Psychological Health, Well-Being, and the Mind-Heart-Body Connection

A Scientific Statement From the American Heart Association

ABSTRACT: As clinicians delivering health care, we are very good at treating disease but often not as good at treating the person. The focus of our attention has been on the specific physical condition rather than the patient as a whole. Less attention has been given to psychological health and how that can contribute to physical health and disease. However, there is now an increasing appreciation of how psychological health can contribute not only in a negative way to cardiovascular disease (CVD) but also in a positive way to better cardiovascular health and reduced cardiovascular risk. This American Heart Association scientific statement was commissioned to evaluate, synthesize, and summarize for the health care community knowledge to date on the relationship between psychological health and cardiovascular health and disease and to suggest simple steps to screen for, and ultimately improve, the psychological health of patients with and at risk for CVD. Based on current study data, the following statements can be made: There are good data showing clear associations between psychological health and CVD and risk; there is increasing evidence that psychological health may be causally linked to biological processes and behaviors that contribute to and cause CVD; the preponderance of data suggest that interventions to improve psychological health can have a beneficial impact on cardiovascular health; simple screening measures can be used by health care providers for patients with or at risk for CVD to assess psychological health status; and consideration of psychological health is advisable in the evaluation and management of patients with or at risk for CVD.

Glenn N. Levine, MD, FAHA, Chair
Beth E. Cohen, MD, MAS
Yvonne Commodore-Mensah, PhD, MHS, RN
Julie Fleury, PhD
Jeff C. Huffman, MD
Umair Khalid, MD
Darwin R. Labarthe, MD, MPH, PhD, FAHA
Helen Lavretsky, MD
Erin D. Michos, MD, MHS
Erica S. Spatz, MD, MHS
Laura D. Kubzansky, PhD, MPH
On behalf of the American Heart Association Council on Clinical Cardiology; Council on Arteriosclerosis, Thrombosis and Vascular Biology; Council on Cardiovascular and Stroke Nursing; and Council on Lifestyle and Cardiometabolic Health

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As clinicians delivering health care, we are very good at treating disease but often not as good at treating the person. The focus of our attention has been on the specific physical condition rather than the patient as a whole. Less attention has been given to psychological health and how that can contribute to physical health and disease. In cardiovascular medicine, there has been an understandable focus on the treatment of specific cardiac disorders with pharmacological and device-based therapies. However, there is now an increasing appreciation of how psychological health can contribute not only in a negative way to cardiovascular disease (CVD) but also in a positive way to better cardiovascular health and reduced cardiovascular risk. Furthermore, the impact of psychological health on cardiovascular health is increasingly being examined in a more rigorous manner.

The World Health Organization defines mental health as "a state of well-being in which an individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community."[1] Negative psychological health encompasses depression, chronic stress, anxiety, anger, pessimism, and dissatisfaction with one's current life. Positive psychological health is also multifaceted and may be characterized by a sense of optimism, sense of purpose, gratitude, resilience, positive affect (ie, positive emotion), and happiness.

Several terms have been used to describe and capture an overall state of health. Wellness is more than simply the absence of disease. It is an active process directed toward a healthier, happier, and more fulfilling life and includes not only physical but also psychological and emotional dimensions.[2] The related term well-being can be defined as one's cognitive and affective evaluation and assessment of one's life, including physical health, satisfaction, happiness, and a sense of fulfillment. Well-being serves as an umbrella term for the different valuations people make about their lives, including their physical and mental health, their financial position, their social supports and connectedness to community, their opportunities for growth and ability to achieve their goals, and a general sense of purpose and satisfaction with their life course. Well-being is a more quantifiable state than wellness, and numerous measures have been developed to evaluate well-being at the individual and population levels.[3] It is thus a term often preferred by health organizations and policy makers.[3,4] Improving patient well-being is central to the mission of the American Heart Association (AHA). Both wellness and well-being serve to remind us as clinicians that a patient is not merely 1 or more physical disease states but a human being for whom we must consider not only physical but psychological aspects. Therefore, we must strive to reduce negative aspects of psychological health and promote an overall positive and healthy state of being.

The mind, heart, and body are interconnected and interdependent. Factors, conditions, and disease states (both physical and psychological) that affect 1 of these 3 components of a person can affect the other 2 components. It is well established that systemic body factors and conditions, including diabetes, hypertension, and hyperlipidemia, can adversely affect the heart and the broader cardiovascular system.[5] The development of CVD such as myocardial infarction (MI), heart failure, stroke, or need for undergoing coronary revascularization can also lead to the development of negative psychological health.[6–9] Although takotsubo or stress-induced cardiomyopathy is the most overt example of how a psychological state can adversely and immediately affect the heart, a growing body of data suggest a broader, long-term relationship as well whereby the psychological health of a person (a person's mind) can positively or negatively affect cardiovascular health, cardiovascular risk factors, risk for CVD events, and cardiovascular prognosis over time. This intertwined relationship between heart, body, and mind can be called the mind-heart-body connection.[2]

This AHA scientific statement was commissioned to evaluate, synthesize, and summarize for the health care community knowledge to date of the relationship between psychological health and cardiovascular health and disease and summarize the most relevant studies of interventions designed to address psychological disorders in patients with CVD. This scientific statement is presented in 9 sections: methodology; negative psychological health; positive psychological health; pathways linking psychological health and CVD; interventions for psychiatric disorders or symptoms to improve cardiovascular health; interventions to promote psychological well-being and improve cardiovascular health; implications for clinical practice; future research; and conclusions.

METHODOLOGY

To develop this scientific statement, writing group members were identified and selected on the basis of a broad array of relevant areas of expertise, specialties, and primary practice settings. Studies on psychological health and cardiovascular health, risk, and disease were searched for on PubMed with the use of search terms including psychological health, wellness, well-being, depression, anxiety, stress, trauma, anger, hostility, pessimism, optimism, gratitude, happiness, resilience, mindfulness, life satisfaction, hope, vitality, positive affect, antidepressants, psychotherapy, and meditation. A review of every single negative and psychological factor that could potentially affect cardiovascular health is beyond the scope of this article. Thus, this document focuses on key and common psychological factors for

which there are the most relevant study data as identified by the writing group. Relevant studies were identified and reviewed, and study findings were summarized in tabular format (and provided as an appendix of supplementary study summary tables).

Factors considered in evaluating study data included observational versus experimental (clinical trial) design, association versus causation, clinical outcomes measured, quality of psychological measures used, confounding variables, duration of follow-up, and issues of directionality and bidirectionality (Does the psychological condition cause the cardiovascular health status, did the cardiovascular health status cause the psychological condition, or is there a bidirectional interaction). Although the majority of studies examining pathways and mechanisms rely on cross-sectional data, more rigorous study designs are commonly used with studies of disease end points. For etiological studies linking psychological factors (positive or negative) with disease end points or health conditions, we prioritized consideration of longitudinal studies that measured psychological factors in healthy individuals and followed up individuals over time to assess risk of developing disease. For studies examining psychological factors in relation to secondary events in patient populations, we prioritized clinical trials or observational studies including clear information on health status at the start of follow-up.

For all sections, a primary author without relevant relationships with industry and ≥1 secondary authors drafted the initial text and conclusions. All sections, tables, and conclusions were then reviewed by all writing group members, and the manuscript was revised on the basis of this review. The manuscript was then reviewed by 3 external reviewers and revised accordingly. The finalized manuscript was approved by all writing group members.

