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Positive Psychological Well-Being and Cardiovascular Disease: *JACC* Health Promotion Series

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Abstract

Facets of positive psychological well-being, such as optimism, have been identified as positive health assets because they are prospectively associated with the seven metrics of cardiovascular health (CVH) and improved outcomes related to cardiovascular disease (CVD). Connections between psychological well-being and cardiovascular conditions may be mediated through biological, behavioral, and psychosocial pathways. Individual-level interventions, such as mindfulness-based programs and positive psychological interventions, have shown promise for modifying psychological well-being. Further, workplaces are utilizing well-being-focused interventions to promote employee CVH, which represents a potential model for expanding psychological well-being programs to communities and societies. Given psychological wellbeing's relevance for promoting CVH, we outline clinical recommendations to assess and promote well-being in patient encounters. Finally, a research agenda is proposed. Additional prospective observational studies are needed to understand mechanisms underlying the connection between psychological well-being and cardiovascular outcomes. Moreover, rigorous intervention trials are

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needed to assess whether psychological well-being-promoting programs can improve cardiovascular outcomes.

Condensed abstract:

Positive psychological well-being and its specific components, such as optimism, predict superior levels of cardiovascular health (CVH) metrics and fewer cardiac events, likely through behavioral, biological, and psychosocial pathways. Individual-, group-, and organization-level approaches to promote psychological well-being have shown promise and could be applied more broadly to communities and society. A guide to assessing psychological well-being and implementing well-being-promoting activities is provided to support application of this knowledge in clinical practice. Next-step research should include continued observational studies to understand the mechanisms linking psychological well-being with CVH, along with rigorous, well-powered psychological well-being intervention trials in diverse settings and populations.

Keywords

Cardiovascular disease; cardiovascular health; health behaviors; optimism; positive psychological well-being

Introduction

Associations between adverse psychological factors, such as depression, and cardiovascular disease (CVD) are well-established. However, accumulating evidence suggests that positive psychological well-being (hereafter, psychological well-being)—which includes positive thoughts and feelings such as purpose in life, optimism, and happiness—has its own independent associations with lower risk of CVD and may promote cardiovascular health (CVH; 1). As part of the present *JACC Cardiovascular Health Promotion Series* (1,2), we focus on psychological well-being and its role in CVH promotion and CVD prevention.

In recent years, the fields of preventive cardiology and positive psychology have both set ambitious goals that go beyond simply reducing risk of disease to include increasing healthy longevity, improving quality of life, preserving good mental health and cognitive function, and achieving health care savings (3). Relevant metrics have been developed alongside those goals. For example, the American Heart Association (AHA) recently proposed a definition of CVH that has become widely accepted (4) and comprises seven components: four health behaviors (healthy diet, physical activity, abstinence from tobacco, and normal body mass index [BMI]) and three health factors (favorable blood pressure, total cholesterol, and glucose). CVH has been prospectively linked with reduced risk of cardiovascular and all-cause mortality, as well as lower incidence and burden of many chronic diseases of aging (5).

For its part, psychological well-being has been defined in various ways and encompasses the positive thoughts and feelings that individuals use to evaluate their lives favorably (1). Two distinct theoretical perspectives have informed characterizations of psychological well-being: the eudaimonic approach defines well-being according to one's ability to identify

meaningful life pursuits and striving to achieve one's best (6); the hedonic approach defines well-being according to pursuing and attaining pleasure and happiness (7). Other, less easily classified, facets of psychological well-being (e.g., optimism, emotional vitality) have also been identified, several of which consistently predict cardiovascular outcomes (1). Moreover, it is increasingly clear that effects of psychological well-being and distress are not simply two sides of the same coin. Indeed, research has shown that the absence of psychological distress does not necessarily denote the presence of psychological well-being (8). Thus, psychological well-being should be investigated as an independent predictor of CVH.

Pathophysiological and Beneficial Effects

Psychological Health and Cardiovascular Health

Investigations of psychological factors in relation to CVH have variously considered the 7 CVH components individually or in various combinations as a composite score of "favorable" or "ideal" CVH. In these studies, psychological distress was associated with poor CVH (e.g., 9), but none were prospective in design, making the directionality of the associations unclear. In contrast, while still limited in number, some initial studies in the U.S. and Europe using both cross-sectional and prospective designs have suggested that psychological well-being promotes CVH (10,11).

Psychological Health and Cardiovascular Disease

Numerous reviews and meta-analyses have evaluated the role of depression (12,13), anxiety (14), anger (15), post-traumatic stress disorder (PTSD; 16), and chronic stress in relation to the development of CVD (17). For example, a 2014 meta-analysis of 30 prospective studies (including 40 independent reports) based on 893,850 participants with follow-up periods ranging from 2–37 years, found depression consistently predicted excess risk of developing coronary heart disease (CHD; 13). This finding is consistent with other meta-analyses regarding the magnitude of risk and the presence of a dose-response relationship. Findings for anxiety, PTSD, anger, and hostility are similar. Anxiety and PTSD appear to be at least as potent risk factors for CHD as depression (18,19), and it appears that a combination of these negative factors confers cumulative risk (20).

A growing body of research has examined whether psychological well-being might lead to reduced risk of CVD. In 2012, a comprehensive review focusing on the most rigorous evidence available (i.e., prospective designs, adjustment for psychological distress, objective measures of CVD), found that several facets of psychological well-being were consistently associated with reduced risk of incident CVD (1). Generally, evidence was strongest for optimism, (e.g., 2,21) although that may be in part because more long-running cohort studies have measured optimism whereas fewer epidemiologic cohorts measure other facets of psychological well-being. Prospective evidence available since 2012 is highly congruent with these findings. Five prospective studies evaluating the relation between optimism and CVD have generally found results in the expected direction. For example, in a prospective study of 70,021 older women followed over 8 years, women in the highest versus lowest quartile of optimism had a 38% reduced risk (95% CI: 0.50–0.76) of heart disease mortality

and a 39% reduced risk (95% CI: 0.43–0.85) of stroke mortality after adjustment for sociodemographic factors (22). Several other cohorts have reported similar findings when considering CVD mortality as well as incident heart failure (2,21,23).

