Positive psychological well-being and health in patients with heart disease: a brief review

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Poor psychological health (e.g., depression and anxiety) is prospectively associated with adverse cardiac outcomes. In contrast, there is increasing evidence that positive psychological constructs like happiness, optimism and gratitude are independently and prospectively linked to better health behaviors and superior cardiac prognosis in people with and without heart disease. However, a critical question is whether such positive states and traits are modifiable. Recent studies of systematic positive psychology interventions designed to promote well-being have shown promise in patients with heart disease, and more data are needed to learn whether these interventions are effective and whether they can be broadly applied to impact public health.

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8 years ago, we wrote an editorial in *Future Cardiology* entitled, ‘Could being happy give you a healthy heart?’ [1]. Since that time, much research has been conducted regarding our understanding of the relationship between positive psychological well-being and health outcomes. Furthermore, there is increasing research regarding the development of interventions aimed at promoting positive states in patients with heart disease and related conditions. In this piece, we will provide an update on what is known in this area and key ongoing gaps in our knowledge. Specifically, we will first summarize findings that link negative psychological syndromes (such as depression and anxiety) with adverse cardiac prognosis. Next, we will describe studies that have found positive psychological states and traits to be prospectively associated with superior cardiac outcomes, and we will discuss potential mechanisms that may explain these findings. Finally, we will describe interventions that have been designed to promote psychological well-being and outline the evidence for their efficacy in the general population and in patients with heart disease.

Negative psychological syndromes & adverse cardiac outcomes

There is considerable evidence suggesting that having a negative psychological syndrome, such as clinical depression, is associated with adverse cardiac outcomes. Healthy adults who have depression are more likely to subsequently develop heart disease, independent of traditional risk factors [2]. For example, a large prospective study found a 2.7-fold increased risk of cardiac death in patients with depression over a median follow-up period of 8 years [3], and a meta-analysis of 21 studies found an 81% increased risk of future coronary heart disease among those patients with depression [4]. Furthermore, among those with stable cardiovascular illness, depression is associated with majority of new cardiac events [5,6]. Finally, in patients hospitalized for heart failure or an acute coronary syndrome, or those undergoing coronary artery bypass graft surgery, depression is an independent risk factor for recurrent events, rehospitalization and death [7-9]. These connections between depression and adverse cardiac outcomes appear to be present in young and older persons, and in men and women. Furthermore, the prospective effects of depression on outcomes are present both in the short-term and over the course of many subsequent years.

Elevated symptoms of anxiety and formal anxiety disorders are also associated with cardiovascular morbidity and mortality. A 2016 meta-analysis found anxiety to be associated with elevated risks of coronary heart disease, heart failure, cardiovascular mortality and stroke, though anxiety was not associated with major cardiovascular events.
and there was substantial across-study heterogeneity [10]. Elevated anxiety symptoms are also associated with higher rates of mortality and adverse cardiac events in those with existing heart disease, especially among those with stable coronary artery disease, independent of the effects of depression [11]. The magnitude of these effects of anxiety, however, is less than that for depression. Specific anxiety disorders – such as generalized anxiety disorder and panic disorder – have also been linked to adverse cardiac events in some, but not all, studies [10,12–15].

Taken together, evidence suggests that poor psychological health, manifested as depression and anxiety, tends to be associated with poor cardiovascular health in initially healthy individuals as well as individuals already diagnosed with cardiovascular disease.

**Positive psychological well-being & cardiovascular health**

However, there is more to psychological health than just the absence of depression and anxiety. Positive psychological well-being may also play an important role. For the purposes of this discussion, positive psychological well-being refers to relatively transient feelings like joy and contentment, longer-lasting characteristics such as life satisfaction or purpose in life, and more dispositional traits like optimism [16]. Importantly, positive states and traits that comprise positive psychological well-being are not simply the flipside of depression. For example, optimism and depression are only modestly inversely correlated [17], and indeed we have all met people (and patients) who are depressed but hopeful about recovery, as well as those who are not depressed – but not optimistic about their future. In short, not being happy or hopeful is not the same as being depressed.