NEGATIVE PSYCHOLOGICAL HEALTH AND CVD

Research has now clearly demonstrated that negative psychological factors, personality traits, and mental health disorders can affect cardiovascular health. Although many of these studies have considered CVD risk in relation to specific negative emotions, numerous investigators have pointed to overlap across them, and posited effects are driven largely by underlying personality dimensions such as neuroticism or type D personality. However, specific emotional experiences have distinct neurobiological and behavioral features, and they uniquely contribute to CVD risk.[10–13] Considering effects of these negative emotions and states can provide critical insight into mechanisms and strategies for more targeted interventions. Although many earlier studies focused on specific (eg, nongeneralizable) populations and often used subjective and self-reported measures of disease to assess CVD outcomes, newer studies have confirmed these associations in more diverse and generalizable populations and have included measures derived from objective testing to establish the presence of CVD.

Chronic Stress and Social Stressors

The concept of stress is complex, and the many conflicting definitions and causes of stress have made studying the impact of stress on CVD challenging. Stressful life events, chronic daily stressors, and high levels of perceived stress have been shown to affect CVD health.[14] Psychological stress can result from numerous sources such as challenges from work, poor-quality or insufficient relationships, financial hardships, and discrimination. Beyond these types of stressful experiences, people may also be exposed to traumatic stress if they experience or witness events that involve a threat to safety.

Studies have demonstrated that both cumulative exposure to daily stressors and exposure to traumatic stress can increase the risk of CVD.[15–17] A meta-analysis of prospective studies published through 2011 found that work-related stress was associated with a 40% increased risk of incident CVD (risk ratio [RR], 1.4 [95% CI, 1.2–1.8]).[18] Another meta-analysis that focused on patient reports of perceived stress, regardless of cause, and included data from 118 696 participants across 6 studies found that high perceived stress was associated with a 27% increased risk in incident coronary heart disease (CHD) and CHD mortality (RR, 1.27 [95% CI, 1.12–1.45]).[19] Social isolation and loneliness, common sources of stress, are also linked to increased CVD risk, with a meta-analysis of prospective studies finding a 50% increased risk of incident CVD events (RR, 1.5 [95% CI, 1.2–1.9]).[18] Stressful experiences in childhood can have far-reaching effects on cardiovascular health. Childhood maltreatment, social isolation, and socioeconomic disadvantage have been linked to higher levels of inflammation and metabolic risk factors later in life.[20,21]

Posttraumatic stress disorder (PTSD) is the sentinel stress-related mental disorder that occurs after exposure to a potentially traumatic life event and is characterized by extreme levels of distress. Two meta-analyses of PTSD and CVD have been published, with the most recent one from 2018 including 9 studies with 151 144 participants. This analysis found that PTSD was associated with a 61% increased risk of CHD (hazard ratio [HR], 1.61 [95% CI, 1.46–1.77]).[22] This association remained significant after additional adjustment for comorbid depression (HR, 1.46 [95% CI, 1.26–1.69]). Numerous studies have also linked PTSD to elevations in traditional CVD risk factors[23–27] and confirmed the association of PTSD and CVD by using objective tests of cardiovascular health and function such as nuclear imaging.[28–30]

Anger and Hostility

Instances of anger and hostility can precipitate undesirable sympathetic response. A meta-analysis found that induction of angry rumination was associated with increases in cardiovascular reactivity as measured by heart rate, diastolic blood pressure, and systolic blood pressure.[31] Anger may also acutely increase the risk of adverse cardiovascular events, with a systematic review of case-crossover studies demonstrating higher rates of CVD events, including MI/acute coronary syndrome (ACS), stroke, and ventricular arrhythmia, in the 2 hours after an outburst of anger.[32]

Chronic anger and hostility have also been linked to increased risk of CHD. In a meta-analysis of 25 studies, anger and hostility were associated with increases in incident CHD (HR, 1.19 [95% CI], 1.05–1.35) in healthy populations and with recurrent events (HR, 1.24 [95% CI, 1.08–1.42]) in patients with existing CHD.[33] Additional work has suggested that long-standing exposure to personality traits of greater anger and hostility can lead to premature development of CVD. For example, in a cohort of 416 physicians recruited during medical school, high levels of self-reported hostility and measures of aggression predicted an increased rate of CVD and CHD at 55 years of age.[34]

Anxiety

The American Psychological Association defines anxiety as "an emotion characterized by feelings of tension, worried thoughts, and physical changes like increased blood pressure,"[35] suggesting the likelihood of a link between anxiety and CVD risk. Anxiety may occur as a transient state or as a general tendency (ie, trait-like) or, when experienced frequently or persistently at high intensity and in inappropriate settings, may be characteristic of a clinical disorder such as generalized anxiety disorder. In the United States, the lifetime prevalence of anxiety disorders is >25%.[36]

There is some evidence that anxiety is a risk factor for hypertension, excess adiposity, and smoking, which can accelerate atherosclerosis.[37,38] Several meta-analyses of studies examining the association of anxiety and CVD have been published, with the largest study from 2016 including 2 017 276 participants from 46 cohorts. Anxiety was associated with an increased risk of CVD mortality (RR, 1.41 [95% CI, 1.13–1.76]) and specific types of CVD, including CHD (RR, 1.41 [95% CI, 1.23–1.61]), stroke (RR, 1.71 [95% CI, 1.18–2.50]), and heart failure (RR, 1.35 [95% CI, 1.11–1.64]).[39]

Some experts have proposed that anxiety and depression can additionally lead to ischemia through coronary artery vasospasm. In a Taiwanese study of the presence of confirmed coronary artery spasm using health records from a national insurance database, models adjusted for a range of potential confounders demonstrated that anxiety was associated with a notably increased risk of incident coronary artery spasm (odds ratio [OR], 5.20 [95% CI, 4.72–5.40]).[40]

Depression

The lifetime prevalence of major depressive disorder in the United States is 20.6%, with women, younger adults, and those earning lower income being at greater risk.[41] Numerous studies have found that people who experience depression are at increased risk of developing and dying of CVD. Multiple meta-analyses[42–44] of depression and CVD have been published, including a study from 2014 including 893 850 participants from 30 prospective cohort studies conducted in North America, Western Europe, and Asia.[42] In this 2014 meta-analysis, depression was associated with an increased risk of MI (RR, 1.30 [95% CI, 1.22–1.40]) and incident CHD (RR, 1.30 [95% CI, 1.18–1.44]). These associations remained significant after adjustment for potential confounders, including sociodemographic factors and health behaviors. A separate meta-analysis including 399 791 participants also found that depression was associated with a significantly increased risk of stroke (RR, 1.45 [95% CI, 1.31–1.61]).[45] Although these studies focused on incident CVD, considerable evidence also demonstrates that depression increases the risk of recurrent events and mortality in patients with existing CVD.[46,47] On the strength of these findings, the AHA issued a 2014 scientific statement recommending that depression be considered a risk factor for recurrent cardiovascular events in survivors of ACS.[48]

The increased CVD risk seen in patients with depression may be driven partially by elevations in traditional cardiovascular risk factors. Obesity has received the most attention, with a meta-analysis of 19 studies finding a significant bidirectional association that was stronger in the direction of depression leading to increased risk of obesity (RR, 1.37 [95% CI, 1.17–1.48]).[49]

Pessimism

Pessimism is characterized by the tendency to expect negative outcomes or by the tendency to routinely explain events in a negative way. A pessimistic explanatory style has also been linked to a sense of hopelessness. These factors have been linked to cardiovascular risk. For example, in an 11-year prospective cohort study from Finland that garnered a great deal of media attention, pessimism was a significant predictor of CHD mortality, with the adjusted risk being double among those in the highest versus lowest quartile (OR, 2.17 [95% CI, 1.21–3.89]).[50] Additional work has explicitly considered effects of a related construct, having a more positive outlook (see the Optimism section).

