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Health-promoting lifestyle in cardiac patients: The mediating role of cognitive flexibility in the relationship between intimate relationships and distress tolerance

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Abstract

BACKGROUND: The present study aimed to determine the predictive model of health-promoting lifestyle in cardiovascular patients based on intimate relationships and distress tolerance, mediated by cognitive flexibility.

METHODS: The research design was a cross-sectional correlational study using structural equation modeling. The statistical population included cardiovascular patients in 2025 who referred to three specialized cardiology clinics for outpatient examination. A total of 265 individuals were selected as the sample using convenience sampling. Standard questionnaires for health-promoting behaviors (Walker et al.), social intimacy (Miller and Lefcourt), distress tolerance (Simons and Gaher), and cognitive flexibility (Dennis and Vander Wal) were used. Statistical data analysis was performed using the Pearson correlation coefficient and path analysis with bootstrap testing, employing AMOS 24 and SPSS 26 software.

RESULTS: The results of path analysis and bootstrap testing showed that the proposed model had a good statistical fit (χ^2/df = 2.94, RMSEA = 0.071, CFI = 0.939, GFI = 0.990). The indirect effect of intimate relationships on health-promoting lifestyle through cognitive flexibility (β = 0.1148, p = 0.001) and the indirect effect of distress tolerance on health-promoting lifestyle through cognitive flexibility (β = 0.0924, p = 0.001) were confirmed.

CONCLUSION: The structural model, with good fit, explained the mediating role of cognitive flexibility in the relationship between intimate relationships and distress tolerance with health-promoting lifestyle in cardiovascular patients. These findings provide an operational framework for psychotherapy interventions based on strengthening distress tolerance and interpersonal relationships to improve cardiovascular health.

Keywords: Cardiovascular Diseases, Distress Tolerance, Health Lifestyle, Intimate Relationships, Cognitive Flexibility

Introduction

Cardiovascular diseases (CVDs), as one of the most prominent global public health challenges, impose a significant burden on healthcare systems and individuals' quality of life. These disorders, which encompass a wide range of problems related to the heart and blood vessels, are often highly correlated with modifiable behavioral risk factors, including poor diet, physical inactivity, tobacco use, and chronic stress. In this regard, adopting and adhering to a health-promoting lifestyle has gained importance not only as a fundamental strategy in the primary prevention of CVDs but also as a vital element in disease management and improving clinical outcomes for affected patients[1]. This lifestyle, which includes a set of positive environmental and individual behaviors, has the potential to reduce disease progression, enhance cardiovascular function, and increase longevity[2]. Research evidence consistently emphasizes the critical role of lifestyle management in reducing the risk of cardiovascular diseases[3]. Understanding the key modifiable lifestyle elements and their association with health outcomes, including mortality in patients with non-communicable diseases, can help reduce premature mortality from these diseases[4]. Despite the complexity of factors influencing individual lifestyle choices[5], numerous studies have shown that psychological and social factors play a significant role in shaping these choices and, consequently, cardiovascular health.

Intimate relationships, as one of the key psychological and interpersonal factors, play a significant role in cardiovascular health status[6]. Intimacy in relationships, beyond physical presence, refers to deep access to an individual's inner world and mutual understanding of their personality. In romantic relationships, intimacy is defined by feelings of closeness, connection, and bonding, which include components such as self-disclosure, emotional expression, mutual trust, support, physical intimacy, and the experience of deep understanding[7]. High-quality intimate relationships are associated with better heart health. These relationships help modulate stress responses and reduce blood pressure[8,9]. Even daily interactions with a romantic partner can lead to reduced blood pressure; in contrast, social isolation and loneliness are significant risk factors for coronary artery disease (CAD)[10], while social isolation can accelerate disease progression and reduce quality of life[11].

Distress tolerance, meaning the willingness to face internal discomforts and continue purposeful activities despite psychological distress, is associated with health-promoting behaviors[12]. This trans-emotional construct, which explains individual differences in tolerating negative emotions[13], influences decision-making regarding adherence to health behaviors. Individuals with low distress tolerance may struggle to manage their negative emotions and feel ashamed[14]. Research has shown that distress tolerance is inversely related to high blood pressure[15], and health-promoting lifestyle education can improve distress tolerance and blood pressure[16]. Additionally, psychological distress is associated with an increased risk of CVD and mortality, while psychological resilience has a protective effect[17].

