Psychosocial Risk Factors and Cardiovascular Disease: Epidemiology, Screening, and Treatment Considerations

Alan Rozanski, MD

Division of Cardiology, Mount Sinai St. Luke’s Hospital, Mount Sinai Heart, and Icahn School of Medicine at Mount Sinai, New York, NY 10025, USA

Abstract

The recognition that psychosocial risk factors contribute to the pathogenesis of cardiovascular disease has led to the development of a new field of behavioral cardiology. The initial impetus for this field was studies performed in the 1980s and 1990s that provided epidemiological evidence and a pathophysiological basis for a strong link between a number of psychosocial risk factors and cardiovascular disease, including depression, anxiety, hostility, job stress, and poor social support. In recent years, additional psychosocial risk factors have been identified, including pessimism; other forms of chronic stress, such as childhood abuse and trauma, and the psychological stress that may be associated with chronic medical illness; lack of life purpose; and the syndrome of “vital exhaustion,” which consists of a triad of exhaustion, demoralization, and irritability. New research in the last decade has also established that positive psychosocial factors, such as optimism, positive emotions, a vibrant social life, and a strong sense of life purpose, can have an important health-buffering effect through their favorable influence on health behaviors and promotion of positive physiological functioning. Patients can be screened for psychosocial risk factors in clinical practice through either the use of open-ended questions, which can be integrated into a physician’s standard review of systems, or the use of short questionnaires. Physicians can assist in the treatment of psychosocial risk factors in various ways, such as screening patients for psychological distress and making appropriate referrals when indicated, providing patients with practical lifestyle suggestions, and employing office personnel to teach patients behavioral or psychosocial interventions that can promote a sense of well-being and/or reduce stress.

Keywords: stress; psychosocial factors; coronary heart disease; atherosclerosis; behavioral cardiology

Introduction

During the early 20th century, acute infectious illnesses began to recede as the chief cause of death because of advances in sanitation and safe food supply, and the development of vaccines and antibiotics. Chronic diseases then began to emerge as the primary causes of death, with cardiovascular disease (CVD) as the leading cause of death. In 1948 the famous Framingham Heart Study was initiated. By 1961 most of the major modifiable risk factors for CVD had been elucidated, including hypertension, dyslipidemia, diabetes, and smoking. At that time, interest regarding potential psychosocial risk factors for CVD was minimal. Growth of interest was sparked by research into “type A behavioral pattern,” a triad of hostility, impatience/time urgency, and a highly competitive drive, that was first proposed by Friedman and Rosenman [1]. In the late 1970s the Alameda County Study uncovered the role of social network size as a risk factor...
for all-cause death [2], and with increasing studies the role of depression as a risk factor for CVD began to delineate. In the 1980s research began to expand into the role of acute stress in precipitating myocardial ischemia [3–5], and experimental animal studies delineated pathophysiological mechanisms by which chronic stress can cause the development of atherosclerosis [6]. Other epidemiological studies began to elucidate a growing evidence base for other psychosocial risk factors for CVD, including anxiety, hostility, and work stress.

These epidemiological studies were complemented by a growing understanding of the complex ways in which psychosocial risk factors are pathogenic, including both pathophysiological and behavioral mechanisms (Figure 1) [7, 8]. The most potent psychosocial stressors such as depression and chronic stress can lead to persistent activation of the hypothalamic pituitary adrenal axis as well as dysregulation of the sympathetic nervous system. The consequence is widespread systemic effects, such as autonomic dysfunction, inflammation, insulin resistance and diabetes, ovarian dysfunction, endothelial dysfunction, potential telomere erosion, hyperreactive heart rate and blood pressure response to stress, platelet abnormalities, and unfavorable alterations in brain plasticity, such as enlargement of the amygdala and reduced hippocampal and prefrontal lobe size.

As understanding regarding the importance of psychosocial risk factors has expanded, it has led to a new field of behavioral cardiology, which concerns itself with the epidemiological and pathophysiological study of unhealthy behaviors and psychosocial risk factors for CVD, as well as the clinical translation of these findings into medical practice. This review provides an overview of the current established psychosocial risk factors for CVD (Table 1), as well as practical considerations for screening patients for these risk factors and treating patients with these risk factors in clinical practice.