Table 1. Effect Estimates for Associations of Negative Psychological Factors With Cardiovascular Events and Conditions

Negative psychological factors	Parameter/ end point	Effect estimates (95% CI)
Depression	Incident MI	RR, 1.30 (1.22–1.40)[42]
	Incident CHD	RR, 1.30 (1.18–1.44)[42]
	Stroke	RR, 1.45 (1.31–1.61)[45]
	Obesity	RR, 1.37 (1.17–1.48)[49]
	Hypertension	RR, 1.42 (1.09–1.86)[51]
	Diabetes	RR, 1.32 (1.18–1.47)[52]
Anxiety	CVD mortality	RR, 1.41 (1.13–1.76)[39]
	Incident CHD	RR, 1.41 (1.23–1.61)[39]
	Coronary artery spasm	RR, 5.20 (4.72–5.40)[40]
	Incident stroke	RR, 1.71 (1.18–2.50)[39]
	Heart failure	RR, 1.35 (1.11–1.64)[39]
Work-related stress	Incident CVD events	RR, 1.4 (1.2–1.8)[18]
Any-cause stress	Incident CHD/CHD mortality	RR, 1.27 (1.12–1.45)[19]
PTSD	Incident CHD	RR, 1.61 (1.46–1.77)[22]
Social isolation and loneliness	Incident CVD events	RR, 1.5 (1.2–1.9)[18]
Pessimism	CHD mortality	OR, 2.17 (1.21–3.89)[50] (highest vs lowest quartile)
Anger and hostility	Incident CHD	HR, 1.19 (1.05–1.35)[33]
	Recurrent CHD	HR, 1.24 (1.08–1.42)[33]

CHD indicates coronary heart disease; CVD, cardiovascular disease; HR, hazard ratio; MI, myocardial infarction; OR, odds ratio; PTSD, posttraumatic stress disorder; and RR, risk ratio.

Summary of Findings: Negative Psychological Health and CVD

Calculated RRs for associations of negative psychological factors and cardiovascular risk are given in Table 1, and a summary of key relevant studies on negative psychological health and CVD is provided in the Online Data Supplement (Supplemental Table 1A–1E). Taken together, these studies highlight the potential adverse impact of poor psychological functioning, psychological stress, trauma, anger and hostility, and mental health disorders on cardiovascular health. Given the nature of this work, most human studies in this area are observational, with many involving large administrative databases or self-reporting of exposures. The potential thus exists for bias from misclassification and confounding, presenting challenges to establishing causal associations. However, many studies have used methodology including carefully adjudicated events and objective measures of CVD and adjustment for a broad range of potential confounders, and overall, there appear to be good data to support associations between negative psychological health and cardiovascular risk.

POSITIVE PSYCHOLOGICAL HEALTH AND CVD

There is no single universal definition of positive psychological health. For the purposes of this scientific statement, positive psychological health includes the presence of positive psychological factors such as happiness, optimism, gratitude, sense of purpose, life satisfaction, eudaimonic (virtuous) well-being, and mindfulness. Although prior work has noted some conceptual similarities across various facets of positive psychological well-being, a substantial body of work also suggests that each facet is distinctive in important ways and, as a result, may have different effects on health-related outcomes. This issue has been addressed in more detail elsewhere.[53] Positive psychological health implies more than the mere absence of negative psychological factors such as depression, anxiety, and pessimism, and the absence of psychological distress does not necessarily imply that individuals are actively experiencing psychological well-being.[54] It is worth noting that many of the more rigorous studies of positive psychological factors in relation to either biological or behavioral mechanisms have gone to considerable lengths, within the limits of available data, to demonstrate that any apparent effects are maintained even after accounting for depression or anxiety or other negative psychological factors. This includes statistical adjustment and the exclusion of individuals who are highly distressed. Findings to date suggest that positive psychological factors are independently associated with cardiovascular benefits beyond simply the absence of negative states.

Optimism

Optimism is characterized by having a sense of hopefulness and confidence that things will work out well in the future and anticipating the best possible outcomes. Multiple studies have found that optimism is associated with healthier behaviors such as more physical activity, not smoking,[55] healthy diet score,[56] better sleep quality,[57] and higher composite cardiovascular health scores.[57–59] An optimistic frame of mind has been shown to be associated with healthy aging[60] and a lower risk of CVD,[61] including stroke[62] and heart failure,[63] and a lower risk of all-cause mortality.[64] One study found that women with higher optimism scores experienced slower progression of atherosclerosis in their carotid arteries.[65] A recent meta-analysis that included 15 observational studies and 220 391 individuals found that higher levels of optimism were associated with a 35% decreased risk of incident CVD events (RR, 0.65 [95% CI, 0.51–0.78]) and a 14% decreased risk of all-cause mortality (RR, 0.86 [95% CI, 0.80–0.92]).[66] This association was seen for both men and women and remained significant after adjustment for depression. Of note, this degree of association for optimism was similar

to that of traditional CVD risk factors. In 2 epidemiological cohorts of men and women, more optimistic individuals had an ≈10% longer life span and a greater adjusted odds of surviving to ≥85 years of age (OR, 1.5 for women and 1.7 for men).[67]

In individuals with established CVD, optimism has similarly been linked to more favorable cardiovascular outcomes.[68,69] In the GRACE study (Gratitude Research in Acute Coronary Events), which assessed degree of optimism in 164 patients with ACS and then followed up these individuals for 6 months, higher optimism was associated with decreased risk of hospital cardiac readmissions (HR, 0.92 [95% CI, 0.86–0.98]).[68]

Sense of Purpose

Sense of purpose can be defined in many ways, but it is generally conceptualized as finding meaning in one's daily life and being motivated and directed by one's values and life goals. Similar to optimistic adults, adults with a greater sense of purpose have more favorable lifestyle and cardiovascular risk factors such as less smoking,[70] more physical activity,[30] less alcohol and substance abuse, and better glucose control.[71] A greater sense of purpose in life has been associated with better cardiovascular health, longevity, and reduced risk of CVD,[72] including decreased risk of both MI[73] and stroke.[74] Older adults who have a greater sense of purpose in life also had a lower risk of mortality, even after accounting for depression, disability, and other comorbidities.[75] A meta-analysis including 10 prospective studies and >130 000 participants found that having a greater sense of purpose in life was associated with a 17% decreased risk of both CVD events (RR, 0.83 [95% CI, 0.75–0.92]) and all-cause mortality (RR, 0.83 [95% CI, 0.75–0.91]).[76]