Since 2012, additional studies have evaluated purpose in life (24–26), with 5 of these included in a recent meta-analysis (10 studies, pooled n = 124,948; mean age 57–72 years; mean follow-up duration 7.3 years). Across studies, the relative risk for cardiovascular events was 0.83 (95%CI: 0.75–0.92) in models that adjusted for a broad range of potential confounders (25). In another study conducted since then, 453 elderly adults (mean age 84 years) were followed over 6 years and upon death, autopsied, and diagnosed by neurologists. Higher life purpose was associated with lower odds of macroscopic infarcts (OR: 0.54, 95%CI: 0.35–0.83), but not microinfarcts (27). Findings have been evident albeit not fully consistent when considering other facets of psychological well-being (e.g., positive affect; 24). Earlier studies identified a protective effect of positive affect on CVD risk, but recent large studies have showed null results (26). However, as noted elsewhere, a somewhat weak measure of the exposure and possible statistical over-adjustment may render these studies somewhat less convincing (28). That said, it is also plausible that not all facets of psychological well-being predict CVD-related outcomes equally strongly.

Key Questions

Although this brief review suggests that psychological well-being is associated with CVH and CVD, outstanding questions remain. In the rest of this paper, we address key questions regarding the mechanisms underlying these associations, the social environmental influences on psychological well-being, and the effectiveness of interventions to strengthen psychological well-being. In addition, we provide guidance for healthcare providers in application of psychological well-being interventions in CVH promotion and, finally, discuss directions for future research.

Mechanisms and Social Environmental Influences

Effects of Psychological Well-Being: Biological, Behavioral and Psychosocial Pathways

Psychological well-being may influence CVH across the lifespan via three plausible pathways: 1) direct effects on neurobiological processes, 2) indirect effects through health behaviors, and 3) promotion of other psychosocial resources known to protect health or buffer cardiotoxic effects of stressful experiences. For each pathway, effects of psychological well-being may reduce the likelihood of deteriorative processes (e.g., cigarette smoking, inflammation) and/or increase the likelihood of restorative processes (e.g., optimal sleep). The Central Illustration presents a model illustrating these links between psychological well-being and CVH, adapted from previous work (1).

Here, we briefly summarize findings on psychological well-being's relationship with each of these pathways, emphasizing health and behavior factors relevant to CVH with a focus on studies conducted in healthy populations. While most studies published to date are crosssectional, some studies using more rigorous methods (i.e., experimental or longitudinal study designs, adjustment for relevant covariates including psychological distress, use of

validated measures of exposure and outcomes) have been conducted, and we emphasize findings from these studies.

Biological Pathways

Research has linked various components of psychological well-being with biological processes posited to underlie the observed associations with CVH metrics (blood pressure, lipids, and glucose) and other cardiovascular conditions (e.g., atherosclerosis). The primary hypothesis is whether psychological well-being may lead to specific biological alterations that mediate effects on CVH. While many studies are cross-sectional, one advantage of these studies is that biological parameters are generally objectively measured, reducing concerns about self-report bias.

Previous reviews of the literature examining associations between psychological wellbeing and blood pressure have reported mixed findings, although longitudinal studies generally suggest that psychological well-being is prospectively associated with lower blood pressure across sex, race/ethnicity, and age (29). For example, in a large prospective study of 6,384 healthy British adults, greater emotional vitality was associated with 11% lower risk of developing hypertension over an average 11.8 years of follow-up, after adjusting for numerous potential confounders, including psychological distress (30). Heart rate variability has also been posited as a potential mechanism. Several studies have found higher psychological distress to be associated with reduced heart rate variability, generally indicating greater sympathetic activation and lower parasympathetic tone (31). In contrast, studies considering psychological well-being in relation to heart rate variability have found less consistent associations (32,33). Given the suggestive findings with distress, however, additional research considering whether psychological well-being might induce healthier parasympathetic tone and higher heart rate variability is warranted.

A review of findings with lipids reported mixed results (1), but rigorous studies have found higher psychological well-being is associated with more favorable lipid levels (34). It appears that these associations may vary depending on sex and race, as well as cultural differences (35,36). While cross-sectional studies have reported largely null associations of psychological well-being with blood glucose or glycosylated hemoglobin (HbA1c; 1,35), at least one longitudinal study found positive affect was associated with lower HbA1c over 2 years of follow-up (37). Investigators have also found consistent inverse associations between higher psychological well-being and metabolic syndrome prevalence (e.g., 38). Overall, this research suggests higher psychological well-being is associated with lower risk of metabolic dysfunction. Immune and inflammatory processes have received limited attention, with inconsistent but sometimes suggestive findings (34–38).

Behavioral Pathways

Psychological well-being has been studied in relation to each of the 4 CVH behaviorrelated factors defined by AHA: smoking, physical activity, diet, and BMI. Most studies are cross-sectional and rely on self-report of both psychological well-being and behaviors (aside from BMI), raising the possibility of self-report bias in estimates of association.

Numerous studies document a cross-sectional association between greater psychological well-being and lower likelihood of smoking (39,40). Some but not all longitudinal studies have documented associations in the expected directions (41). For example, young adolescents with lower levels of optimism and hope at baseline were more likely to be current smokers 7–10 months later, adjusting for sociodemographics and baseline smoking status (42); among patients who experienced acute coronary syndrome (ACS), the most versus least optimistic patients were less likely to be smoking cigarettes 12 months later (43).

