wurm S, Terracciano A. Subjective Aging and Incident Cardiovascular Disease. J Gerontol B Psychol Sci Soc Sci. 2021;76(5):910-9.
3. Krasieva K, Clair C, Gencer B, Carballo D, Klingenberg R, Räber L, et al. Smoking cessation and depression after acute coronary syndrome. Prev Med. 2022;163:107177.
4. Qin Z, Mei S, Gao T, Liang L, Li C, Hu Y, et al. Self-Esteem as a Mediator between Life Satisfaction and Depression among Cardiovascular Disease Patients. Clin Nurs Res. 2022;31(1):115-21.
5. Poletti V, Pagnini F, Banfi P, Volpato E. The Role of Depression on Treatment Adherence in Patients with Heart Failure-a Systematic Review of the Literature. Curr Cardiol Rep. 2022;24(12):1995-2008.
6. Carrillo A, Belnap BH, Rothenberger SD, Feldman R, Rollman BL, Celano CM. Psychosocial predictors of health behavior adherence in heart-failure patients with comorbid depression: a secondary analysis of the Hopeful Heart trial. BMC Psychol. 2024;12(1):328.
7. Westby M, Norman G, Vedhara K, Game F, Cullum N. Psychosocial and behavioural prognostic factors for diabetic foot ulcer development and healing: a systematic review. Diabet Med. 2020;37(8):1244-55.
8. Schopfer DW, Beatty AL, Meyer CS, Whooley MA. Longitudinal Association Between Angina Pectoris and Quality of Life. Am J Cardiol. 2022;164:1-6.
9. Park SJ, Lee MG, Jo M, Kim G, Park S. Joint effect of depression and health behaviors or conditions on incident cardiovascular diseases: A Korean population-based cohort study. J Affect Disord. 2020;276:616-22.

 

10. Welten JJE, Cox VCM, Kruithof WJ, Visser-Meily JMA, Post MWM, van Heugten CM, et al. Intra- and interpersonal effects of coping style and self-efficacy on anxiety, depression and life satisfaction in patient-partner couples after stroke. Neuropsychol Rehabil. 2023;33(5):849-70.
11. Von Visger TT, Lee D, Lyons A, Chang YP. Integrated Review of Psychosocial and Behavioral Health Assessments and Interventions in Pulmonary Hypertension. Nurs Res. 2021;70(2):150-61.
12. Mei S, Qin Z, Yang Y, Gao T, Ren H, Hu Y, et al. Influence of Life Satisfaction on Quality of Life: Mediating Roles of Depression and Anxiety Among Cardiovascular Disease Patients. Clin Nurs Res. 2021;30(2):215-24.
13. Basu J, Nikoletou D, Miles C, MacLachlan H, Parry-Williams G, Tilby-Jones F, et al. High intensity exercise programme in patients with hypertrophic cardiomyopathy: a randomized trial. Eur Heart J. 2025;46(19):1803-15.
14. Marini S, Kimball TN, Mayerhofer E, Tack RWP, Senff JR, Prapiadou S, et al. Health-Related Behaviors and Risk of Common Age-Related Brain Diseases Across Severities of Genetic Risk. Neurology. 2024;103(10):e210014.
15. Russell ER, Lyall DM, Mackay DF, Cronin K, Stewart K, MacLean JA, et al. Health and Lifestyle Factors and Dementia Risk Among Former Professional Soccer Players. JAMA Netw Open. 2024;7(12):e2449742.
16. Liss DT, Uchida T, Wilkes CL, Radakrishnan A, Linder JA. General Health Checks in Adult Primary Care: A Review. Jama. 2021;325(22):2294-306.
17. Riaz M, Shah G, Asif M, Shah A, Adhikari K, Abu-Shaheen A. Factors associated with hypertension in Pakistan: A systematic review and meta-analysis. PLoS One. 2021;16(1):e0246085.
18. Flicker L. Evidence-based strategies to prevent cognitive decline in older people. Maturitas. 2024;187:108062.
19. Yu JT, Xu W, Tan CC, Andrieu S, Suckling J, Evangelou E, et al. Evidence-based prevention of Alzheimer's disease: systematic review and meta-analysis of 243 observational prospective studies and 153 randomised controlled trials. J Neurol Neurosurg Psychiatry. 2020;91(11):1201-9.
20. van Zutphen EM, Rijnhart JJM, Rhebergen D, Muller M, Huisman M, Beekman A, et al. Do Cardiovascular Risk Factors and Cardiovascular Disease Explain Sex Differences in Cognitive Functioning in Old Age? J Alzheimers Dis. 2021;80(4):1643-55.
21. Lu Q, Wang Y, Geng T, Zhang Y, Tu Z, Pan A, et al. Depressive symptoms, lifestyle behaviors, and risk of cardiovascular disease and mortality in individuals of different socioeconomic status: A prospective cohort study. J Affect Disord. 2024;347:345-51.
22. Aggarwal M, Ornish D, Josephson R, Brown TM, Ostfeld RJ, Gordon N, et al. Closing Gaps in Lifestyle Adherence for Secondary Prevention of Coronary Heart Disease. Am J Cardiol. 2021;145:1-11.
23. Lee SK, Hwang SY. Cardiovascular Health Behavior Prediction Model in Patients With Type 2 Diabetes. J Cardiovasc Nurs. 2025;40(2):E72-e81.
24. Uphoff E, Pires M, Barbui C, Barua D, Churchill R, Cristofalo D, et al. Behavioural activation therapy for depression in adults with non-communicable diseases. Cochrane Database Syst Rev. 2020;8(8):Cd013461.
25. Yang Y, Wang Y, Yang L. Association between physical activity and sedentary behavior and depression in US adults with cardiovascular disease: NHANES 2007-2016. J Affect Disord. 2024;367:342-9.
26. Pinheiro M, Tonaco LAB, Felisbino-Mendes MS, Velásquez-Meléndez JG, Malta DC, Moreira AD. Association between cardiovascular health and self-reported depression: 2019 National Health Survey. Cien Saude Colet. 2025;30(4):e08822023.
27. Xiao W, Liu Y, Huang J, Huang LA, Bian Y, Zou G. Analysis of factors associated with depressive symptoms in stroke patients based on a national cross-sectional study. Sci Rep. 2024;14(1):9268.

 