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# Depressive and anxiety disorders in the cardiological conditions: psychological interventions

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**ABSTRACT**

Cardiovascular disease (CVD) remains a leading cause of mortality worldwide, despite diagnostic and pharmacological advances. These adverse effects lead to the search for new etiological factors and effective ways to prevent, treat and rehabilitate CVD. The impact of psychological factors on the development of CVD has gained scientific recognition. Mental and mood disorders, such as depressive disorders, anxiety disorders, and post-traumatic stress disorder (PTSD), can contribute to CVD and significantly affect the quality of life and prognosis of a CVD patient, often contributing to premature death. Therefore, it is essential to study the socio-demographic and psychosocial factors that are most likely to support pro-health behaviour and identify effective psychotherapeutic interventions for CVD patients. These findings result in new interventions, such as meta-cognitive therapy and mindfulness-based training, which promote healthy behaviours and improve clinical conditions and prognosis in CVD patients.

**Key words:** psychocardiology, cardiovascular disease, psychosocial factors, meta-cognitive therapy, mindfulness

## Introduction

Cardiovascular disease (CVD) has been a major cause of mortality worldwide since the mid-20th century, causing 17.9 million deaths annually [1]. The number of cardiovascular incidents poses a significant therapeutic, social and economic challenge in most countries. Numerous studies conducted over the past decade suggest that psychological determinants may be the critical factors in the onset and trajectory of both CVD and heart failure (HF) patient populations [2]. These include cardioprotective factors, which prevent or delay the onset of symptoms, and risk factors, which facilitate the onset of the disease. Chronic depression, loneliness, anxiety or social withdrawal are conducive to CVD and HF and have a significant impact on the effectiveness of proposed therapies and the patient's prognosis. Some studies have shown that incorrect views on health may also condition CVD morbidity. Furthermore, the patient's socioeconomic conditions, occupation and personality traits, health behaviours, or an unexpected and sudden cardiac incident may influence the course of CVD [3].

Despite diagnostic and therapeutic advances and extensive evidence of the impact of psychosocial risk factors on the development of cardiovascular disease, an increasing number of patients with diagnosed CVD gave rise to the emergence of a new scientific discipline, the so-called behavioural cardiology, at the beginning of the 21st century. It is currently the subject of numer-

ous theoretical and practical studies and functions as a distinct science [4]. The present study discusses behavioural and psychosocial factors contributing to cardiovascular disease and some determinants with cardioprotective properties.

The role of psychocardiology is therefore not limited to the disclosure of CVD risk factors. When appropriate methods are applied, it supports the patient in the course of the disease, influencing the level of acceptance of his condition and promoting the patient's conscious participation in therapeutic and rehabilitation management, as well as facilitating health behaviour change.

Today, behavioural cardiology is beginning to be defined as a research discipline that has been moving toward the application of psychosocial factors in the assessment of cardiovascular disease risk and methods for its mitigation. In recent years, researchers have exhibited growing awareness about recognizing the biological and behavioural psychosocial factors contributing to the atherosclerotic processes leading to CVD. Psychosocial risk factors include diagnosis of depression symptoms and social isolation, hostility and anger, abnormal personality patterns, and stress [4]. In addition, social and economic variables, such as poor education and low income, shift work, and chronic and subjectively perceived stress at work are also detailed [5]. These factors have a detrimental effect on health behaviours, adherence, persistence and are likely to give rise to inadequate patient expectations for therapy. From the perspective of stress and a person's predisposition to change his behaviour, the patient's external environment, including home environment, family and close relationships, becomes important. A significant increase in the risk of cardiovascular diseases both in men and women is also attributed to low socioeconomic status.

There are extensive psychocardiology reports referencing studies of the supportive role of patients and staff in CVD. Therefore, it is important to promote knowledge and close cooperation between physicians and psychologists. Research on the association of negative emotions with cardiovascular disease risk should still be conducted, considering such additional factors as gender and socioeconomic status. However, a systematic review of the results of 18 clinical trials has not yielded conclusive evidence to support a claim that psychotherapeutic interventions related to anger control lower the risk of myocardial infarction [6].

## Depressive and anxiety disorders in the cardiological patient population

Many studies have shown that depression is a significant risk factor for CVD. For example, some meta-analyses have confirmed the prognostic significance of depressive symptoms, which doubles the risk of death or myocardial infarction in patients diagnosed with coronary artery disease (CAD) [7]. Among patients with CAD, the prevalence of severe depression is three times higher than in the general population. Anxiety and depression are associated with poorer adherence and discontinuation of treatment [8], higher rates of risk behaviours (e.g., smoking) and increased risk of subsequent cardiac events and death [9].