Happiness and Positive Affect

Happiness is a form of positive affect, characterized by a state of positive well-being and contentment. Happy individuals tend to sleep better, exercise more, eat better, and not smoke.[77] In a prospective cohort study, individuals who were rated by trained observers as displaying a more positive affect had a 22% lower risk of incident CHD (HR, 0.78 [95% CI, 0.63–0.96]).[22] Other work has found that positive affect protects against disease progression in the context of diabetes and other cardiometabolic conditions.[77,78] In a study of participants in the NHANES (National Health and Nutrition Examination Study) I NHEFS (Epidemiological Follow-Up Study), patients with diabetes with higher positive affect had reduced risk of mortality over 10 years of follow-up (HR, 0.87 [95% CI, 0.76–0.99]) in multivariable-adjusted models. However, in the Million Women Study, there was no association of happiness with risk of mortality after accounting for health status, although concerns have been raised about the study methodology.[79,80]

Mindfulness

Mindfulness can be defined in many ways. For the purposes of this article, mindfulness can be defined as a present, moment-by-moment, nonjudgmental awareness of one's thoughts, emotions, and actions.[81] Mindfulness can also be a form of meditation, and the potential benefits of meditation on CVD have previously been reviewed.[81] Practicing mindfulness allows one to be more aware of and to have more control over one's emotional responses to the experiences of daily life. Mindfulness is associated with less stress, more compassion, and higher levels of well-being.[82–84] With respect to cardiac risk factors, modest study data suggest that higher levels of mindfulness are associated with a lower likelihood of having cardiovascular risk factors. Mindfulness has been associated with less tobacco use and a greater likelihood of not smoking, greater physical activity levels, more restrained eating, fasting glucose level <100 mg/dL, and a lower body mass index.[85–87] There are no studies to date on the association of mindfulness and hard cardiovascular end points. Still, a scientific statement from the AHA concluded that meditation was a reasonable adjunct to other cardiovascular risk reduction methods given its low cost and risk and its potential benefits.[81]

Other Positive Factors

Other positive psychological factors have been linked to reduced risk of CVD, including emotional vitality (a marker of having a sense of positive energy and capacity to regulate emotions effectively), gratitude, and resilience, and overall psychological well-being, although the quantity of study data to date are extremely limited. In a population-based cohort study of 6025 adults without CHD at baseline who were followed up for a mean of 15 years after baseline interview, those with higher levels of emotional vitality had a smaller multivariate-adjusted relative risk of developing CHD compared with those with lower levels of vitality (RR, 0.81 [95% CI, 0.69–0.94]), with a significant dose-response relationship evident.[88]

In the English Longitudinal Study of Ageing (n=4925), older adults who experienced higher levels of psychological well-being were more likely to maintain favorable cardiovascular health (defined as being a nonsmoker, being free of diabetes, and having healthy levels of blood pressure, cholesterol, and body mass index) at each of 3 time points across 8 years of follow-up.[89] Psychological well-being was also associated with a 29% reduced risk of cardiovascular-related mortality in multivariable-adjusted models (OR, 0.71 [95% CI, 0.59–0.84]).

Gratitude is the affective trait of being appreciative of and thankful for people and experiences in one's life. Small clinical trials evaluating a gratitude intervention (eg, gratitude journaling) suggested improvements in blood pressure, sleep, inflammatory biomarkers, and heart rate variability.[19,20] Among patients with ACS, gratitude was associated with increased self-reported medication adherence,[90] although it was not associated with fewer cardiac readmissions.[68]

Resilience is the ability to maintain stable psychosocial and physical function in response to stress or adversity and to mitigate detrimental processes related to such experiences. To date, there are very limited, and mixed, study data results with regard to effects on cardiovascular outcomes.[91,92]

Summary of Findings: Positive Psychological Factors and Cardiovascular Health

Calculated relative risks or prevalence ratios for the associations of positive psychological factors and cardiovascular health and prognosis in relevant studies are given in Table 2, and a summary of key relevant studies on positive psychological health and CVD is provided in Supplemental Table 2. In general, most, but not all, studies have found a number of positive psychological attributes to be associated with a lower risk of CVD and mortality, as well as with behavioral and biological factors that may be mediators of these noted associations. Methodological limitations of some studies include the quality of ascertainment tools used to assess the psychological factors, lack of standardized consensus agreement about the best tools to use in such studies, the potential for misclassification bias, and assessments of positive psychological attributes often measured at baseline, with few studies evaluating change in psychological states over time. That said, many studies use a variety of methods to address concerns about residual confounding or reverse causation by poorer health status, and the overall body of current data are largely consistent and strongly suggestive that these positive psychological factors should be considered independent factors that play at least some causal role in better cardiovascular health.

Table 2. Effect Estimates for Associations of Positive Psychological Factors With Cardiovascular Events and Cardiovascular Health Indicators

Positive psychological factors	Parameter/ end point	Effect estimates (95% CI)
Optimism	Incident CVD	RR, 0.65 (0.51–0.78)[66]
	Hospital readmission after ACS	HR, 0.92 (0.86–0.98)[68]
	All-cause mortality	RR, 0.86 (0.80–0.92)[66]
Sense of purpose	CVD risk	RR, 0.83 (0.75–0.92)[76]
	All-cause mortality	RR, 0.83 (0.75–0.91)[76]
Happiness/more positive affect*	Incident CHD	HR, 0.78 (0.63–0.96)[93]
Mindfulness†	Good cardiovascular health	PR, 1.83 (1.07–3.13)[86]
	Nonsmoking	PR, 1.37 (1.06–1.76)[86]
	Body mass index <25 kg/m^2	PR, 2.17 (1.16–4.07)[86]
	Fasting glucose <100 mg/dL	PR, 1.47 (1.06–2.04)[86]
	High level of physical activity	PR, 1.56 (1.04–2.35)[86]
Higher emotional vitality	Incident CHD	RR, 0.81 (0.69–0.94)[88]
Psychological well-being	Cardiovascular mortality	OR, 0.71 (0.59–0.84)[89]

A PR >1 indicates a greater (desirable) association with some beneficial cardiovascular status.

ACS indicates acute coronary syndrome; CHD, coronary heart disease; CVD, cardiovascular disease; HR, hazard ratio; OR, odds ratio; PR, prevalence ratio; and RR, risk ratio.

*Positive affect graded on a scale of 1 to 5, with HR (and 95% CI) calculated for each 1-point increase in positive affect between groups.

†Study compared those with high degrees of mindfulness and those with low degrees of mindfulness.

PATHWAYS LINKING PSYCHOLOGICAL HEALTH AND CVD

Psychological factors may influence cardiovascular health through direct biological alterations, through indirect effects on behaviors that influence cardiac health, and by promoting or impairing psychosocial resources that protect health or buffer detrimental effects of stressful experiences. Studies have considered a broad array of psychological factors, including negative emotional states (eg, anger, anxiety, depression, general distress) and perceived stress, as well as positive emotions (eg, happiness) and other facets of psychological health (eg, optimism, purpose, life satisfaction). Although some pathways are shared across negative and positive psychological factors,[11,53,77,94,95] specific manifestations of psychological health may also have distinct biobehavioral effects.[96] Some studies demonstrate associations of depression with higher concentrations of low-density and very-low-density lipoprotein cholesterols,[97] whereas higher psychological health has been linked to elevated high-density lipoprotein cholesterol levels only.[98,99] Furthermore, pathways linking psychological factors and CVD may differ depending on whether the population under study is healthy or already has CVD. For example, in healthy populations, preventive screening may serve as a mediator of outcomes, whereas in populations with established CVD, medication adherence is a plausible mechanism.