**Sleep**

Increasing data have established that both sleep duration and the quality of sleep may increase CVD risk. With respect to sleep duration, both short sleep (i.e., ≤5–6 hours per night) and long sleep (i.e., >8–9 hours per night) have been linked to a greater risk of either developing or dying of CVD, as shown in a meta-analysis of 15 studies [9]. A meta-analysis of 13 studies has demonstrated that insomnia is also associated with an increased risk of developing CVD or cardiac events [10]. Short sleep has also been shown to be a risk factor for hypertension and diabetes [11, 12].

A growing literature has identified several pathophysiological mechanisms by which poor sleep...
promotes CVD, including abnormalities in neuroendocrine function, inflammation, and hormonal changes that stimulate increased appetite and weight gain [13–16]. Nevertheless, work is needed to identify potential factors that may mediate individual differences in sleep requirements. For example, it has been postulated but not yet studied whether a high sense of life purpose offsets sleep needs in some patients [17].

**Screening and Treatment**

Physicians can use open-ended questions to assess patients for sleep problems. Alternatively, sleep questionnaires customarily target a few domains of sleep difficulty, such as difficulty to fall asleep within 30 min, waking up in the middle of the night with difficulty to fall back asleep, or waking up feeling unrest.

Vulnerable patients who are voluntarily reducing sleep because of stress or difficulties with life-work balance need to be advised as to the health benefits of adequate sleep and/or provided with assistance in stress reduction. For patients with from mild to moderate insomnia, sleep hygiene measures can be suggested or a trial of a sleeping medication may be indicated. If sleeping difficulties are substantial, patients can also be referred to sleep medicine programs accustomed to dealing with these issues.

**Depression**

Depression was one of the first psychosocial factors to be strongly linked to CVD. The clinical presentation of depressive symptoms can range from mild depressive symptoms to major depressive disorder. Major depressive disorder is defined as the experience of severely depressed mood, loss of pleasure and interest in most activities, and the development of associated clinical symptoms, such as fatigue, insomnia, and loss or gain of appetite. Epidemiological studies have consistently demonstrated a strong gradient relationship between the magnitude of depressive symptoms and the risk of adverse clinical outcomes [18, 19]. Notably, even mild depressive symptoms are associated with increased risk compared with the absence of depressive symptoms (Figure 2).

**Figure 2** Five-year Survival After Acute Myocardial Infarction is Shown in Relation to the Measurement of Depression at the Time of Hospitalization. Depression was measured by the Beck Depression Inventory (BDI). There was a progressive decrease in survival according to increasing baseline BDI scores. Even mild elevations in BDI scores (5–9) were associated with increased incidence of events compared with normal BDI scores (<5). MI, myocardial infarction. From [18].

Depression is a commonplace symptom in cardiac practice. Whereas major depressive disorder has a point prevalence of 4–5% in the general population, it is commonly found among 15% of cardiac patients according to literature study [7]. In addition, another 15% of cardiac patients tend to have milder subsyndromal levels of depression. Thus depressive symptoms may be found in nearly one-third of cardiac patient populations. The reason for this high frequency appears to be due to a bidirectional relationship between depression and heart disease: depression is a direct causative risk factor for heart disease, but the occurrence of cardiac events may also drive the development of depressive symptoms among patients.

Various meta-analyses have confirmed a strong relationship between depressive symptoms and cardiac events, both in community cohorts without preexisting heart disease and in patients with known CVD. The largest of these meta-analyses involved the study of 146,538 patients among 54 studies [20]. In that meta-analysis, the adjusted risk ratio for cardiac events was increased by approximately two-fold among depressed versus nondepressed individuals in both community and known CVD cohorts.
Screening and Treatment

An American Heart Association multidisciplinary council has recommended screening cardiac patients for depression according to a two-item subscale of the Patient Health Questionnaire (PHQ-2), which asks patients how often they have been bothered over the previous 2 weeks by (1) little interest in or pleasure in doing things, and (2) feeling, down, depressed, or hopeless. Both questions are answered according to a four-point scale (0=not at all; 1=several days; 2=more than half the days; 3=nearly every day). A positive answer to either question (i.e., score ≥2) is an indication to use the full nine-item version of the Patient Health Questionnaire (PHQ-9) for further screening (see Appendix 1). In patients with high scores on the PHQ-9, a more comprehensive clinical evaluation by a qualified professional is recommended.