Cognitive flexibility acts as a crucial cognitive regulatory process, bridging the influence of socio-emotional variables to long-term health behaviors through its capacity for attentional and strategic shifting[18]. This concept refers to an individual's ability to adapt their thinking and behavior in response to environmental changes[19] and includes skills such as shifting attention, updating strategies, responding to feedback, reversal learning, environmental exploration, and task switching. Cognitive flexibility, as an essential component of executive functions, aligns with working memory and inhibitory control, facilitating goal-directed behaviors[20]. Individuals with high cognitive flexibility accept problems instead of avoiding them, respond appropriately to their surroundings, and act in line with their values[21]. This ability to adapt to the changing demands of daily life is essential for success in today's fast-paced world[22]. Recent findings indicate that cognitive flexibility influences perceptions and choices of exercise

programs and is associated with cardiovascular disease risk factors[23]. These findings highlight the importance of cognitive flexibility as a potential protective factor against CVD and an overall health enhancer.

Given the increasing burden of cardiovascular diseases and the growing importance of lifestyle modification in their management, there is a significant knowledge gap regarding the role of psychological and interpersonal factors. Understanding how intimate relationships, distress tolerance, and cognitive flexibility interact to shape sustainable health behaviors in populations at risk for CVD is essential. This uncertainty poses serious obstacles to the development of comprehensive and personalized clinical interventions that simultaneously target these factors. Lifestyle modification, as a key strategy in improving clinical outcomes and reducing CVD risk, requires the identification of individual, social, and professional predictive factors. Therefore, this research aims to explore this knowledge gap, not only enriching the theoretical foundations of future research but also paving the way for designing more innovative treatment protocols to improve clinical outcomes, as a complement to medical interventions aimed at reducing drug dependence or increasing their effectiveness in promoting the lifestyle of cardiovascular patients.

Methods and Materials

This study was conducted with a descriptive-correlational design using the Structural Equation Modeling (SEM) method and with ethical approval code IR.IAU.LIAU.REC.1404.023. The research population included cardiovascular patients referred to three specialized cardiology clinics in the cities of Rasht, Lahijan, and Astaneh Ashrafieh in 2025, who had been diagnosed with the disease for at least one year. The target sample size was determined using Kline's approach, considering the complexities of SEM[24]. Given the inclusion of 17 observed variables (including total and subscale scores), a minimum required sample size of 85 to 170 participants (based on a 5 to 10 subject-to-variable ratio) was established to ensure adequate statistical power and stability of the results. Consequently, 300 individuals were recruited via convenience sampling to account for potential sample attrition. After applying inclusion and exclusion criteria, 265 valid samples were used in the final analysis.

Inclusion criteria included: clinical diagnosis of cardiovascular disease, age over 18 years, at least one year since diagnosis, and written informed consent. The exclusion criterion was incomplete questionnaires. Screening and selection of samples were carried out in collaboration with a cardiologist through medical record review and a brief clinical interview. Adherence to ethical principles was ensured by providing patients with full explanations about the purpose, duration, confidentiality, and voluntary nature of participation, as well as addressing their questions and concerns.

The questionnaires used in this study were health-promoting behaviors, social intimacy, distress tolerance, and cognitive flexibility. Demographic information (age, gender, education, marital status, number of children, and duration of illness) was also collected.

Questionnaires

Health-Promoting Lifestyle Profile (HPLP-II) Questionnaire: This questionnaire, developed by Walker et al., consists of 52 items covering six main dimensions of health: health responsibility, physical activity, nutrition, personal growth/ self-actualization, stress management, and interpersonal relations[25]. Responses are recorded on a 4-point Likert scale (from "never" = 1 to "always" = 4). The total score is obtained by calculating the average of responses to all items, with scores ranging from 52 to 208; higher scores indicate a healthier lifestyle. Scores between 52–103 indicate a low level of adherence to health-promoting behaviors, scores between 104–155 indicate a moderate level, and scores above 156 indicate a higher level. Subscale scores are also calculated by averaging the items related to each dimension.