Numerous studies have also found that high levels of psychological well-being are associated with greater likelihood of regular exercise (39). Although the association is likely bidirectional, accumulating prospective longitudinal evidence indicates that psychological wellbeing predicts greater likelihood of engaging in recommended levels of activity (e.g., 44). For example, in a sample of nearly 10,000 older adults from England, those with the highest wellbeing levels at baseline showed the most physical activity across 11 years of follow-up, adjusting for baseline health status and depression (45). Some null findings have also been reported (41).

Cross-sectional and prospective studies indicate that people with higher psychological well-being levels tend to consume more fruits and vegetables and fewer sweets and processed meats (39,40). For example, in analyses adjusting for age, sex, and baseline health, Finnish adults who were initially more versus less optimistic ate healthier diets at a 6-year follow-up (41). As with physical activity, there may be a bi-directional relationship such that healthier dietary patterns also promote psychological well-being. Findings are more equivocal for a healthy BMI, with protective associations suggested by cross-sectional studies but inconsistent results from prospective studies (e.g., 40,41).

Psychosocial Pathways and Stress Buffering

Various psychosocial mechanisms are posited to mediate the association between psychological well-being and CVH. For example, social support may link optimism with CVH because optimistic individuals are more likely to seek social support when facing difficult situations, be more well-liked, have larger networks of friends, and have friends who provide greater support during stressful times (46,47). Further, optimism provides confidence about the future, fostering other psychological and cognitive mechanisms that enhance CVH such as acting on medical advice more readily, engaging in effective problem solving, and taking action to prevent bad events (48). Some investigators have posited that “unrealistic optimism” may be detrimental, but most research suggests that those with high but not extreme optimism can distinguish between controllable versus uncontrollable stressors. Optimists tend to persevere and cope by using problem-solving and planning strategies to manage controllable stressors, but when faced with uncontrollable stressors, they shift to other goals and use other coping mechanisms (49). Similar mechanisms likely exist for other facets of psychological well-being.

Capacity to self-regulate may also be a mechanism by which psychological well-being influences health outcomes (50). Self-regulation involves appropriate cognitive, affective,

and/or behavioral responses during daily life and in the context of one's larger goals; these capacities provide the means to confront and adapt effectively to life's challenges (51). Using more adaptive strategies for emotion regulation (e.g., cognitive reappraisal) versus maladaptive strategies (e.g., suppressing emotion expression) are associated with lower inflammation and more favorable CVH (50).

Having high levels of psychological well-being may also help buffer against harmful effects of stress. For example, optimism can alter processing and interpretation of daily stressors so they are experienced as less threatening (48). Evidence from both experimental and observational studies supports this hypothesis. For example, greater psychological well-being appears to mitigate such forms of stress as recalling experiences of sadness and anger (52) and stressors stemming from lower socioeconomic status (53).

Social Environmental Influences

Significant opportunities for improving cardiovascular outcomes in the U.S. may come from addressing social determinants (54), defined by the World Health Organization as the circumstances in which people live across the lifespan and the systems available to deal with illness (55). A recent AHA scientific statement described social factors (e.g., socioeconomic status, social relationships, childhood adversity) known to influence CVD, as well as possible psychological mechanisms such as emotional distress and psychiatric disorders (54,56). The statement did not, however, discuss the potential benefits of psychological well-being related to social factors and cardiovascular outcomes. While many facets of psychological well-being are considered partly heritable—with dispositional optimism, life satisfaction, and purpose in life showing 25% to 47% heritability (familial as well as genetic; 57)—the social environment can substantially influence the development and distribution of psychological well-being (58). A systematic social epidemiologic approach to psychological well-being—identifying its distributions in the population and its key determinants—is needed. Both developmental and social structural factors merit consideration.

Early life environment is important to the development of psychological functioning. Early life adversity, including exposure to adverse parental attributes (e.g., poor mental health), low socioeconomic position, and adverse family structure (e.g., single parenthood, parental alcoholism) predicts poor psychological health in childhood, adolescence, and adulthood (e.g., 59,60). Lack of safe or nurturing relationships in childhood can affect structural and functional development of the brain in ways that increase likelihood of developing maladaptive habits and less supportive relationships (61). Fewer studies have considered how early social environments can establish trajectories of psychological well-being, though some important factors have been identified including parenting practices (warmth, being nurturing), ease of communication with parents, as well as liking school and having other supportive relationships (62–64). Other external factors that promote psychological well-being in youth include positive and high quality peer relationships and strong social networks (65), perceiving school as a supportive environment, and living in neighborhoods with high social capital (66–68).

With regard to structural factors, the World Happiness Report documents ecological findings linking greater psychological well-being with numerous macro-level factors, including higher country-specific GDP per capita, freedom to make life choices, absence of corruption, and lower income inequality (69). Studies have further demonstrated that life satisfaction is associated with higher income, education, and occupational status (70,71) although few studies have examined associations of social structural factors with psychological well-being facets beyond life satisfaction and positive affect. In the U.S., race and ethnicity may also play a role, given greater life satisfaction reported by Whites than by Blacks and Hispanics. However, some studies have also noted that associations of structural factors with psychological well-being are not always independent, and may be synergistic (70). Evidence points to other social indicators that may influence psychological well-being, including greater social support, increased network size (72–74), financial crises (75), community social capital (76), social mobility (77), and neighborhood disorder (78).

Preventive Action at Personal, Community, and Societal Levels

Given the data linking psychological well-being with CVH metrics and clinical endpoints, a key next step is to assess whether specific interventions at individual, community, and societal levels can successfully modify psychological well-being, and whether cultivating well-being leads, in turn, to better CVH. While it may be the case that some aspects of psychological well-being are heritable and/or relatively fixed, other facets of l well-being have been identified as life skills, part of a set of malleable personal characteristics and capabilities that increase chances of success and well-being in life (79). Psychological well-being-based interventions to build skills and promote health could be applied at four phases throughout the life course: promoting healthy gestation/development/aging; achieving favorable change in CVH components; enhancing effective acute and long-term management following clinical cardiovascular events; and supporting palliative/end-of-life care (3).