Biological Processes

Psychological factors lead to specific biological alterations that influence cardiovascular health. Anger and hostility are associated with increased platelet aggregation and inflammation.[100] Most forms of psychological distress (eg, anger, anxiety, depression, PTSD) lead to activation of the hypothalamic-pituitary-adrenal axis, resulting in dysregulation of the autonomic nervous system and a cascade of downstream effects that can increase the risk of developing CVD.[95,101] Acute instances of distress can lead to immediate changes and even dramatic elevations in catecholamines.[102–107] An experimental study comparing cardiovascular recovery after an acute stress task in 50 healthy individuals with high versus low distress found that highly distressed participants demonstrated differences in baroreflex sensitivity and other markers suggesting impaired cardiovagal reactivation.[108] Acute instances of mental stress combined with psychological distress (eg, depression) has also been linked to inducible myocardial ischemia among patients with coronary artery disease.[109–111] These biological processes have the potential to perturb parasympathetic/sympathetic cardiac innervation, increase myocardial oxygen demand, precipitate myocardial ischemia, increase the risk of arrhythmia, and potentially precipitate coronary plaque rupture. Takotsubo cardiomyopathy is one such untoward event likely related to these processes.

Chronic psychological stress can increase long-term cardiovascular risk through related biologically plausible mechanisms. Specifically, chronic distress is associated with detrimental processes, including hypercoagulability, dyslipidemia,[112–114] impaired glucose control,[115,116] and increased inflammatory processes and impaired immune responses.[95,117,118] An example of a more chronic effect comes from a study of 475 healthy women comparing markers of endothelial function before and after the onset of PTSD. Those who developed PTSD exhibited larger increases in vascular cell adhesion molecule 1 relative to women with no history of trauma and PTSD.[119] Chronic persistent psychological distress can also lead to increased sympathetic tone, decreased vagal tone, decreased heart rate variability, and increased arterial stiffness and endothelial dysfunction.[120–123] As noted, at least 1 study found that chronic anxiety was associated with a notably increased risk of coronary spasm.[40] Although numerous studies note that associations between negative psychological health and factors that increase cardiovascular risk are likely bidirectional, recent longitudinal studies provide strong evidence that factors such as depression and PTSD precede and predict higher levels of inflammation in both healthy and patient populations.[118,119,124] In turn, these factors are associated with an increased risk of atherosclerosis and arterial thrombosis.

Positive psychological factors can promote healthier cardiovascular function via either health-promoting effects on biological processes such as inflammation or buffering effects whereby reactivity to stressful experiences is mitigated or less potent, although study findings are not fully consistent.[53,125] Positive psychological factors, including the capacity to regulate emotions effectively, are associated with and plausibly mechanistically responsible for healthier basal levels of autonomic parameters such as heart rate and heart rate variability, greater vagal tone, and healthier biological stress responses.[126–131] One longitudinal study of an older adult population found that increases in eudaimonic (purpose and growth within life) well-being were associated with decreases in C-reactive protein and fibrinogen levels, even after accounting for baseline health status and mental health.[132] Some, but not all, other studies have similarly found relationships between positive psychological factors and healthy immune response or lower levels of inflammation.[54,133–135] Inflammation is now a well-recognized risk for atherosclerosis progression and plaque rupture.

Behavioral and Psychosocial Processes

As described earlier, negative psychological health, including depression, anxiety, and stress, is associated with smoking, lower levels of physical activity, poorer diet quality, and being overweight or obese.[25,95] These lifestyle factors are all causally linked to an increased risk of the development of CVD.[5] Although the question of bidirectionality exists between the presence of negative psychological states and these cardiac risk factors, longitudinal studies show that negative psychological factors precede and predict poorer health-related behaviors and faster rate of weight gain.[136–138] For example, separate studies following up 50 000 women over 20 years found that higher PTSD symptom levels were associated with more future weight gain and with less healthy changes in diet quality over time.[136,137] Moreover, they found a steeper decline in physical activity after the onset of PTSD symptoms.[136–138]

Positive psychological states can plausibly lead to lower CVD risk through healthier behaviors. Individuals with better psychological health are more likely to engage in preventive screening, including for CVD.[139,140] In a recent cross-sectional study of 2.5 million people, those with higher positive affect or high life satisfaction were more likely to engage in healthy lifestyle behaviors (eg, exercising, not smoking).[141] Findings are relatively consistent across studies and evident for multiple facets of positive psychological health, although effect sizes are modest.[54,141–143] Although the issue of bidirectionality has been raised, longitudinal studies suggest that it is the presence of positive psychological states that contributes to better future lifestyle practices.[56,144–146]

Psychological illness and psychological health have been shown to be associated with medication nonadherence or adherence, respectively.[142,147–150] Numerous studies have found a relationship between major depressive disorder and poor adherence to cardiovascular medications.[151–155] One study of patients with ACS found a "dose-response" relationship between the degree of depressive symptom severity and degree of medication nonadherence (15% in nondepressed patients, 29% in mildly depressed patients, and 37% in moderate to severely depressed patients).[152] Strikingly, the medication assessed was simple once-daily aspirin. This same study also found that depressive symptom improvement was associated with improved medication adherence after 2 months.[152] Although fewer studies have considered whether positive psychological factors may lead to better medication and treatment adherence and findings are not fully consistent, the preponderance of current data support such a relationship.[156,157] In 1 study of 662 patients with CHD, those initially with higher versus lower levels of positive affect and those who reported increases in positive affect during 5 year follow-up demonstrated greater medication adherence.[158] Negative psychological health likely also influences detrimental processes such as poor dietary compliance in general, as well as compliance with low-sodium diets such as in those with heart failure. In addition, some studies suggest that psychological health may influence compliance with other cardiac health–modifying behaviors such as cardiac rehabilitation or related interventions.[56,68,159,160]

Psychological factors may further influence cardiovascular health via various psychosocial mechanisms. Individuals with better psychological health tend to have better social support,[161] be less likely to perceive daily stressors as threatening,[162,163] be more likely to use problem-solving and planning strategies to manage controllable stressors,[164] and be better able to regulate emotion and behavior.[165] For example, more adaptive versus maladaptive emotion regulation strategies are associated with lower inflammation and more favorable cardiovascular health.[99] Together, these strategies can facilitate healthier adaptation to the challenges of life.

Summary of Findings

A summary of key relevant studies on pathways linking psychological factors and cardiovascular health is provided in Supplemental Table 3. Issues of bidirectionality complicate investigations of which psychological states are merely associated with negative or positive cardiovascular risk and risk factors and which are causative. In addition, identification of specific markers such as C-reactive protein or factors such as heart rate variability does not necessarily imply that future outcome will be better or worse. Nonetheless, multiple plausible biological, behavioral, and psychosocial mechanisms support a causative relationship between psychological state and cardiovascular risk or health, and the preponderance of current data suggest that at least some of these findings are not merely associations. Plausible mechanisms by which improved psychological health can affect cardiovascular health are shown in the Figure.

INTERVENTIONS FOR PSYCHIATRIC DISORDERS OR SYMPTOMS

Although observational studies have identified connections between psychological factors (eg, depression, optimism) and cardiovascular health, an important clinical question is whether these factors can be modified through pharmacological or behavioral interventions. At this stage, numerous studies have examined the impact of such interventions on mental health and cardiovascular outcomes. These studies are discussed in this and the following section, Interventions to Promote Positive Psychological Health.