The original HPLP-II has content validity (through literature review and expert opinions), construct validity (confirmation of the six-dimensional model with exploratory factor analysis), convergent validity (r = 0.678), and criterion validity (significant correlation with perceived health status and quality of life; rs = 0.209 to 0.491). The reliability of the total scale with a Cronbach's alpha coefficient of 0.94 and subscales between 0.79 and 0.87 has been reported[26]. In Iranian studies, the reliability of the total scale has been reported as 0.88[27]. In the present study, the reliability of the total scale was calculated as 0.91, with subscales ranging between 0.67 and 0.85.

Miller Social Intimacy Scale (MSIS): The Miller Social Intimacy Scale, introduced by Miller and Lefcourt in 1982, is designed to measure an individual's level of closeness and intimacy in various relationships (friends, acquaintances, family). This instrument functions as a semi-structured interview and includes 17 items categorized into two sections: six items for the frequency of intimacy experience and 11 items for the intensity of intimacy. Responses are recorded on a 10-point Likert scale (from 1 = "very rarely/little" to 10 = "almost always/a lot"), and items 2 and 4 are reverse-scored. The total score is calculated from the sum of all item scores, with higher scores indicating a higher level of social intimacy.

The Cronbach's alpha coefficient reported by Miller and Lefcourt for this scale ranged from 0.86 to 0.91[28]. Additionally, discriminant, construct, and convergent validity have been confirmed. In the internal study by Manafi and Dehshiri, reliability was reported with a Cronbach's alpha of 0.91[29]. In the present study, the Cronbach's alpha coefficient for MSIS was found to be 0.83.

Distress Tolerance Scale (DTS): The Distress Tolerance Scale is a self-report questionnaire for emotional distress tolerance, designed by Simons and Gaher in 2005. It has 15 items and four subscales, including emotional distress tolerance, absorption by negative emotions, cognitive appraisal of distress, and regulation of efforts to alleviate distress. The score range is between 15 and 75. Higher scores indicate greater distress tolerance. A score of 15–30 indicates low distress tolerance, 31–60 indicates moderate distress tolerance, and 61–75 indicates high distress tolerance. Item 6 is reverse-scored.

In the research by Simons et al., the Cronbach's alpha coefficient was 0.92 for the entire scale and 0.76, 0.81, 0.78, and 0.86 for the subscales (tolerance, absorption, appraisal, and regulation), respectively[30]. They also reported good initial criterion and convergent validity. In the research by Barati et al., a Cronbach's alpha coefficient of 0.94 was reported[31]. In the present study, the Cronbach's alpha coefficient for the entire scale was 0.94, and for the subscales, it was 0.76, 0.64, 0.62, and 0.67, respectively.

Cognitive Flexibility Inventory (CFI): The Cognitive Flexibility Inventory, developed by Dennis and Vander Wal, consists of 20 items evaluated using a 6-point Likert scale. This questionnaire is based on three main components: perception, perceived controllability, and justification of behavior. Items 2, 4, 7, 9, 11, and 17 are reverse-scored. The total score is obtained from the sum of all items, ranging from 20 to 140; higher scores indicate a higher level of cognitive flexibility. A score between 20–60 indicates low cognitive flexibility, 61-95 indicates moderate cognitive flexibility, and 96-140 indicates high cognitive flexibility[32].

Dennis and Vander Wal (2010) reported the reliability of this questionnaire using the split-half method and Cronbach's alpha as 0.83, and determined its validity with a criterion validity of 0.85. In another study by Salehi et al., the Cronbach's alpha coefficient for the total scale was calculated as 0.84[33]. In the same study, Cronbach's alpha coefficients for the components were reported as follows: perception factor (0.90), perceived controllability factor (0.55), and justification of behavior factor (0.78). In the present study, the reliability of the total scale was reported as 0.91.

Statistical Analysis

To examine demographic characteristics and descriptive statistics, indices of frequency, percentage, mean, and standard deviation were calculated using SPSS 26 software. Additionally, statistical data analysis and examination of research hypotheses were performed using Pearson's correlation coefficient and path analysis with bootstrap testing, employing AMOS 24 software at a significance level of 0.05.