Individual and Small-Group Interventions

First, psychological well-being may be strengthened via interventions designed for individuals or small groups. Such programs include mindfulness-based programs and positive psychological interventions that directly target optimism, positive affect, and related constructs. Thus far, the majority of studies have examined mindfulness-based interventions. Mindfulness is an approach that involves attending to present-moment experiences with openness, nonjudgment, and curiosity. Here mindfulness is conceptualized as a tool to increase psychological well-being, rather than as a component of psychological well-being itself. A variety of mindfulness-based interventions have been developed, including mindfulness-based stress reduction (80) and mindfulness-based cognitive therapy (81). Related mind-body techniques, such as progressive muscle relaxation, deep-breathing exercises, guided imagery, yoga, and tai chi, have also been used to promote psychological well-being.

Among generally healthy persons without existing heart disease, mindfulness-based interventions are associated with improvements across a range of physical and mental health

outcomes including improved depressive symptoms, anxiety, stress, quality of life, physical functioning, smoking cessation, healthy eating, and physical activity (82–84). Among persons with cardiac risk factors, mindfulness training has been associated with weight loss (85), disease self-management and glucose control (86,87), and improved problem-focused coping and blood pressure (88).

Mindfulness-related interventions in patients with existing heart disease have led to benefits in physical and mental health-related quality of life, depression, anxiety, physical activity, and blood pressure (89,90). Overall, a meta-analysis of mindfulness-based stress reduction and mindfulness-based cognitive therapy in 578 patients with vascular disease (including heart disease) from 8 randomized controlled trials found that, compared to control conditions, the interventions were associated with small to medium effects on stress (standardized mean difference [SMD] −0.36 [95% CI −0.67, −0.09]; p=0.01), depressive symptoms (SMD −0.35 [−0.53, −0.16]; p=0.003) and anxiety (SMD −0.50 [−0.70, −0.29]; p<.001; 91), mostly at 8-week follow-up. Tai chi and yoga have led to improved outcomes in heart failure patients (92–94) and blood pressure and exercise capacity improvements in other CVDrelated populations (95). Meditation is a component of many mindfulness-based interventions, and has been associated with mortality reduction in individuals with hypertension (96). A recent AHA scientific statement (97) recommended meditation as an adjunct to other cardiovascular risk reduction methods given promising evidence of benefit and low cost and risk. Overall, mindfulness-based interventions appear to promote psychological well-being and support CVH, though not all studies have found benefit and study quality remains inconsistent (82,91).

In contrast to mindfulness interventions, positive psychology interventions aim to promote optimism, gratitude, and positive affect directly through activities such as imagining and writing about a better future, recalling positive life events, identifying and using personal strengths, and planning and performing acts of kindness (98,99). Positive psychological interventions can be straightforward to deliver, are often feasible and well-accepted by patients, and may not require extensive provider training. Many programs have participants complete well-being activities on their own, followed by feedback and support from a program clinician/trainer (Figure 1). In healthy individuals, such activities have been found to improve indicators of psychological well-being such as optimism (100,101) in the short term, with some suggestion of sustained effect. Overall, a meta-analysis of 6139 participants in 39 randomized trials found that positive psychological interventions were associated with significant, small effects on well-being (SMD .34; p <0.001) and depression (SMD 0.23; p <0.001), with effects sustained at 3- or 6-month follow-up (101).

Less research exists for positive psychology interventions in patients with CVD or cardiac risk factors. Positive psychological interventions in at-risk populations (e.g., patients with hypertension or diabetes) have led to improvement in psychological well-being (102–104) and often, but not always, improvements in medication adherence (102–105) or other self-care behaviors (106). For example, in a randomized trial among patients with type 2 diabetes, a positive affect intervention led to greater improvements in depression ($\beta = -0.21$; p =0.05) compared to the control conditon (103). Among patients with existing CVD, positive psychology interventions, including programs specifically targeting optimism (107),

have consistently led to greater improvements in psychological well-being and functional performance than comparison conditions (107–109), with one large trial also finding improvements in physical activity (109). For example, a positive psychological intervention was associated with medium effect size differences in depression, anxiety, and positive affect improvement (SMD = 0.47–0.71) compared to treatment as usual among patients with a recent acute coronary syndrome (108). Additional large studies are required to examine effects on behavioral and health outcomes. Beneficial effects of positive psychological interventions in CVD populations have also been reported for biological markers, including inflammation and heart rate variability (110,111), though these biological effects have been less consistently observed than effects on health behaviors.

Finally, programs specifically focused on increasing meaning and purpose have also been developed and tested. Large randomized trials among those with advanced cancer or in palliative care have found that meaning- and purpose-related interventions have led to improvements in well-being, quality of life, depression, and physical symptom distress, with increased sense of meaning in life found to mediate these effects (112,113). A meaning-focused intervention study in palliative care found strong effects on purpose ($r = 0.56$; $p < 0.001$) and depressive symptoms ($p < 0.05$; 113). To our knowledge such interventions have not been tested in individuals with, or at risk for, CVD.

Along with their utility as stand-alone interventions, programs that cultivate psychological well-being could be combined with existing programs that target health behavior change (114). Mindfulness-based interventions have been integrated successfully into cardiac rehabilitation programs (115). In addition, positive psychological activities have led to increases in self-efficacy, confidence, and interpersonal connectedness (114), which in turn are linked with greater engagement in traditional health behavior interventions (116,117). This suggests that a combined psychological well-being-health behavior intervention could provide cardiac benefit both directly via improving psychological factors linked to cardiac outcomes (e.g., depression) *and* by boosting engagement with a linked behavioral intervention such as motivational interviewing (114). Indeed, a recent factorial design trial found that adding motivational interviewing to a positive psychological intervention led to greater health behavior adherence compared to those receiving the positive psychology intervention alone (118).