Antidepressants

Some observational studies and a secondary analysis from a psychotherapy trial in cardiac patients have found that prescription of antidepressants, specifically selective serotonin reuptake inhibitors (SSRIs), is associated with lower rates of cardiovascular mortality[167,168] or MI.[169] However, other observational individual studies and meta-analyses have found no such associations[170,171] or even increased cardiac risk[172] with SSRIs.

Initial placebo-controlled studies of standard antidepressants (primarily SSRIs) found that these agents were safe and largely effective in the prevention or treatment of major depressive disorder among patients with CVD,[173–177] but these studies were not powered or designed to detect effects on cardiac risk factors, health behaviors, or cardiac events.

More recent placebo-controlled studies have examined the effects of antidepressants on cardiac-related outcomes. Follow-up from a cohort from the 12-month ESDEPACS trial (Escitalopram for Depression in Acute Coronary Syndrome) in 300 depressed patients after ACS found that those assigned to the escitalopram group had lower rates of major adverse cardiac events at 8 years compared with those receiving placebo (40.9% versus 53.6%; HR, 0.69 [95% CI, 0.49–0.96]).[178] Other controlled trials have demonstrated modest improvements associated with SSRIs in patients with heart disease on surrogate markers, including heart rate variability[179] and mental stress–induced myocardial ischemia,[180] although other studies have found no such effect on clinical events or other markers.[179,181] In individuals without heart disease, SSRIs have been linked to improvements

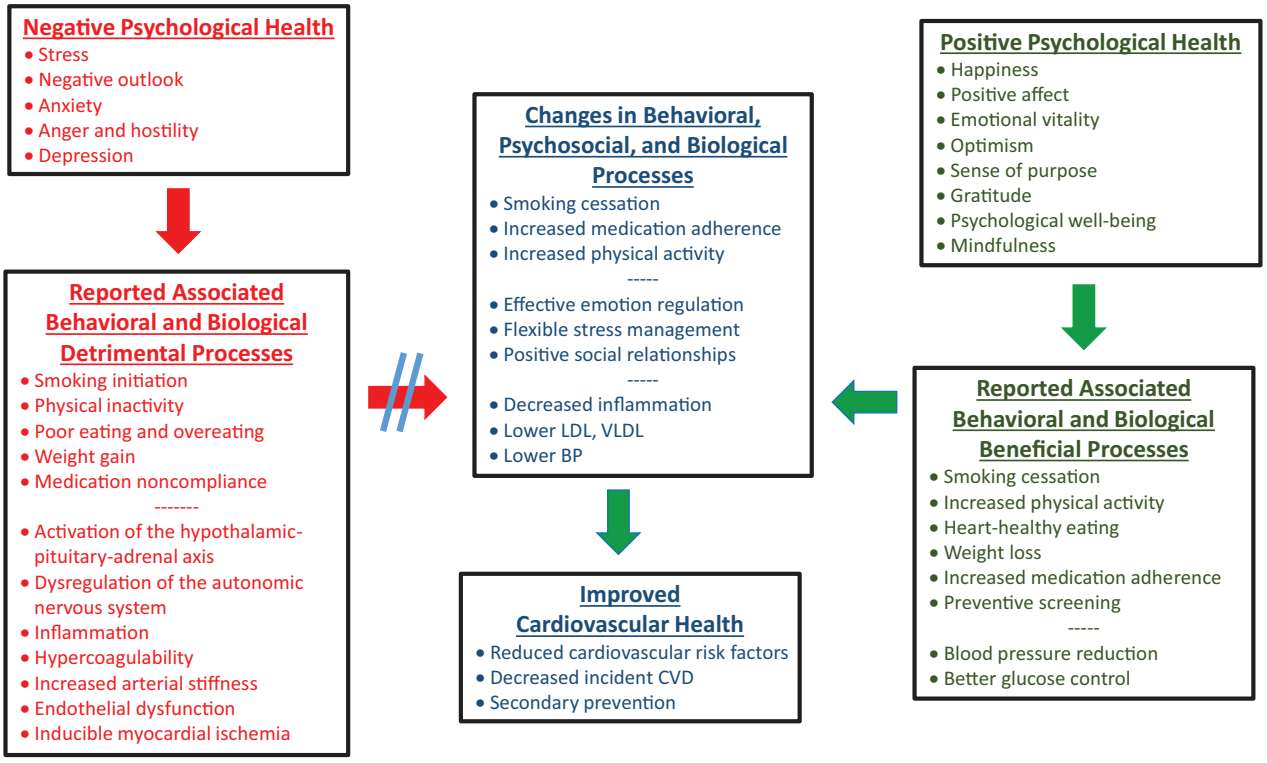

Figure. Negative and positive associations of psychological health and cardiovascular risk and health and potential biologically plausible mechanisms of how improved psychological health can lead to decreased cardiovascular risk.
Figure concept inspired by Levine,[2] Kubzansky et al,[54] Rozanski,[166] and many other sources. BP indicates blood pressure; CVD, cardiovascular disease; LDL, low-density lipoprotein; and VLDL, very-low-density lipoprotein.

in inflammatory markers[182] associated with improved cardiovascular prognosis. Although there are conflicting data on the cardiovascular benefits of antidepressants in patients with CVD, a synthesis of data from numerous intervention trials found that unsuccessful treatment of depression after hospitalization for ACS is linked to elevated risk of mortality and cardiac events.[183]

Psychotherapy

Several trials have used psychotherapy for depression in heart disease. The ENRICHD trial (Enhancing Recovery in Coronary Heart Disease; N=2481), the largest intervention trial for depression in patients with heart disease, examined the effects of cognitive behavioral therapy after MI. Cognitive behavioral therapy modestly improved depression but did not lead to any improvement in cardiac events or mortality compared with the control condition[184]; of note, those receiving SSRI antidepressants in either arm had lower mortality rates at the 3-year follow-up (adjusted HR, 0.57 [95% CI, 0.37–0.96]).[168] Cognitive behavioral therapy in patients with heart failure with major depression was likewise associated with significant improvements in depression and other mental health outcomes but not in heart failure self-care. Cognitive behavioral therapy was also associated with lower rates of hospitalization at 1 year compared with usual care (incidence rate ratio, 0.47 [95% CI, 0.30–0.76]).[185] Other trials of psychotherapy have sometimes, but not universally, been associated with improvements in depression, and they have not been powered to examine cardiac events.[176,185]

Care Management

Broader care management approaches have also been studied in patients with coronary artery disease, arrhythmia, and heart failure. Collaborative care management approaches for depression or anxiety disorders, which use a nonphysician care manager to assess and monitor symptoms and deliver psychosocial interventions (eg, psychotherapy) with medication recommendations made by a team psychiatrist, have been used in at least 5 randomized trials (N=1685 total). These trials have consistently led to improvements in mood symptoms and often better function but have not been associated with reductions in cardiac readmissions, cardiac events, or mortality.[186–189] Although these trials were not fully powered for major cardiac outcomes, absolute rates of cardiac events or mortality were highly similar in intervention and control conditions in these studies, suggesting that even substantially larger trials may have observed no effect.