Findings

An analysis of 265 participants revealed a mean age of 50.42 years (SD = 13.10), with an age range of 19 to 87 years. The sample comprised 65.7% women and 34.3% men, with 70.6% married and 29.4% single. The average illness duration was 4.53 years (SD = 4.10, range 2–40 years). Descriptive statistics and Pearson correlation coefficients for the study variables are presented in Tables 1 and 2, respectively.

The present study showed that in cardiovascular patients, intimate relationships and distress tolerance have a positive and significant correlation with cognitive flexibility, as well as with a health-promoting lifestyle. Furthermore, cognitive flexibility itself shows a positive and significant relationship with a health-promoting lifestyle. To test these relationships, structural equation modeling (SEM) was employed, and its assumptions were carefully examined: the normality of the data (both univariate and multivariate) was confirmed, three outliers were identified, and no signs of multicollinearity were observed. After ensuring the validity of the method, the proposed model was evaluated using the maximum likelihood estimator (MLE), and its fit indices are presented in Table 3.

The R^2 index indicates the amount of variance explained by the endogenous latent variables. Chin[34] describes R^2 values of 0.67, 0.33, and 0.19 as strong, moderate, and weak, respectively, in structural equations. The coefficient of determination for the health-promoting lifestyle variable in the proposed structural model is 0.360, which indicates that exogenous and mediating variables namely intimate relationships, distress tolerance, and cognitive flexibility can predict 36% of the

Table 1. Descriptive indices of research variables in cardio vascular patients

Variable		Mean	Standard Deviation	Min-Max	Skewness	Kurtosis
Intimate relationships		134.70	22.14	71-235	-0.55	1.71
	Tolerance	8.06	3.25	3-15	0.24	-0.90
	Absorption	8.90	3.26	3-15	0.05	-0.68
Distress tolerance	Appraisal	18.01	4.91	7-29	0.03	-0.69
	Regulation	6.41	2.80	3-15	0.78	0.17
	Total distress tolerance score	41.38	11.31	16-71	0.03	-0.42
	Perception	44.87	9.67	13-60	0.58	0.26
Cognitive flexibility	Perception of controllability	33.91	5.22	22.47	0.16	0.34-
	Behavior justification	8.05	2.41	2-12	-0.27	0.54-
	Total cognitive flexibility score	86.84	11.15	52-114	0.24-	0.44
	Nutrition	33.62	5.21	19-44	-0.15	0.35-
	Physical activity	37.89	7.46	18-2	-0.02	-0.40
Health-promoting lifestyle	Health responsibility	23.82	4.04	10-32	-0.14	0.06
	Stress management	15.06	3.39	7-24	0.26	0.01
	Interpersonal relationships	18.89	6.13	8-32	0.22	0.61-
	Self-actualization	19.55	3.90	10-31	0.07	0.14-
	Total health-promoting lifestyle score	148.85	21.46	80-212	-0.03	0.13

Table 2. Correlation matrix between research variables

Variable / Component	1	2	2a	2b	2c	2d	3	3a	3b	3c	4 e
1. Intimate Relationships	1	–	–	–	–	–	–	–	–	–	–
2. Distress Tolerance	0.08	1	–	–	–	–	–	–	–	–	–
2a. Tolerance	0.05	0.60**	1	–	–	–	–	–	–	–	–
2b. Absorption	0.07	0.55**	0.50**	1	–	–	–	–	–	–	–
2c. Appraisal	0.10	0.58**	0.52**	0.50**	1	–	–	–	–	–	–
2d. Regulation	0.03	0.65**	0.48**	0.45**	0.50**	1	–	–	–	–	–
3. Cognitive Flexibility	0.18**	0.35**	0.12	0.10	0.11	0.09	1	–	–	–	–
3a. Perception	0.28**	0.15	0.08	0.07	0.09	0.06	0.70**	1	–	–	–
3b. Perception of Controllability	0.25**	0.12	0.06	0.05	0.07	0.04	0.65**	0.60**	1	–	–
3c. Behavior Justification	0.15	0.10	0.05	0.04	0.06	0.03	0.55**	0.50**	0.45**	1	–
4. Health-Promoting Lifestyle	0.45**	0.21**	0.12	0.10	0.11	0.09	0.45**	0.35**	0.33**	0.25**	1