Community- and Population-Level Interventions

Promoting psychological well-being in community-based contexts—whether through workplaces, churches, neighborhoods, or population-wide—could provide even greater benefits. Prior trials have tested programs to enhance psychological well-being for adolescents in school settings (119,120) and older adults through community agencies (121). These interventions have resulted in fewer depressive symptoms and physical complaints, improvements in quality of life and emotional well-being, and personal growth (120,121). A church-based positive psychological group intervention (Figure 1) in U.S. Hispanics/Latinos at risk for CVD found the program to be feasible and associated with pre-post increases in emotional well-being and greater engagement in happiness-inducing behaviors (e.g., meditation; 122).

Perhaps the richest development of such institutional programs has been in the workplace. Such programs are of particular interest given that the overwhelming majority of U.S. adults are employed in a workplace setting, and many experience work as a significant source of stress (122). Moreover, routine job-related stress, including job strain and long working hours, may contribute to elevated risk for CVD (123). Recent AHA publications have focused on the workplace, including a *Workplace Health Playbook* on resilience-training programs (124). These resilience programs have been performed by individuals or groups of employees and use a mix of traditional cognitive behavioral therapy (CBT), mindfulness, promotion of 'psychological capital,' and programs rooted in positive psychology (125,126). They have demonstrated small but significant effects on work performance, psychological outcomes, and physical health. Other psychological well-being-focused programs related to 'positive organizational health,' have been less well-studied empirically (127) than traditional CBT-based stress management programs, and thus more research is needed to understand the impact of such workplace programs.

Though psychological well-being programs have not yet been applied to whole communities, there is an increasing focus on CVH promotion interventions tailored to specific communities (128). Examples include the city-wide *Healthy Chicago/Healthy Hearts Action Plan* and *Be There San Diego*, a project to make San Diego County CVD- and stroke-free. The Robert Wood Johnson Foundation's Culture of Health initiative (129) supports roughly 30 U.S. communities nationwide by "making health a shared value, fostering cross-sector collaboration to improve well-being, creating healthier, more equitable communities, and strengthening integration of health services and systems." The potential contribution of psychological wellbeing interventions to these and similar initiatives should be investigated with high priority.

Caregivers in Health Promotion: Implications for Clinical Practice

Clinical Practice

Clinical cardiology encounters can provide an excellent opportunity to assess and promote psychological well-being, especially as it relates to health. A first step during the visit may be a brief assessment for symptoms of psychological distress, such as depression and anxiety. Prior state-of the-art reviews on psychological distress and CVD (130,131) have outlined an approach to such screening and potential next steps in clinical management of mental health conditions.

Next, assessment of psychological well-being is warranted. While long-term survivors of acute CVD events often do not present clinically with a current psychiatric condition nor are they typically actively distressed, the majority of patients in the short-term aftermath of the event are likely to find that promotion of psychological well-being is relevant to their quality of life and function. When reviewing results of depression/anxiety screening with patients, clinicians can briefly introduce the idea that psychological well-being, not just the absence of acute distress, is important to health. Several specific questions (Table 1) about psychological well-being may be informative and can stimulate conversation about promotion of psychological well-being. These questions can focus on a patient's optimism,

life satisfaction, social support, life purpose, and positive affect, both in relation to their overall life circumstances and their health.

Psychological well-being can then be promoted and supported in a variety of ways by clinicians and co-providers (Figure 2). Such an approach focuses on bolstering a person's strengths to promote their psychological well-being and health, an approach that patients may find engaging and rewarding. Specific statements from clinicians can support psychological well-being, especially when statements relate to patients' personal circumstances (Table 1). Next, clinicians can make tailored recommendations (Tables 1 and 2). For example, a clinician may "give permission" for patients to engage in valued hobbies or other enjoyable activities, especially those that involve physical activity, social support, or deeper life satisfaction and purpose. Such clinician "prescriptions" to tend to one's well-being can be powerful and highly valued by patients, and such prescriptions may hold further weight when clinicians share that psychological well-being is associated with better health-related quality of life and superior cardiovascular outcomes.

For patients with adequate insight and interest, clinicians can additionally recommend specific structured psychological well-being-related activities. Sample activities, summarized in Table 2, may include optimism-focused or health-related activities linked to better well-being (132). Clinicians or co-providers can also provide information about community programs and resources that promote psychological well-being and/or increase social support, including social networks and home care. This approach may be particularly important in low-income areas or underserved communities given potential barriers to traditional psychological and behavioral strategies related to cost, stigma, and environmental resources. While it may seem challenging to help patients modify psychological well-being in the context of a new medical diagnosis, these events can represent a "teachable moment".

It is well understood that most physicians have had minimal training in this area and have highly limited time with patients. However, a structured and brief approach to psychological well-being that involves a small number of targeted - questions, a patient-centered discussion of sources of psychological well-being and specific activities to promote well-being, information about the benefits of psychological well-being, and provision of specific resources, may be a brief and meaningful component of a patient's appointment and overall care. More in-depth discussions, follow-up on positive activities, and additional resources may be provided by other members of the clinical team (e.g., nurses, office staff, or behavioral health colleagues). Furthermore, settings focused on cardiovascular wellness, such as cardiac prevention and rehabilitation programs, may provide ideal opportunities for conducting these assessments, conversations, and interventions. Finally, psychiatrists, psychologists, and other clinicians with behavioral cardiology expertise may be able to utilize well-being approaches, and can combine or integrate them with other psychological or behavioral interventions (Figure 2).