Experiencing heart disease, especially sudden or unexpected, can facilitate psychiatric disorders. According to Rao et al., up to 64% of cardiac patients may experience clinical symptoms of anxiety and depression at the beginning of cardiac rehabilitation, and approximately 18% struggle with moderate to severe depression [10]. Other data suggest that anxiety disorders are present in approximately 43% of patients who are hospitalized immediately after a cardiac event (including after an acute myocardial infarction (AMI), acute coronary syndrome (ACS), and/or unstable angina (UA) or undergoing a coronary artery bypass graft surgery (CABGS). Anxiety was observed in 27% of them after a 6–12-month recovery [11]. In contrast, among people with depression, the risk of developing CVD is approximately 60% higher [12]. Wulsin and Singal [13] found that MDD was a better predictor of CVD development in baseline healthy individuals (relative risk = 2.69; CI: 1.63–4.43) than depressive symptoms alone (relative risk = 1.49; CI: 1.16–1.92). The EUROASPIRE III study [14] assessed the prevalence of anxiety in patients suffering from heart disease in 22 countries and found that anxiety ranged from 12% to 41.8% in men and 21.5% to 63.7% in women, with older age, female gender, low education and no history of invasive treatment being associated with a higher prevalence of anxiety, including depressive disorders.

Several meta-analyses have found that an increased risk of coronary heart disease is associated with anxiety symptoms in both the general population and cardiac patients [15]. Moreover, generalized anxiety disorder (GAD) increases the risk of subsequent major cardiac episodes from 61% to 74% [16]. Other studies have indicated that CVD risk is particularly elevated in patients suffering from generalized anxiety disorder [17], panic attacks [18] and posttraumatic stress disorder (PTSD) [19]. The first observations of PTSD symptoms in patients with cardiovascular disease were carried out by Kutz, Garb, and David [20], who detailed case reports of patients who developed post-traumatic symptoms after a heart attack. Edmondson et al. concluded that psychological intervention could alleviate the sense that heart disease and its consequences are a constant and immediate threat to cardiological patients' lives [17].

Depressive disorders are associated with an increased risk of CV events in patients suffering from cardiovascular diseases and are considered to increase the cost of patient care and decrease quality of life [21]. After the onset of coronary artery disease, approximately 20 to 50% of patients exhibit depressive symptoms, and 15 to 20% develop severe symptoms of major depression [22]. It appears that even mild depressive symptoms contribute to an increased risk of recurrence of acute coronary syndromes, as well as increased mortality. Prospective epidemiological studies have shown that depression is associated with increased risk, independently of other well-studied predictive markers of CVD morbidity [23].

It is noteworthy that up to 20% of patients with heart disease meet the DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, 5th Edition) diagnostic criteria for a major depressive episode [24]. Anxiety disorders with panic attacks are reported in approximately 4% of the general population, approximately 20% of primary care patients and 14% of cardiological patients [25]. Therefore, appropriate therapeutic interventions are needed to improve the medical, financial and psychosocial aspects associated with CVD in such patient populations. The rationale behind implementing psychocardiological interventions is also evidenced by the British Heart Foundation Program's finding that symptoms of depression, classified as milder than the underlying clinical diagnosis, may be associated with the risk of a cardiovascular event [26].

Furthermore, the concurrence of anxiety and depressive disorders harms the cardiovascular treatment process — e.g., in addition to negative health behaviours. Patients with depression are less likely to adhere to the recommended treatment and are more likely to discontinue their rehabilitation [27].

Mental disorders and diseases often hinder human contact or strongly limit integration with the social environment. Feelings such as shame and apathy accompanying depression cause reluctance to leave home and engage in human communication. The fear of stigmatization and discrimination also hinders social engagement. This kind of social isolation may result in an increased risk of cardiovascular disease and a fatal outcome of a first cardiovascular event. According to a recent study, living alone increases the risk of death from a first heart attack or stroke, mainly due to the lack of immediate ability to call for medical assistance [28]. Limiting or withdrawing from social contacts leads to neglect in requesting social support, which directly or indirectly affects the patient's chances of survival.