The standard treatment of depression includes either the use of psychotherapy and/or the use of antidepressant medications. Psychotherapeutic approaches include the use of either cognitive behavioral therapy or interpersonal psychotherapy. Cognitive therapy helps patients to identify distortions in their thoughts and patterns of behavior and then provide them with assistance in changing these distortions. Interpersonal therapy attempts to help patients improve their social interactions, such as the experience of social isolation and role conflicts. The first-line medication for treating depression is the use of a selective serotonin reuptake inhibitor. Randomized control trials have demonstrated the safety of selective serotonin reuptake inhibitors in the treatment of cardiac patients. Considerable evidence also supports the use of exercise as an alternative treatment for depression, on the basis of various epidemiological studies, including the results of three randomized controlled studies that found exercise to be comparable to antidepressant medication in alleviating depressive symptoms (Figure 3) [21–23].

Figure 3  Results from a Prospective Randomized Involving 101 Depressed Patients with Known CAD. Patients were randomized to undergo 16 weeks of aerobic exercise, to receive treatment with a selective serotonin reuptake inhibitor (sertraline), or to receive placebo. Depression was measured by the Hamilton Rating Scale for Depression (HAM-D). Aerobic exercise and treatment with a selective serotonin reuptake inhibitor resulted in comparable reductions in the depression scores assessed by the HAM-D versus treatment with placebo. MI, myocardial infarction. From [23].

Anxiety Syndromes

As with depression, anxiety symptoms can range from mild feelings of anxiety to well-known psychiatric conditions. With respect to general anxiety symptoms, a meta-analysis of 20 studies found the presence of such symptoms to be associated with an increased incidence of CVD (hazard ratio 1.48, 95% confidence interval 1.15–1.38) [24]. However, the analysis also demonstrated considerable variability among the individual studies, with only half of the studies manifesting a significant association between anxiety and CVD. A greater and more consistent link with CVD has been observed among psychiatric-level anxiety syndromes, including phobias [25, 26], panic disorder [27], generalized anxiety disorder [28, 29], and posttraumatic stress disorder (PTSD) [30]. Distinguishing characteristics of these anxiety syndromes are listed in Table 2.

Screening and Treatment

The presence of anxiety can be assessed by use of a two-item subscale of the Generalized Anxiety Disorder seven-item scale (GAD-7), which asks patients how often they have been bothered over the prior 2 weeks with (1) feeling nervous, anxious, or on edge and (2) not being able to stop or control worrying. The two questions are scored on a four-point scale (0=not at all, 3=nearly every day). Those with increased scores can then be assessed with the
GAD-7 (see Appendix 2). Patients with elevated scores may benefit from referral to a trained mental health professional.

A variety of treatment options can be used to treat anxiety, depending on the preference of patients and/or the severity of anxiety symptoms. Relaxation techniques, problem-solving counseling, and various targeted psychotherapies may be used to treat mild anxiety symptoms. As with depression, the use of cognitive therapy is often a mainstay of treatment, with modifications of the therapy, as appropriate, for specific forms of anxiety, such as PTSD or phobias. For those patients with severe anxiety symptoms, pharmacological interventions can also be used, including the use of selective serotonin reuptake inhibitors or benzodiazepines.

Table 2  Major Anxiety Syndromes Linked to Cardiovascular Disease.

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generalized anxiety disorder</td>
<td>Excessive and generally uncontrollable anxiety or worry Present most days for &gt;6 months Social and occupational dysfunction</td>
</tr>
<tr>
<td>Phobias</td>
<td>Marked and persistent fear of objects and performance situations On exposure, produces anxiety and a fear of acting in a dysfunctional manner</td>
</tr>
<tr>
<td>Panic disorder</td>
<td>Recurrent panic attacks The disorder may lead to adverse changes and/or persistent concern of having more panic attacks</td>
</tr>
<tr>
<td>Posttraumatic syndrome</td>
<td>Occurrence for &gt;1 month of flashback memories or other reexperiencing, avoidance of stimuli related to original trauma, numbing feelings, and hyperarousal</td>
</tr>
</tbody>
</table>