**P<0.001

Table 3. Fit indices of the proposed model of the study

Proposed Fitness Index	χ^2	Df	P-value	CMIN/df	RMSEA(CL90%)	PNFI	CFI	PCFI	IFI	GFI
	157.89	72	<0.001	2.94	0.071(0.06-0.08)	0.641	0.939	0.726	0.958	0.990

Acceptable levels for indices: PNFI, PCFI (>.5), CFI, GFI, IFI (>.9), RMSEA (<0.08), CMIN/DF (good > 3, acceptable > 5) (Kline, 2023).

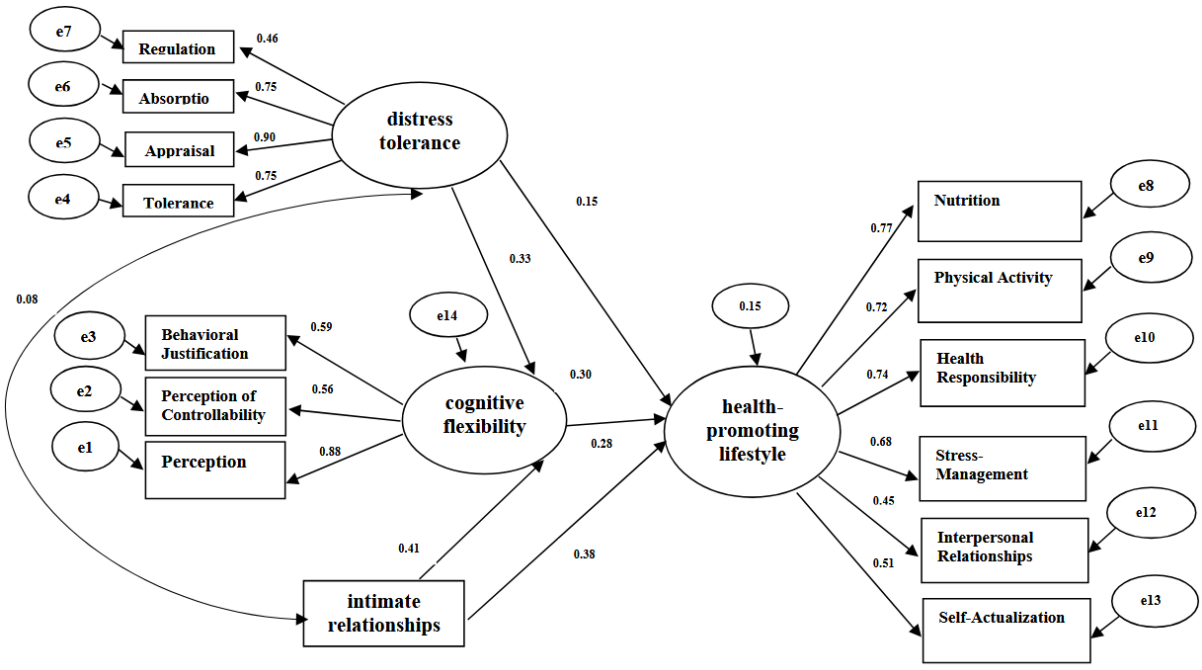

Figure 1. Standardized coefficients of the proposed structural model of health-promoting lifestyle based on intimate relationships and distress tolerance with the mediating role of cognitive flexibility

changes in health-promoting lifestyle, which is a moderate level.

Therefore, based on the estimated indices, the results show that the structural relationship of a health-promoting lifestyle, based on intimate relationships and distress tolerance, fits with the mediating role of cognitive flexibility. Referring to Table 4, the standardized coefficients of all paths and critical values in the proposed model can be observed.

The results showed that intimate relationships have a positive and significant effect on health-promoting lifestyle and cognitive flexibility. Also, distress tolerance has a positive and significant effect on health-promoting lifestyle and cognitive flexibility. Furthermore, the results obtained from mediating relationships using the bootstrap test to examine the mediating path are shown in Table 5. In the final model of the present study, there are two indirect or mediating paths. The bootstrap method was used to determine the significance of the mediating relationship and the indirect effect of the independent variable on the dependent variable through the mediator.