Future Research Directions

Further research is needed at three distinct but complementary levels. First, better definition and measurement of psychological well-being will enhance the field. A small number of

well-validated measures are established for specific aspects of well-being (133). However, for most facets of well-being (e.g., purpose, positive affect) strong instruments are lacking or there is no consensus choice of measure. Additional work is needed to gain consensus around optimal existing measures and to develop psychometrically sound instruments when they are lacking.

Second, because insight into mechanisms is fundamental to establishing causality and can guide intervention development (see 134), the field requires more rigorous investigation of causal pathways linking psychological well-being with cardiovascular outcomes. Studies of mechanistic pathways linking psychological well-being with CVH behaviors, factors, and outcomes have often been cross-sectional, examined only a single psychological factor, and had several other key shortcomings. Future studies evaluating mechanistic pathways require robust observational epidemiologic studies that incorporate: (1) multiple measures of well-being to distinguish if distinct facets of psychological well-being differentially impact outcomes; (2) longitudinal study designs to assess prospective relationships; (3) concurrent examination of biological, behavioral, and psychosocial pathways; (4) adequate control for psychological distress (e.g., depression) and other confounders; (5) large, diverse samples; and (6) the use of optimal causal inference methods.

Regarding studies of biological pathways and psychological well-being, findings have often been only suggestive, due in part to methodological issues noted above. While prospective findings provide more compelling evidence, standard techniques for reducing concerns about reverse causality, like adjusting for baseline levels of the outcome of interest, may not always address this concern. Bidirectional associations are also likely, as with depression and CVD (135). Alternative methods for assessing causal inference—such as epidemiologic studies utilizing repeated measures, statistical methods specifically targeted at these issues (e.g., marginal structural models), or experimental designs—can help resolve these concerns. Further, because reliance on a single biological measure may not reflect biological status across multiple systems, newer “omics” approaches (e.g., metabolomics the microbiome) may add insight.

Studies of psychological well-being and health behaviors have more often been longitudinal, and associations found more consistently, especially for physical activity and smoking, although a diversity of study populations has contributed to some mixed findings. Obtaining repeated measures of objectively measured health behaviors over time will result in a more comprehensive and rigorous body of evidence to indicate which health behaviors link psychological well-being with CVH. Psychosocial pathways also represent an important mechanism, as they can promote effective problem solving, capacity to regulate, and stress buffering; however, few studies have specifically tested these pathways as potential mediators. Direct evidence will require well-designed studies that assess psychological well-being, a range of psychosocial factors, and CVH.

Regarding social environmental antecedents, macro-level factors like socioeconomic position and social relationships correlate with psychological well-being, though most studies have been ecological and correlational. Individual-level prospective studies of socioeconomic position or changes in social networks have shown predictive relationships

with psychological well-being; however, such relationships are not uniform across well-being constructs (77).

Further studies evaluating social environmental influences on psychological well-being, especially those measuring multiple psychological well-being constructs, are needed.

Third, study of interventions that promote psychological well-being must be a key focus of the clinical and research agenda. Though mindfulness-based and positive psychological interventions appear effective in improving psychological well-being among healthy persons, their impact on promoting CVH and improving outcomes for CVD patients remain seriously understudied. Contemporary individual-, group-, and community-level well-being interventions should be based in theoretical models, target modifiable attributes linked with CVH, and be studied via rigorous, well-powered pragmatic trials in patient samples and healthy populations. Intervention studies should also consider mobile health interventions to improve reach and impact of a combined psychological well-being-health behavior intervention, which may be more powerful than either intervention alone. Interventions based in churches, workplaces, and other community settings, could promote greater community-wide well-being and social support, and strengthen individual-level psychological assets. Investigators have noted that some countries more actively promote resources that enhance psychological well-being, including social support and generosity and universal provision of physical and mental healthcare, and speculate these resources may explain the superior life expectancies and overall health seen in these countries. However, no studies have assessed population-level well-being interventions to promote CVH.

Conclusions

A substantial body of research addresses psychological well-being's relationship with CVH. Psychological well-being may affect CVH through three broadly defined pathways—biological, behavioral, and psychosocial. Psychological well-being can be strengthened by interventions such as mindfulness-based programs and positive psychological interventions. Such interventions, applied in clinical practice for both individuals and small groups, have generally been found to improve mental health outcomes and quality of life—worthy outcomes in their own right; however, whether such interventions durably and powerfully change CVH behaviors, biological factors, or cardiac outcomes remains an open question. Community-level interventions in workplaces, schools, churches, and other organizations have received limited evaluation to date. Moreover, no studies have specifically tested whether psychological wellbeing interventions lead to improvements in CVH per se (110). However, the field is increasingly headed in this direction, with studies aiming to identify optimal components of psychological well-being that can be subsequently tested in rigorous controlled trials examining effects on health-related outcomes (118). With wider experience and further evidence, clinical practice recommendations and health policy guidelines for psychological well-being interventions could substantially impact population-level CVH. Investment in the proposed research is urgently needed to realize this potential contribution of improved psychological health to better population CVH—an issue that can no longer wait.

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Abbreviations:

AHA	American Heart Association
BMI	body mass index
CBT	cognitive behavioral therapy
CHD	coronary heart disease
CVD	cardiovascular disease
CVH	cardiovascular health
HbA1c	Hemoglobin A1c
PTSD	post-traumatic stress disorder