Pessimism

A psychosocial parameter that has been increasingly linked to health is the domain of pessimism versus optimism. This domain has long been identified by psychologists as an important determinant of subjective well-being. Optimism tends to be associated with more positive moods, greater morale, heightened resiliency and perseverance, and greater life success. Pessimism, by contrast, tends to be associated with less adaptive coping styles. The study of pessimism as a risk factor for CVD has been relatively recent. The earliest study, reported by Maruta et al. [31] in 2000, observed an increased risk of death for pessimists versus optimists during the 30 year follow-up of initially healthy participants. Subsequently, Kubzansky et al. [32] demonstrated an increased risk of adverse cardiac outcomes among pessimists in the Veteran Affairs Normative Aging Study. Since then, substantial further study has confirmed the increased risk posed by pessimism for CVD, stroke, and all-cause death [33–37]. In those studies in which it was assessed, there is a gradient relationship between the degree of measured pessimism/optimism and the likelihood of adverse clinical events.

Screening and Treatment

The domain of optimism/pessimism has been measured according to two differing constructs. One approach termed “dispositional” optimism/pessimism assesses a person’s general personality disposition toward expecting positive or negative outcomes in the future. The alternative approach is to assess a person’s “explanatory style.” The explanatory style of pessimists involves the tendency to blame themselves when negative events occur, to view negative events as likely to remain persistent, and to see these events as affecting many aspects of their lives. Optimists tend to minimize self-blame and to see negative events as transitory and limited in scope. Most recent research tends to use the measurement of dispositional optimism/pessimism (rather than explanatory style), and is most commonly assessed according to the Life Orientation Test-Revised, as developed by Scheier et al. [38]. The scale consists of a ten-item questionnaire involving the rating of such statements as “in uncertain times, I usually expect the best” and “I hardly ever expect things to go my way.”
The promotion of optimism represents a new focus in the arena of positive psychology. One approach involves the tailored use of cognitive behavioral techniques that are traditionally used to treat depression, anxiety, and other negative psychological conditions. In addition, recent psychological interventions that have been developed, such as the “best possible self exercise” [39, 40], deserve further evaluation.

**Hostility and Anger**

The study of anger and hostility as CVD risk factors was an outgrowth of initial interest in the type A behavioral pattern. Interest in this behavioral pattern, which initially was linked to CVD in epidemiological studies, later waned because of negative findings. However, interest in anger/hostility has persisted. Overall, however, the relationship appears to be modest. In a meta-analysis of published studies, Chida and Steptoe [41] observed that the presence of anger or hostility increased the risk of coronary heart disease by approximately 20% among 25 studies involving community cohorts and by 25% among 19 studies involving patients with known coronary heart disease. Various studies have also linked hostility to the progression of atherosclerosis and various pathophysiological determinants of CVD.

**Screening and Treatment**

Assessment of hostility can be performed with the Cook-Medley hostility scale, but the scale is not practically used in clinical practice. While patients can be screened for most psychosocial risk factors by use of open-ended questions, a problem with the use of open-ended questions to screen patients for anger/hostility is the frequent lack of sufficient self-recognition as to this character tendency among those who have it. However, when undue anger has been identified, it can be successfully treated by participation in anger management programs.

**Chronic Stress**

Chronic stress has been strongly linked to CVD on both a pathophysiological and an epidemiological basis. Important insights into the effects of chronic stress have been garnered from studies of the effects of chronic stress in experimental animals. A popular model in this regard is the study of cynomolgus monkeys (*Macaca fascicularis*), for three reasons: cynomolgus monkeys develop atherosclerosis in a manner that is similar to humans; they have quantifiable social characteristics; and their social environment can be readily modified to create a condition of chronic stress. For instance, when male cynomolgus monkeys are placed in constantly changing social groups, a chronically stressful environment is created for “dominant” (versus “submissive”) monkeys since these monkeys continually attempt to reestablish their dominance within each new social group. Dominant male monkeys within unstable groups develop sufficiently greater atherosclerosis than counterparts that are placed in stable unchanging groups [6].