A similar stepped-care management approach offering psychotherapy or medication to patients with elevated depressive symptoms after ACS has been studied. COPES (Coronary Psychosocial Evaluation Study) delivered 6 months of depression stepped care to 157 patients with ACS with persistent depressive symptoms; the intervention led to significant improvements in depression and to lower rates of major adverse cardiac events (4% versus 13%; *P*=0.047; no RR or CI reported) compared with usual care.[190] However, 2 follow-up randomized studies of related interventions for depression after ACS did not appear to find similar benefits on cardiac outcomes,[191,192] although both of these studies examined small numbers of depressed patients (N=150 and 71) and were underpowered to detect effects on cardiac events. In a randomized controlled trial, a flexible 6-month depression management intervention offering several medication and nonmedication options in 331 cardiac patients similarly was not associated with lower risk of cardiovascular events or all-cause mortality 8 years later compared with usual care.[193,194]

Summary of Findings

A summary of key relevant studies on interventions for psychiatric disorders or symptoms is provided in Supplemental Table 4. In summary, antidepressant medications, psychotherapy, and depression care management programs appear to be well accepted by and tolerable in patients with acute and chronic heart disease, with associated improvements in mental health outcomes. Although the majority of intervention studies to date have not found improvements specifically in CVD risk factors or outcomes, many such trials have been substantially underpowered to do so, and it appears that response to antidepressant treatment is associated with better cardiac prognosis. Research on anxiety or other psychiatric conditions in individuals with heart disease is far more limited. Moreover, no studies have evaluated whether treatment for depression or other forms of severe distress in otherwise healthy populations leads to reduced risk of incident CVD.

INTERVENTIONS TO PROMOTE POSITIVE PSYCHOLOGICAL HEALTH

In contrast to treatments that have directly targeted psychiatric syndromes (eg, depression), other interventions have aimed to reduce stress broadly or actively promote positive psychological health (eg, positive affect, mindfulness, gratitude) in broader populations of patients with a history of CVD to improve mental health, health behaviors, and cardiac outcomes.

Psychotherapy and Stress Management Programs

Some studies have examined interventions focused largely on reducing anxiety and stress. Such programs could have a collateral benefit of increasing well-being but were not designed to directly improve psychological health. Three randomized studies have examined the use of psychotherapy to reduce stress and promote health in patients with heart disease. One such trial studied patients who had been hospitalized for MI, percutaneous coronary intervention, or coronary artery bypass graft surgery in the past 12 months. Participants received group-based cognitive behavioral therapy for 1 year or treatment as usual, and the intervention group had a 41% lower rate of fatal and nonfatal first recurrent CVD events (HR, 0.59 [95% CI, 0.42–0.83]).[195] In contrast, 3 additional studies using stepped-care psychotherapy, a psychiatric screening and home nursing intervention, or a stepped nursing-led depression prevention intervention found no difference in mental health or cardiac outcomes compared with usual care over follow-up periods of at least 1 year.[196–199]

There have been similarly mixed but potentially beneficial results of coping skills or stress management training in cardiac patients. One trial in patients with heart failure observed no postintervention between-group differences (coping skills training versus heart failure education alone) with respect to biomarkers or readmissions/death at the 3-year follow-up,[200] but a second trial adding stress management training to cardiac rehabilitation led to lower rates of major adverse cardiac events compared with those receiving cardiac rehabilitation alone (18% versus 33%; HR, 0.49 [95% CI, 0.25–0.95]) at follow-up.[201] A trial of a group-based psychosocial intervention program that focused on relaxation training and coping skills demonstrated lower mortality in the intervention group (OR, 0.33 [95% CI, 0.15–0.74]).[202]

Positive Psychology Programs

Positive psychology–based programs use systematic activities (using personal strengths, recalling positive life events) to improve psychological attributes and experiences (optimism, positive affect) that have been linked to superior cardiac outcomes. Several such programs, either alone or combined with motivational interviewing, have focused on the promotion of physical activity in patients with cardiac disease or cardiac risk conditions in randomized studies, with a majority,[203–207] but not all,[208] of such studies finding positive psychology–based interventions to be associated with greater improvements in physical activity compared with control conditions. Effects of such programs on

cardiac biomarkers (eg, inflammatory markers, heart rate variability) or other disease markers have been mixed, with some observed effects on markers of inflammation in small trials in patients with heart failure[209] or coronary artery disease,[210] modest effects on glycosylated hemoglobin in small studies in diabetes,[206,207] but minimal effects on other markers. Likewise, a pair of larger studies implementing a positive psychology–based program found no intervention effect on blood pressure at 1 year.[211,212]

Meditation Training and Mindfulness-Based Interventions

The potential benefit of meditation training and programs on cardiovascular health was extensively reviewed in a 2017 AHA scientific statement.[81] Some, but not all, studies and meta-analyses have found that meditation can decrease various forms of psychological and psychosocial distress such as perceived stress, anxiety, and negative affect; increase smoking cessation rates; and modestly lower systolic and diastolic blood pressures.[81,213–218] A recent systematic review including 16 studies concluded that mindfulness-based interventions led to greater improvements in negative psychological outcomes (eg, less anxiety, depression, stress) and reduced systolic blood pressure.[219] Several modest-sized studies of meditation for primary and secondary prevention have reported surprisingly robust decreases in nonfatal MI, cardiovascular mortality, and all-cause mortality; these findings need to be reproduced in larger multicenter studies.[81,220–222] The scientific statement concluded that meditation has possible benefit on cardiovascular risk, although the overall quality and, in some cases, quantity of study data are modest. A review of meditation interventions in patients with heart failure found significant improvement in depression and symptom management.[223] In terms of mindfulness-based interventions, a 2019 meta-analysis of randomized clinical trials in patients with CVD found significant improvements in anxiety, perceived stress, depression, and systolic blood pressure.[219]

Summary of Findings

A summary of key relevant studies on interventions to promote positive psychological health is provided in Supplemental Table 5. Overall, some psychosocial intervention programs using psychotherapy or stress management training have had an impact on cardiovascular outcomes in high-risk patient populations, although studied interventions have been highly heterogeneous and replication of successful programs is warranted. Positive psychology–based programs have shown some promise, particularly in improving physical activity in patients with or at high risk for heart disease. However, beneficial effects on cardiac biomarkers or metrics have been more limited, and additional, larger trials are needed to assess the impact on actual cardiovascular outcomes. Methodological issues in existing studies on meditation and cardiovascular risk include heterogeneous intervention type, modest study size, limited and often incomplete follow-up, high dropout rates, lack of appropriate control groups, and unavoidable patient nonblinded study design.[81] Given the low costs and low risks of this intervention, meditation may be considered as an adjunct to guideline-directed cardiovascular risk reduction by those interested in this practice.[81]

Table 3. Suggested Screening Tool to Assess Psychological Distress: Patient Health Questionnaire-2 Depression Screen

Over the past 2 wk, how often have you been bothered by any of the following problems?	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things	0	1	2	3
Feeling down, depressed, or hopeless	0	1	2	3

Total score of ≥3 warrants further assessment for depression.
Data derived from Kroenke et al.[224]

IMPLICATIONS FOR CLINICAL PRACTICE

Clinical cardiology visits can provide an excellent opportunity to assess psychological factors that may affect cardiac health maintenance. Contemporary reviews have outlined approaches to assessing psychological distress and positive psychological health at clinical cardiology encounters.[54,166] In short, brief, well-validated 2-item screening tools (ie, the Patient Health Questionnaire-2 [see Table 3[224] and the Generalized Anxiety Disorder Questionnaire-2[225]) administered by front-line staff (eg, nurses, medical assistants) can be used to assess for depression or elevated anxiety.