Holt and Smith have indicated that an interdisciplinary approach to CVD prevention and treatment of cardiac patients should address social factors through medical education, assessment of individual risks and public health surveillance, the adaptation of guidelines and policies to populations and provision of health care services [29]. The American Heart Association (AHA) recommended screening for depression and anxiety disorders among CVD patients as early as 2008. However, reports of such practical measures and the effectiveness of their implementation are still scarce [30].

## Cognitive determinants of health behaviours

Much of the focus of behavioural cardiology is on modifiable factors, i.e., the moderating/mediating variables between an area of socioeconomic functioning and the patient's health-promoting behaviours. One of the most important cognitive modifiable factors is health cognition — the occurrence of specific thoughts and feelings that the patient can relate to health behaviours. Cognitive determinants of health behaviours are generally understood as expectations of the outcome of presented behaviours. For example, the social cognition model — SCM — details the determinants of health behaviours [29]. Such factors include the belief system, activated when behaviour is produced in response to real-life situations. According to this model, behaviours are the result of self-regulation, which is defined as "... mental and behavioural processes, by which people realize their self-conceptions, correct their behaviours or alter their environment to yield outcomes consistent with their self-conceptions and personal goals" [29]. This self-regulatory approach stems from the tradition of clinical thinking, which views mental health recovery as an effort to eliminate dysfunctional patterns of thinking or behaviour and replace them with adaptive patterns. Effective self-regulation is accomplished by reevaluating beliefs, setting goals and continuously monitoring and evaluating goal-oriented behaviours.

A popular model used in working with patients is the Health Belief Model (HBM) developed by Haefner and Kirscht [31]. The researchers showed that interventions designed to increase the participants' perceived susceptibility to disease and the anticipated benefits of a disease treatment resulted in more follow-up visits to a specialist within eight months than the control group. The HBM model assumes that health behaviours result from perceiving the risk of disease and evaluating behaviours that counteract this risk (cost-benefit estimation). Risk assessment is based on the analysis of the following beliefs: perception of susceptibility to the disease (e.g., "How likely is it that I will get sick?") and perception of the consequences of the disease ("How serious will the disease be?"). This model also considers cues to action and health motivation. Cues to action are stimuli that contribute to a behaviour, which can be internal (e.g., a physical symptom) or external (e.g., a mass media campaign, or advice from others). According to

the self-regulation model, the purpose of cues to action is to prompt the patient to engage in health-seeking behaviours but only when other key beliefs that promote action are already in place. Health motivation depends on individual differences and assumes assigning value to health and focusing on taking care of one's health [31].

## Effectiveness of psychotherapeutic interventions

Implementation of anxiety and depression therapies is undoubtedly required but involves many challenges. The effectiveness of available therapies may be undermined by the hospital environment. Additionally, they may not be widely available to cardiac patients. Furthermore, medical personnel does not have the knowledge and experience necessary to perform such tasks. Several meta-analyses are available regarding the efficacy of psychotherapeutic interventions in the treatment of depressive symptoms and disorders in patients with CVD. It appears that cognitive-behavioural therapy (CBT) was moderately effective in reducing depressive symptoms in most cases. Moreover, associations between the relief of depressive symptoms due to psychotherapy and improved prognoses for cardiovascular disease (e.g., death from cardiac causes or other medical complications) have not been fully confirmed. However, some meta-analyses conducted with the use of control groups have shown that patient psychotherapy along with cardiac rehabilitation (progressive cardio workout), oriented towards people with depressive disorders, can alleviate depressive disorders and adverse coronary events, with cardiac rehabilitation showing higher efficacy in reducing patient mortality [32]. The results of the above studies, therefore, support the co-implementation of psychological/psychiatric treatment and cardiological rehabilitation.

## Metacognitive training for cardiological patients

The European Association of Preventive Cardiology (EAPC) emphasizes that addressing symptoms of anxiety and depression in patients with heart disease plays a key role in the success of cardiovascular rehabilitation (CR) programs [33]. The key factor here is to ensure the effective recognition and treatment of anxiety and depression symptoms, which ensures better clinical outcomes in rehabilitation programs and translates into improved quality of life for cardiological patients. The EAPC has also published detailed information on the essential elements and standards of secondary prevention in the clinical management of patients with CVD [33].