The epidemiological study of chronic stress has been extensive. Among these studies, the internationally conducted INTERHEART study observed a proportional relationship between the chronicity of stress and the risk of myocardial infarction (Figure 4). Moreover, the relationship between stress and myocardial infarction was found to be consistent across countries and continents (Figure 5) [42]. The role of chronic stress has also been evaluated across multiple life situations, such as job, marital, and caregiving stress, and the chronic stress that

**Figure 4**  The Odds Ratio for Myocardial Infarction (MI) in the INTERHEART Study According to Measurements of the Amount of Stress at Work and Stress at Home. For both, the odds ratio increased with increasing frequency and chronicity of stress.
may ensue from childhood abuse and trauma. The most studied of these situational stressors has been chronic job stress. A leading model in this regard has been the study of “job strain,” as first proposed by Karasek et al. [43]. According to that model, individuals are assessed for the amount of work demand and the latitude they are afforded in their job situation. Job strain is present when individuals experience work that is highly demanding but associated with low job latitude (Figure 6). A similar model has evaluated individuals for job demand versus the “reward” (fiscal or nonfiscal) received from working. A meta-analysis by Kivimäki et al. [44], however, found only a modest 1.23-fold increased risk of incident CVD among individuals with job strain. It may be insufficient though to reduce the nature of job stress to just these two variables. Rather, other factors that may potentially impact the relationship between job stress and CVD outcomes deserve further study, including the chronicity of stress, the impact of socioeconomic conditions, and the meaningfulness experienced in one’s work.

Figure 5  Adjusted Odds Ratio for Acute Myocardial Infarction in the INTERHEART Study for Participants with Moderate/Severe Stress, Shown by Geographic Region and by Ethnic Group. Stress was associated with an increased odds ratio in all regions and ethnic groups. CI, confidence interval. From [42].

Figure 6  Model of “Job Strain” as Proposed by Karasek et al. [43]. Work is evaluated according to the amount of demand of the job, and according to the amount of latitude that is afforded to workers. Job strain is present when highly demanding work is associated with little job latitude.
work [45, 46], but overall, research in this arena is quite limited. An interrelated arena is the study of burnout [47] and vital exhaustion [48, 49], two syndromes that are each characterized by a triad of symptoms, as shown in Figure 7. To date, there has been a paucity of studies examining the relationship between burnout and CVD outcomes, although one large follow-up of 8838 healthy individuals assessed for burnout found that those who scored in the highest quintile for burnout symptoms had a higher risk of developing coronary heart disease (hazard ratio of 1.79, 95% confidence interval 1.05–3.04) [47]. By contrast, there has been substantial epidemiologic study that now links vital exhaustion to CVD outcomes [50–53]. For instance, in the Copenhagen City Heart Study, which involved the follow-up of 8882 individuals who were initially free from CVD, vital exhaustion was observed to be a strong independent risk factor for the development of CVD, with manifestation of a strong risk-adjusted gradient relationship [53].

Lesser study has suggested a link between marital strain and CVD [54], and divorce is also associated with an increased risk of death [55]. Similarly, childhood abuse has been found to be associated with an increased risk of CVD and other adverse medical outcomes in adulthood according to a meta-analysis of 24 studies [56]. More recently, study has begun to focus on the stress associated with medical illness and its impact on subsequent CVD risk. For instance, in a meta-analysis of 24 studies in which PTSD was assessed among acute coronary syndrome patients, a 12% prevalence of PTSD was found [57]. Among three of these studies, there was a doubling of subsequent risk of death among those acute coronary syndrome patients who had PTSD.

Screening and Treatment

There is no formal approach to screening patients for stress in clinical practice. A practical approach involves the use of open-ended questions such as “what kind of pressure have you been under at work or at home?” and “do you have difficulty unwinding after work?” Alternatively, there are a variety of scales that can be used to assess factors such as general perceived stress, job strain, burnout, and vital exhaustion. However, these scales are primarily used for epidemiological study rather than in routine clinical practice.

Physicians can often undertake an important and often unappreciated role in helping patients to deal with chronic stress. Physicians often underestimate their potential “bully pulpit” (i.e., their ability to suggest recommendations that patients will take seriously because their physician thinks they are important). Physician management of stress first begins with the physician becoming attuned to recognizing high stress levels in patients. Physicians can then take the following steps when they sense patients have a high burden of stress.