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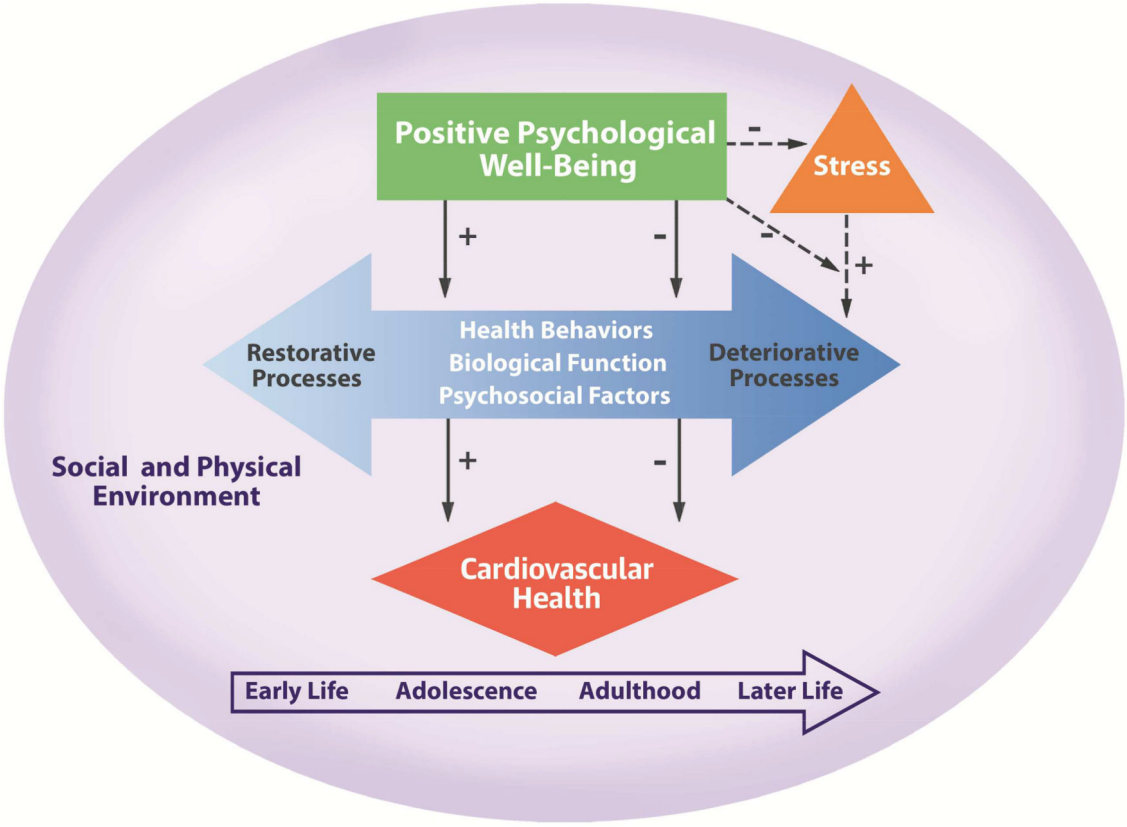

Central Illustration. Model of the Relation Between Positive Psychological Well-Being and Cardiovascular Health.

This model illustrates the complex direct and indirect relationships linking positive psychological well-being with better CVH via health behaviors, biological function, and psychosocial factors. psychological well-being may also reduce likelihood of experiencing stress or buffer the health-related impact of stress. These relationships are conditional on the social and physical environment and may vary in their nature and implications across the life course. (+ represents direct, positive relationships; - represents indirect, negative relationships.)

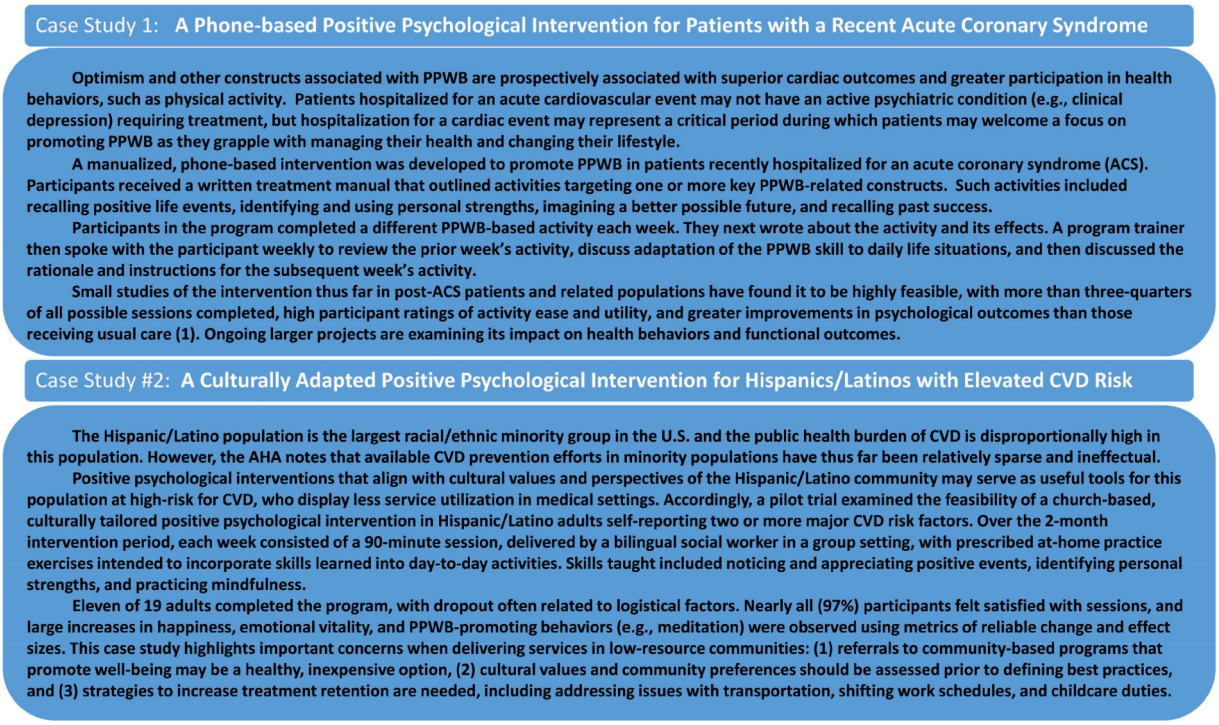

Figure 1: Case Studies of Positive Psychological Well-Being Interventions.