Positive screens for these conditions can open a discussion about additional symptoms; the impact of such symptoms on health, adherence, and function; and referral for additional assessment and management of psychiatric conditions if indicated. These screening tools have previously been used to screen for mood and anxiety symptoms in a range of clinical cardiology settings.[226–228] Likewise, brief questions about optimism, motivation, and positive affect and their impact on self-management, initiated by front-line staff, can lead to important discussions during a clinical encounter. Such a screening tool is given in Table 4.

Table 4. Suggested Screening Questions to Assess Psychological Health

Well-being parameter	Question
Health-related optimism	"How do you think things will go with your health moving forward?"
Positive affect	"How often do you experience pleasure or happiness in your life?"
Gratitude	"Do you ever feel grateful about your health? Do you ever feel grateful about other things in your life?"

Many clinical cardiologists may feel ill-equipped to have substantial discussions about mental health. However, brief, targeted discussions that follow from screening provided by other staff can be highly effective and are often highly valued by patients. Sample statements to address psychological factors in clinical encounters are given in Table 5. Although many studies have examined relationships between general well-being and cardiac health, inquiries about health-related optimism or gratitude flow much more easily in a clinical encounter, and such constructs have been linked to better recovery in cardiac patients.[90,229]

In addition to making appropriate referrals to mental health providers as indicated, clinicians can often prescribe exercise, meditation, or other self-care that can have both mental health and cardiovascular benefits. Although such discussions may take some time during tightly scheduled clinical visits, if substantial issues are identified that lead to medication nonadherence, poor self-care, or high-risk behavior, such time spent discussing and problem-solving these issues might lead to fewer subsequent visits, better adherence, and better patient quality of life and cardiac outcomes.

Table 5. Sample Statements to Address Psychological Health in Clinical Encounters

Sample statements to address depression "It seems like feeling down or even a little hopeless might be affecting the way you are taking care of yourself. Let's think about how we can tackle this problem together."
Sample statements to address anxiety "It seems like your level of anxiety and worry is really wearing on you, and that can really affect your health and the way you take care of yourself. Let's think about how we can tackle this problem together."
Sample statements to support optimism "I have taken care of many patients with this kind of heart problem before, and many of them have done very well. I think you can, too."
Sample statements to support positive affect "There is a lot of research finding connections between feeling happy and satisfied with your life and your heart health. I want to really support you in taking time for yourself and engaging in _____ [fill in as appropriate such as "hobbies" or "meaningful activities"]. Let's think together about that."
Sample statements to support gratitude "We were lucky to catch your heart problem when we did, and there are some good treatments. I think that means that we have a lot to be grateful for here, and there is a good chance that your health can remain strong if we work together."

More in-depth discussion of these factors, follow-up on recommended activities, and additional resources may then be provided by other members of the clinical team. For patients with more substantial distress, psychiatrists, psychologists, and other clinicians with behavioral cardiology expertise may be able to use the information gathered at the cardiology visit to apply specific approaches to reduce stress, address psychiatric conditions, and promote aspects of well-being that have been linked to better cardiovascular outcomes. Team-based care approaches such as the collaborative care programs described above can be used in such patients to allow specialized mental health care and recommendations that are integrated into the rest of the patient's care. Finally, settings focused on cardiovascular wellness such as cardiac prevention and rehabilitation programs may provide ideal opportunities for conducting additional assessments, conversations, and interventions given the comprehensive health focus of these programs and the substantial time spent with participants.

FUTURE RESEARCH

Further work is needed to gain a better understanding of which positive and negative psychological health factors place patients at greatest risk, the pathogenic mechanisms by which negative psychological health contributes to CVD and risk and salutogenic mechanisms by which positive psychological health improves cardiovascular outcome, and which psychological interventions are most effective. Studies of enhancing positive psychological health are nascent but promising. Both further study and, importantly, further funding, are warranted. Future studies, to the extent possible, should include not only high-quality observational studies but also randomized interventional trials with an adequate control group, be methodologically rigorous and use well-validated and reliable measures of psychological health, strive to minimize participant dropout, have at least intermediate (eg, >6 months) or ideally long-term (eg, several years) follow-up, be adequately powered, and examine when possible both major adverse cardiac events and possible mediators to better understand the underlying mechanisms of benefit.

Although even more methodologically challenging, high-quality research is additionally needed on psychological health and primordial prevention of cardiovascular risk and disease.

CONCLUSIONS

Findings from studies to date on psychological health and CVD can be summarized as follows:

- Psychological health is an important component of wellness/well-being for patients with or at risk for CVD.
- The mind, heart, and body are all interconnected and interdependent in a relationship that can be called the mind-heart-body connection.
- There is a substantial body of good-quality data showing clear associations between psychological health and CVD and risk.
- There is increasing evidence that psychological health may be causally linked to biological processes and behaviors that contribute to and cause CVD.
- The preponderance of data suggest that interventions to improve psychological health can have a beneficial impact on cardiovascular health. Simple screening measures can be used by health care clinicians for patients with or at risk for CVD to assess psychological health status.
- Consideration of psychological health is advisable in the evaluation and management of patients with or at risk for CVD.

CVD should not be addressed as an isolated entity but rather as 1 part of an integrated system in which mind, heart, and body are interconnected. Both positive psychological status and negative psychological status appear to affect cardiovascular health and prognosis directly. Wellness and well-being involve not only physical factors but also psychological ones. Clinicians should strive to treat not just the disease state but the patient and the person as a whole.

ARTICLE INFORMATION

The American Heart Association makes every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

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Glenn N. Levine	Baylor College of Medicine	None	None	None	None	None	None	None
Beth E. Cohen	University of California, San Francisco	None	None	None	None	None	None	None
Yvonne Commodore-Mensah	Johns Hopkins University School of Public Health and Nursing	None	None	None	None	None	None	None
Julie Fleury	Arizona State University	None	None	None	None	None	None	None
Jeff C. Huffman	Massachusetts General Hospital	NIH (well-being research in cardiac patients)†	None	None	None	None	None	None
Umair Khalid	Baylor College of Medicine	None	None	None	None	None	None	None
Laura D. Kubzansky	Harvard T.H. Chan School of Public Health, Social and Behavioral Sciences	NIH (principal investigator, optimism and exceptional longevity)†	Lee Kum Sheung Center for Health and Happiness (codirector)†	None	None	None	None	None

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Writing Group Disclosures Continued

Writing group member	Employment	Research grant	Other research support	Speakers' bureau/ honoraria	Expert witness	Ownership interest	Consultant/ advisory board	Other
Darwin R. Labarthe	Northwestern University	None	None	None	None	None	None	None
Helen Lavretsky	Semel Institute for Neuroscience and Human Behavior	None	None	None	None	None	None	None
Erin D. Michos	Johns Hopkins University School of Medicine, Johns Hopkins Hospital	None	None	None	None	None	None	None
Erica S. Spatz	Yale University School of Medicine, Yale-New Haven Hospital	None	None	None	None	None	None	Medtronic Vascular, Inc*

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*Modest.

†Significant.

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Julia K. Boehm	Chapman University	AHA (grant 18AIREA33960394 that investigates how childhood psychosocial resources, including well-being, are related to cardiometabolic risk in adulthood)†	None	None	None	None	None	None
Robert M. Carney	Washington University	NIH (RO1s)†	None	None	None	Pfizer, Inc*	None	None
Sidney C. Smith Jr	University of North Carolina	None	None	None	None	None	None	None

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