With the cognitive flexibility mediating variable introduced, the indirect effect of intimate relationships on health-promoting lifestyle reached 0.1148 and was significant at P<0.001. Additionally, the indirect effect of distress tolerance on health-promoting lifestyle through cognitive flexibility was 0.0924, which was also confirmed at P<0.001. In both pathways, the 95% confidence interval did not include zero, indicating the full significance of the indirect pathways. Therefore, it can be concluded that cognitive flexibility plays an effective mediating role and correctly confirms the research hypothesis regarding the mediation of this variable in the relationships between intimate relationships and distress tolerance with health-promoting lifestyle.

Discussion

The present study aimed to evaluate the predictive model of health-promoting lifestyle in cardiovascular patients based on intimate relationships mediated by cognitive flexibility. The results showed that intimate relationships indirectly, through increased cognitive flexibility, lead to the promotion of a healthier lifestyle in these patients. This finding is consistent with previous research[8,35]. The explanation of these results indicates that intimate relationships, as a secure supportive environment, provide trust, understanding, and acceptance, and by reducing emotional burden and freeing up cognitive resources, help strengthen complex cognitive abilities such as planning, self-monitoring, and adaptation[8,36]. Therefore, cognitive flexibility, which develops in the context of intimate relationships, acts as a vital mediating

Table 4. Standardized coefficients of the proposed model paths

Path	Standardized Coefficients	Standard Error	Critical Ratio	P-value
Intimate relationships → health-promoting lifestyle	0.383	0.013	5.200	P<0.001
Distress tolerance → health-promoting lifestyle	0.152	0.032	2.22	0.019
Intimate relationships → Cognitive flexibility	0.406	0.025	6.236	P<0.001
Distress tolerance → Cognitive flexibility	0.333	0.250	4.634	P<0.001
Cognitive flexibility → health-promoting lifestyle	0.276	0.045	2.897	0.004

Table 5. Bootstrap results for the indirect path of the proposed model

Path	Indirect effect	Error	Lower limit	Upper limit	P-value
Intimate Relationships to Health-Promoting Lifestyle Through Cognitive Flexibility	0.1148	0.0392	0.0721	0.1697	P<0.001
Distress tolerance to Health-Promoting Lifestyle Through Cognitive Flexibility	0.0924	0.0177	0.0677	0.1479	P<0.001

mechanism and significantly facilitates health-oriented choices.

This complex mediating process shows that the impact of intimate relationships on health goes beyond direct emotional support or external monitoring and primarily operates through empowering the brain's executive functions and enhancing high-level cognitive capacities. In other words, high-quality interpersonal relationships increase the patient's cognitive resources and strengthen their mental capacity for complex activities such as strategic planning, continuous self-monitoring, reviewing strategies, and adapting approaches in the face of new feedback[8]. This finding explains why some patients, despite having an extensive social network, do not show changes in their health behaviors; because this support may be merely quantitative and may not strengthen the cognitive abilities necessary for change and adaptation. It is the quality and depth of emotional relationships that affect cognitive functions and enable lasting changes. From a neuroscientific perspective, intimate relationships also help improve cognitive flexibility by modulating amygdala activity (the center for processing emotions and fear responses) and strengthening its connection with the prefrontal cortex (the center for higher-order thinking and planning), providing strong biological foundations for adopting health-oriented behaviors. In simpler terms, when individuals are in intimate and secure relationships, their fear of judgment, rejection, or failure decreases. This reduction in fear regulates amygdala activity, and as a result, the brain's cognitive resources that were previously spent on managing these fears are freed up. These freed resources can then be used to focus on problem-solving, long-term planning, and self-regulation.

These neurobiological changes provide strong biological foundations for improving cognitive flexibility and, ultimately, adopting health-oriented behaviors. Neuroimaging studies also confirm this: positive relational experiences can measurably affect brain structure and function and strengthen neural circuits related to flexible cognition[36]. Therefore, the quality of emotional relationships, more than their quantity, affects cognitive functions and enables lasting changes.