It includes recommendations for psychological assessment and support, specifically assessing the needs of patients, including patients experiencing anxiety and depressive disorders; these recommendations apply to evidence-based interventions. There is compelling evidence for the effectiveness of metacognitive therapy (MCT). It is a relatively new form of psychological therapy that could treat anxiety and depressive disorders in patients who participate in cardiological rehabilitation programs. MCT is based on the Self-Regulatory Executive Function model [34]. In this model, emotional distress is assumed to persist under the influence of a thinking style referred to as cognitive attentional syndrome (CAS). The cognitive attentional syndrome incorporates symptoms in the form of repeated negative thoughts (worrying and/or ruminations), focusing attention on threats (thoughts, physical symptoms, emotions), and using maladaptive coping strategies (e.g., abuse of alcohol or other psychoactive substances). This thinking style results from dysfunctional metacognitive beliefs, which stand for focusing on processing negative information, maintaining mental distress and concentrating on worrying, ruminating, and monitoring threats. Ultimately, this style of thinking reinforces the patient's sense of threat. For example, the patient's reaction to the thought "What will happen if I can no longer work?" will constantly worry and experience negative emotional states.

Therefore, during psychological treatment, including metacognitive training, the patient is encouraged to increase control over worry and create more adaptive ways of responding. Positive and negative metacognitive beliefs are more strongly correlated with anxiety and depression among cardiological patients than oncology patients. Recent trials have also pointed to the feasibility of using group metacognitive therapy among patients in cardiological rehabilitation conducted by non-medical professionals [35].

## The importance of Mindfulness-Based Interventions (MBI) in the treatment of cardiovascular patients

There has also been growing interest in cognitive-behavioural therapies (CBT) based on mindfulness techniques in recent years. Interventions of this type belong to the so-called third wave of CBT [36].

According to the classic definition proposed by Jon Kabat-Zinn, the notion of mindfulness stands for a special kind of attention that is conscious, non-judgmental and focused on the now. The most recognized therapies in this stream are Mindfulness-Based Stress Reduction (MBSR) training [37] and Mindfulness-Based Cognitive Therapy (MBCT) [38]. Mindfulness-

-Based Stress Reduction is a structured, 8-week program, initially designed to assist in treating patients with chronic pain, which was later adapted to assist in the treatment of individuals with chronic illness and emotional and behavioural disorders. Mindfulness-Based Cognitive Therapy was developed on the basis of MBSR, intended for patients with recurring depressive episodes to prevent their relapse [43]. Both programs are delivered as 8-week group classes. Participants learn new behaviours during 2.5-hour sessions held weekly. In between sessions, individuals work at home based on the audio materials provided recommended. Mindfulness-based interventions (MBI) combine mindfulness techniques (body scan, meditation, breathing exercise) with cognitive psychotherapy techniques to increase awareness, attentiveness and acceptance of present experience (thoughts, emotional reactions and physical or mental sensations).

The use of MBIs in treating cardiovascular disease has also been recognized. Preliminary evidence has shown that programs of this type can have a positive impact on alleviating depression and anxiety in people with cardiovascular disease and can also improve patients' quality of life [39]. Existing systematic reviews indicate the effectiveness of mindfulness-based interventions in improving mental well-being and enhancing the quality of life in various cardiac patient populations. Observations were carried out for patients with heart failure [44], patients who suffered from a stroke, patients who suffered from myocardial infarction [40] and patients with hypertension [41]. A systematic review, including 16 randomized trials evaluating the effectiveness of MBI-like interventions (MBSR or MBCT and modifications of both programs) in CVD patients, confirmed their significant impact on psychological endpoints [42]. Patients who benefited from MBI therapy confirmed a significant reduction in psychological symptoms (anxiety, depression, distress, and perceived stress) in comparison to the control group. Improvements in blood pressure parameters (systolic but not diastolic) were also observed.

However, the five studies reviewed reported neither psychological nor physiological benefits in the long term. A pilot study [43] confirmed the therapy's significant impact on reducing depressive symptoms immediately after the program.

The studies evaluating the effect of MBI on endpoints related to the physical state in patients with CVD (exacerbation of disease symptoms, dyspnoea, physical performance, heart rate, respiratory rate) are inconsistent. References also include summaries aimed to evaluate the impact of MBI on cardiovascular risk factors, such as hypertension, insulin resistance, obesity, metabolic syndrome tobacco addiction [44].

A meta-analysis of studies evaluating the impact of mindfulness-based therapies suggests their potential beneficial impact on lowering blood pressure in the population suffering from hypertension, although the results need to be confirmed in well-designed randomized trials [45] and taking into account the possible long-term benefits of MBI therapy [46]. MBI-based therapies can be cardioprotective, helping patients make lifestyle changes [47]. There is also a growing interest in applying mindfulness-based techniques in the treatment of addictions, including tobacco addiction. A meta-analysis conducted by de Souza et al. shows potential benefits, including quitting smoking, reducing the number of cigarettes smoked per day, reducing cravings associated with smoking and preventing relapse [48]. However, the authors note the need for well-designed randomized trials in this area.