First, physicians can make practical suggestions regarding positive health practices to support patients with chronic stress. This is important in light of work by Thayer [58], who demonstrated that patients tolerate stress better when they feel more energetic. The same problem that seems manageable when one feels energetic can loom large when one feels tired. Thus promotion of energy management can often assist patients in managing stress. A principal recommendation in this regard is to promote exercise. Exercise has the benefit of elevating mood, improving cognitive function, and reducing the negative pathophysiological effects of chronic stress [17]. Other important energy tips include obtaining adequate sleep and having a healthy diet.

Second, physicians can recommend relaxation techniques when appropriate. This can include simple measures such as breathing exercises and progressive relaxation techniques that could be demonstrated by trained ancillary office personnel, or the referral of patients to structured programs, such as mindfulness-based stress reduction classes, yoga, or Tai Chi.
Third, physicians can also make practical lifestyle suggestions to help patients reduce stress or to unwind, such as creating better boundaries around work, taking more vacation, or spending more time with their family or in leisure pursuits.

Fourth, physicians can suggest referral of appropriate patients for behavioral interventions, including traditional psychotherapies, for patients who are apparently overwhelmed by chronic stress.

Social Isolation and Poor Social Support

The need for social attachment is a basic psychological need. Its absence may lead to both negative psychological sequelae and poor health. The study of the social determinants of health has been extensive and multidimensional, including study of the size and frequency of contact within one’s social network, the quality of emotional support, and the quality of tangible forms of social support. Each of these determinants has been shown to be an important health predictor. Even among social animals, the induction of social isolation can induce potent pathophysiological disturbances [59, 60]. For example, among experimental female cynomolgus monkeys that were all fed the same atherogenic diet, those that were placed in single cages developed substantially greater atherosclerosis than those that were placed in groups [60].

A recent extensive meta-analysis of 148 studies, involving 308,849 individuals, found that an index of social integration had a moderate to large effect size with respect to diminishing the subsequent risk of all-cause death [61]. The nearly two-fold odds of increased survival with good social integration noted in this analysis is comparable to that noted with many cardiac interventions, such as cardiac rehabilitation.

Another important social index is socioeconomic status, which is commonly assessed as a composite of factors, such as education, occupational status, and income. A consistent inverse gradient has been observed between socioeconomic status and the likelihood of both all-cause death and cardiac events [62, 63]. Low socioeconomic status increases the likelihood of overall chronic stress because of its common association with poor income, job insecurity or unemployment, poorer housing conditions, decreased public safety, and other factors.

Screening and Treatment

While numerous scales have been developed to assess social support, there is no standard scale that has gained widespread acceptance for clinical practice. Instead, patients can be screened for poor social support according to open-ended questions, such as “who do you turn to for social support?” Further questions may follow according to practical circumstances, such as inquiring whether an infirm patient has adequate tangible social support or resources.

Physicians can undertake practical steps to support patients who appear to be lonely or have poor social support. One step is to become cognizant of the various support groups, social services, and community resources that are available to aid patients with their social needs and to then encourage patients to use these resources. In addition, physicians can also encourage patients to be more socially active and let them know that they will follow-up on this advice at subsequent visits. This may inspire some patients to become more socially active. For example, among elderly retirees who feel socially isolated, volunteering may be a meaningful and useful way to improve social contact. Volunteering has been shown to have practical health benefits, including extension of longevity [64, 65]. Finally, when needed, a physician can refer patients who have difficulty in constructing a healthy social life to an appropriate behavioral specialist.

Positive Psychosocial Factors

In the last decade increasing focus has been placed on the health-mediating effects of positive psychological factors. This focus grew out of research that explored the role of positive psychological factors in improving overall well-being and resiliency. In essence, all of the negative psychological factors noted in previous sections have their positive counterparts, and when assessed, these positive factors promote health and longevity [17], just as the negative factors promote disease and reduce longevity. In an initial meta-analysis of epidemiological studies that studied positive psychological factors, Chida and Steptoe [66] found that the presence of positive psychological well-being reduced mortality in both
community cohorts and diseased populations. This initial meta-analysis included a broad variety of positive psychological factors, such as positive mood, optimism, and life satisfaction. Since then, epidemiological studies have continued to support the benefits of positive psychological factors, while physiological studies have helped to delineate mechanisms by which positive psychosocial factors are physiologically beneficial, such as by reducing activation of the neuroendocrine and immune systems, and increasing the likelihood of positive health behaviors [17].