These two case studies illustrate application of psychological well-being interventions in clinical and community/organizational settings, respectively. While these are small in scale, they typify intervention approaches being explored in this arena. (ACS, acute coronary syndrome; AHA, American Heart Association; CVD, cardiovascular disease; CVH, cardiovascular health.)

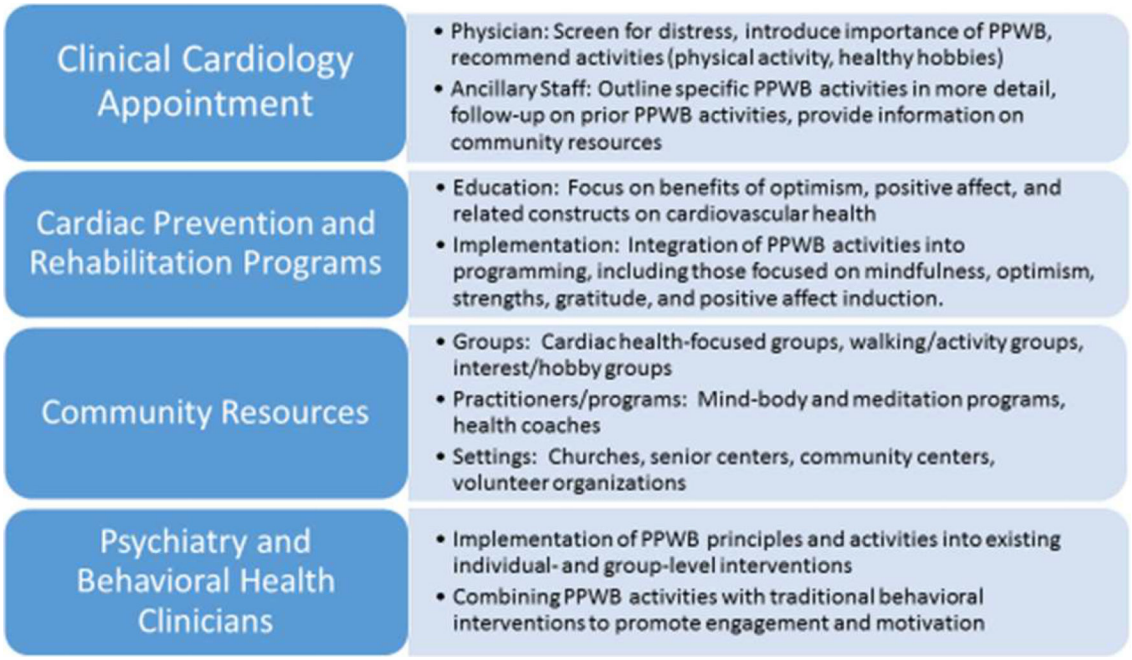

Figure 2: Principles and Methods of Positive Psychological Interventions.

These principles are illustrated in two types of settings. Together they may aid the clinician and co-providers to identify previously unrecognized opportunities for improving CVH through approaches unique to each setting. (CVH, cardiovascular health)

Table 1.

Brief clinician questions and statements to address and promote positive psychological well-being in clinical encounters.

Optimism

Questions:
• "Do you expect that good things will happen for you in the future?"
• "How do you think things will go with your health in the future?"
Sample statements to support positive psychological well-being:

I have managed many patients with this health problem before and I have seen many of them do very well. I think you can too.

Positive affect/life satisfaction

Questions:
• "How often do you experience pleasure or happiness in your life?"
• "Are you satisfied with how your life has gone and how you have lived it?"

Sample statements to support positive psychological well-being:

There is a lot of research finding connections between feeling happy and satisfied with your life, and your heart health. So I want to really support you in taking time for yourself and engaging in [healthy hobbies or meaningful activities].

Gratitude

Questions:
• "What, if anything, do you have to feel grateful for in your life?"
• "Do you ever feel grateful about your health? Tell me about that."

Sample statements to support positive psychological well-being:

We were lucky to catch this problem when we did, and I think that means that there is a good chance that your health can remain strong if we work together.

Leveraging Personal Strengths

Questions:
• "What are your greatest strengths and skills?"
• "When have you applied your best skills to improving your health?"

Sample statements to support positive psychological well-being:

I have been so impressed with how you have succeeded in your life when [life situation]. You can use those same skills to be successful in taking care of your heart health.

Table 2.

Activities to promote positive psychological well-being in clinical encounters and beyond.

Characteristic/Asset	Introductory activity in clinical encounter	Structured activities	Skill to be developed
Optimism	Considering and discussing a better possible health-related future	Writing in detail about a best possible health-related future one year from now and how this could be realized	Developing optimistic health expectations and goal-focused accomplishment of these expectations
Gratitude	Discussing reasons to be grateful related to one's current health status	Initiating a practice of recalling or journaling positive life events Writing a letter of gratitude to another person	Cultivating a grateful world-view, including gratitude for health.
Self-fficacy/confidence and use of personal strengths	Considering one's prior successes, the characteristics that led to such successes, and how this might apply to health goals	Writing about a major past life success, and writing about how the skills that led to this success will apply to self-care Identifying a personal signature strength (e.g., perseverance, social intelligence, creativity) and using this strength in a new way	Developing a strengths-focused identity, and cultivating use of personal strength(s) for health-related activities
Positive affect	Discussing past positive life events and valued current activities that bring pleasure	Scheduling pleasurable activities Capitalizing on positive life events by savoring or sharing them	Creating a practice of experiencing and savoring positive life events
Meaning/purpose	Discussing the things in one's life that provide a sense of purpose	Writing about one's legacy, steps to reach those life goals, and how health related activities can facilitate such goals	Identifying specific, meaningful life goals and utilizing health-related self-care to facilitate reaching such goals