In 2017, The American Heart Association (AHA) issued an expert consensus evaluating the impact of mindfulness-based interventions on cardiovascular disease. According to their statement, existing evidence may suggest their potential beneficial effect on cardiovascular risk reduction. However, further research requires significant improvements in the methodology applied. Given its low cost, good tolerability and accessibility, mindfulness-based interventions can be considered a legitimate therapy to complement the standard cardiovascular risk reduction management recommended in the official guidelines of scientific societies [49].

A 2020 analysis of data from the U.S. National Health Interview Survey evaluating the relationship between mindfulness-based techniques, cardiovascular risk factors and prevalence found that meditation practices are an independent factor associated with lower rates of hypercholesterolemia, hypertension, diabetes, stroke and ischaemic heart disease [50].

Mindfulness-based interventions are characterized by a significant degree of complexity, and their exact mechanisms have not been fully understood. Several mechanisms have been proposed to affect patients with cardiovascular disease, e.g., increasing physical activity through mindful movement (yoga), increasing empathy and self-care through self-compassion exercises, or decreasing adrenergic tension by stimulating the vagus nerve using breathing exercises.

Mindfulness-based interventions are assumed to show positive effects on mental function by decreasing ruminations, and emotional avoidance and by increasing behavioural self-regulation. Available data also points to improvements in working memory, autobiography memory, cognitive flexibility and meta-awareness as potential mechanisms of MBI impact.

Studies illustrating the use of MBIs in the prevention or treatment of patients with CVD have several methodological limitations, including a lack of blinding, small group sizes, short observation period, lack of clear definition of the control group and lack of randomization. Undoubtedly, a study of such inter-

ventions is warranted but requires developing a structured methodological approach and improvements in effectiveness. Given their wide availability, low cost and safety, mindfulness-based techniques may be a valuable supplement to the traditional management of cardiovascular disease.

Most of the completed studies and analyses suggest the inclusion of mindfulness training as a complementary treatment to the classical treatment modalities used in clinical practice [51].

## Discussion

This article discussed the importance of psychosocial factors and their impact on cardiovascular disease. Psychosocial factors may indirectly affect the cardiovascular system, i.e., through habits that regulate health-oriented behaviours. For example, depressive or anxiety disorders, or isolation, may keep people from receiving pharmacological treatment. At the same time, certain adaptive beliefs and/or a supportive social network may help people refrain from smoking or facilitate weight control.

The cognitive perspective is also important, as it determines the processes of information processing that translate into the adequate perception of the patient's reality and health decisions and the appropriate repertoire of behaviours. These are processes of self-regulation as a higher-order function of psychological regulation responsible for making the knowledge about oneself more realistic, adjusting one's behaviour to the internal requirements and the surrounding environment to the extent of the individual's abilities. These actions are independent of environmental and economic factors, although maladaptive perceptual processes are not the only psychological barriers to adherence to health behaviours; for example, personality traits can adversely affect patient behaviour. The cardiological patient may succumb to excessive worry and ruminations, which in turn may translate into the long-term development and maintenance of depressive and anxiety states. Concurring mental disorders, especially depression, significantly limit the patient's ability to comply with medical recommendations.

In difficult situations, e.g., mental breakdown, there is effective psychological assistance based on techniques found in cognitive-behavioural psychotherapy, metacognitive training and mindfulness-based training — all verified in empirical studies. Many authors of studies and meta-analyses cited in the article emphasize the importance of psychosocial factors in the prevention, treatment, and rehabilitation of cardiological patients and suggest including psychological training in routine patient care.

The psychological proposal of evidence-based therapeutic interventions can contribute to reduced mortality among cardiac patients.

However, it is important to note that, currently, psychological interventions designed for CVD patients still play a minor role in patient care in most countries worldwide. One reason for this is that cardiology's diagnostic and therapeutic strategies are opposed paradigms to psychological treatments given their short and long-term treatment outcomes, respectively (cardiology focuses on immediate results for patients, while psychotherapy requires time). Another reason may be the available knowledge on the effectiveness of psychological interventions in heart disease, which, despite its diversity, is still ambiguous at many points and problematic to interpret, which is also hampered by the conclusions of meta-analyses reporting limited or moderate benefits.

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