As this research has expanded, an area of specific interest has centered around the basic psychological need of having a sense of purpose, as proposed by many theorists. While this line of investigation has only been recent, a meta-analysis of ten studies found a consistently lower risk of adverse clinical

![Figure 8](image-url)  
**Figure 8** Unadjusted (top) and Adjusted (bottom) Risk Ratios for All-cause Death According to High versus Low Purpose in Life.  
Squares represent the risk ratio of the individual studies, while the diamond represents the pooled risk ratio or the overall effect. CI, confidence interval; RR, relative risk. From [67].
events among individuals with a strong sense of life purpose in these studies (Figure 8) [67]. Other studies have found a reduced risk of stroke [68], dementia [69, 70], and future physical disability [71] among participants reporting a higher sense of life purpose at the baseline.

**Screening and Treatment**

No formal approach to screening patients for positive psychosocial functioning has yet been developed, but one practical approach is to assess patients for their reported sense of vitality (i.e., to what extent they feel energetic). Those reporting low energy can then be evaluated as to physical or psychological factors that may potentially diminish their sense of vitality.

Promoting positive psychological well-being is not merely the result of reducing negative psychosocial factors. Rather, for those individuals seeking a “positive prescription,” a baseline of promoting exercise and healthy nutrition can be coupled with a tailoring from other integrative health practices, such as yoga and meditative practices, the performance of appreciation and gratitude exercises, promoting volunteering or other meaning-based activities, the use of positive cognitive therapy, and other approaches. The future will likely see the development of programs that offer such services within health care systems.

**Summary**

The study of psychosocial risk factors has led to the development of a new field of behavioral cardiology. This field concerns itself with the identification of health behaviors and psychological and societal factors that contribute to the pathogenesis of CVD and the clinical translation of these findings into practical methods to help patients reduce psychological distress and improve health behaviors. The epidemiological evidence linking negative psychosocial risk factors to CVD is both consistent and strong. The last decade has also seen a marked growth in the examination of psychological factors that promote overall health, longevity, and individuals’ sense of well-being. This article has also reviewed practical means for screening patients for psychosocial risk factors as well as practical interventions that can be used to manage psychosocial risk factors in clinical medical practice.

**Conflict of Interest/Disclosures**

The author declares no conflict of interest.

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Appendix 1. Nine-Item Patient Health Questionnaire

Over the last 2 weeks, how often have you been bothered by any of the following problems?

<table>
<thead>
<tr>
<th>Problem</th>
<th>Not at all</th>
<th>Several days</th>
<th>More than half the days</th>
<th>Nearly every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Little interest or pleasure doing things</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. Feeling down, depressed, or hopeless</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. Trouble falling or staying asleep, or sleeping too much</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. Feeling tired or having little energy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. Poor appetite or overeating</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. Feeling bad about yourself – or that you are a failure or have let yourself or your family down</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. Trouble concentrating on things, such as reading the newspaper or watching television</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. Thoughts that you would be better off dead or of hurting yourself in some way</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all  □  Somewhat difficult □  Very difficult □  Extremely difficult □
Appendix 2. Generalized Anxiety Disorder Seven-Item Scale

Over the last 2 weeks, how often have you been bothered by any of the following problems?

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Several days</th>
<th>More than half the days</th>
<th>Nearly every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Feeling nervous, anxious, or on</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>edge</td>
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<td></td>
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<tr>
<td>2. Not being able to stop or control</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>worrying</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Worrying too much about different</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>things</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Trouble relaxing</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. Being so restless that it’s hard</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>to sit still</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Becoming easily annoyed or</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>irritable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Feeling afraid as if something</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>awful might happen</td>
<td></td>
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</tbody>
</table>

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

<table>
<thead>
<tr>
<th>Not difficult at all</th>
<th>Somewhat difficult</th>
<th>Very difficult</th>
<th>Extremely difficult</th>
</tr>
</thead>
<tbody>
<tr>
<td>□</td>
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<td>□</td>
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