Simultaneously strengthening high-quality social support and flexible cognitive capabilities is a promising strategy for sustainably improving health-oriented behaviors and clinical outcomes in cardiovascular patients.

Furthermore, the results of the present study indicate that distress tolerance, indirectly and through cognitive flexibility, has a significant impact on promoting a healthy lifestyle in cardiovascular patients. This finding, consistent with the studies by Amirpour and Sadeghin[37] and Habibović et al.[38], indicates that the ability to tolerate distress caused by illness frees up individuals' cognitive resources. Instead of expending energy to suppress or avoid these distresses, they can direct them towards developing adaptive strategies and flexible thinking. This liberation of cognitive resources creates the necessary mental space for deeper information processing, exploring various options, and making health-oriented decisions. Enhanced cognitive flexibility enables patients to find alternative and adaptive solutions when faced with unforeseen challenges and to adjust their health-oriented plans to new circumstances. The mechanism of this mediation is explained through the reduction of cognitive load, the creation of a safe psychological space, physiological optimization, and an increased frustration tolerance threshold[39].

From a neuroscientific perspective, this mediating relationship can be explained by the impact of distress tolerance on the function of brain networks related to cognitive control. Distress tolerance, by modulating the activity of emotion-processing centers and strengthening their connections with the prefrontal cortex, provides the groundwork for the optimal functioning of executive control networks. This neurobiological regulation increases an individual's capacity to switch between different tasks, update strategies, and inhibit automatic unhealthy responses[40].

This finding emphasizes the importance of simultaneous attention to emotional regulation and cognitive functions in health interventions and shows that investing in distress tolerance training can yield a dual return in reducing emotional suffering and strengthening the cognitive abilities necessary for disease management. Simultaneously strengthening distress tolerance and cognitive flexibility can be an effective strategy for the sustainable promotion of health-oriented behaviors in cardiovascular patients.

limitations

Despite clarifying the positive correlations between intimate relationships, distress tolerance, cognitive flexibility, and health-promoting lifestyles in cardiovascular patients, this study is subject to several limitations, including its descriptive and cross-sectional nature, sample homogeneity, reliance on standardized instruments, and generalizability constraints stemming from the gender imbalance (65.7% women and 34.3% men) and weak instrument reliability (low Cronbach's alpha). These factors collectively restrict the ability to infer causality.To overcome these limitations, future research should focus on longitudinal studies, clinical trials, examining moderating and mediating factors, combining quantitative and qualitative methods, and replication in diverse populations to achieve a deeper understanding and more effective clinical interventions.

Conclusion

The findings of this research have broad practical potential for clinical professionals and health policymakers. For clinical professionals, the study highlights the importance of designing psychological screening protocols to assess patients' intimate relationships, distress tolerance, and cognitive flexibility, so that vulnerable individuals can be identified earlier and referred to supportive interventions. Furthermore, it emphasizes the necessity of developing evidence-based educational programs that focus on increasing distress tolerance skills (such as mindfulness and acceptance), strengthening cognitive flexibility (such as cognitive restructuring), and improving communication skills in intimate relationships. These trainings help patients manage stress and adhere to lifestyle changes.

It is also recommended that physicians and healthcare staff pay attention to the dimension of patients' intimate relationships in their interactions and, if necessary, refer them to supportive resources or family counselors to increase patient trust and improve adherence to treatment recommendations. For policymakers and health institutions, the research results provide strong evidence for the necessity of including psychological services (individual and group counseling, life skills training) in the treatment and rehabilitation package for cardiovascular patients. This comprehensive and integrated approach highlights the innovation of the research in the form of the proposed model and provides the groundwork for designing targeted psychological interventions and sustainable improvement in patients' health.

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Conflict of interests

The authors declare no conflict of interest.

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Author's Contributions

Study Conception or Design: MMM, MB, LM
Data Acquisition: MMM, MB, LM
Data Analysis or Interpretation: MMM, MB, LM
Manuscript Drafting: MMM, MB, LM
Critical Manuscript Revision: MMM, MB, LM
All authors have approved the final manuscript and are responsible for all aspects of the work.

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