In contrast to depression and anxiety, positive psychological well-being has been associated with superior cardiac outcomes among people who are initially healthy or who have already been diagnosed with a cardiovascular condition [18]. As one early example, a meta-analysis of more than 80 studies found that optimism, or thinking positively about the future, was prospectively associated with superior physical health, better cardiac outcomes and lower mortality [19]. More generally, positive psychological well-being has also been linked with greater longevity [20]. Similar findings have been reported by rigorous prospective studies conducted with epidemiological cohorts followed over many years. For example, among older adults who were initially free from heart disease, those who reported greater baseline levels of optimism, life satisfaction or emotional vitality (i.e., enthusiasm for life) showed reduced risk of developing heart disease more than 5 years later [21]. Likewise, a recent prospective study of a large nationally representative population of older adults in the USA reported a 48% reduction in odds of developing heart failure among those with the highest versus lowest levels of optimism [22]. In these prospective studies, connections between well-being and cardiovascular health were independent of not only conventional risk factors such as hypertension, but also indicators of psychological distress such as depression. Finally, in a systematic review of studies encompassing more than 14,000 patients with existing heart disease, the majority of studies found a connection between positive psychological well-being and superior health outcomes, including lower rates of mortality [23]. Overall, the preponderance of the evidence supports the assertion that well-being has prospective cardiac health benefits.

Why might positive psychological well-being be connected with better cardiovascular outcomes? Mechanistically, some, though not all, studies have found connections between positive psychological well-being and biomarkers of cardiac health, including markers of inflammation, neuroendocrine and lipid levels, such as lower IL-6, lower C-reactive protein, lower fibrinogen, greater high density cholesterol, lower triglycerides and lower salivary cortisol [24–28]. However, it appears that the strongest prospective connections between well-being and cardiac health may be related to health behaviors, with numerous studies finding connections between positive psychological constructs and health behaviors, especially physical activity, in both cardiovascular patients [23,29–32] and healthy individuals [33–37].

Nonetheless, there are outstanding questions about which indicators of positive psychological well-being (e.g., positive emotions, optimism, life satisfaction or gratitude) may be most strongly associated with beneficial health effects. For example, one recent study found that optimism – but not gratitude – was prospectively associated with greater subsequent physical activity and reduced hospitalizations in patients suffering an acute coronary syndrome. Other studies have reported that life satisfaction and emotional vitality – but not optimism – were associated with incident diabetes and hypertension, both of which are chronic conditions related to heart disease [38,39]. These differences could be due to measurement issues (e.g., a single item assessing a given construct may be less reliable than multi-item measures) or to conceptual distinctions between different indicators of positive psychological well-being (e.g., one indicator of positive psychological well-being may be characterized by an ‘active ingredient’ that influences a particular health outcome while another may not). In sum, there is significant evidence...
Interventions to promote positive psychological well-being

Given the documented associations between positive psychological well-being and better cardiovascular health, it is important to determine whether well-being could serve as a target of intervention for fostering improved cardiovascular outcomes. Notably, there have been mixed results – with only a few promising studies – in trials to date aimed at merely reducing negative affect or managing depression to improve cardiac morbidity and mortality [40–47]. On the other hand, there has been minimal study of interventions designed to increase positive psychological well-being in order to improve cardiac outcomes, and unlike medications for depression, anxiety disorders and related negative psychological syndromes, there are no pharmacologic treatments that have been developed to increase optimism or other positive psychological constructs.

There is increasing evidence that it may be possible to actively cultivate optimism, happiness, gratitude and other positive psychological states and traits, even among those who may initially have a more pessimistic worldview. The discipline of positive psychology has found that, though a sizeable portion of happiness is explained by factors that are difficult to alter (such as intrinsic disposition and external life events), substantial variability within well-being may be directly under one’s own control [48]. Positive psychology interventions – which promote well-being through systematic activities such as identifying and using personal strengths, savoring positive life events and performing kind acts for others – are used to increase the frequency and intensity of positive emotions in one’s life. These interventions have been found to consistently and persistently improve psychological well-being (and reduce depression) in studies involving thousands of healthy persons [49–51]. These interventions (which typically take place over 4–12 weeks) tend to be simple and straightforward to implement, can be used with patients from a wide range of educational backgrounds and with varying psychological insight and require little provider training to be delivered.

No research to date has been conducted to determine whether initially healthy individuals who engage in preventative positive psychology interventions have better cardiovascular outcomes in subsequent years. However, increasing research has started to examine whether it is possible to customize and utilize such interventions for patients with newly identified or existing cardiovascular disease, as well as other chronic medical conditions. Interventions that are somewhat related to positive psychological interventions – such as mindfulness-based treatments and those involving the development of coping skills – have been found to be effective in improving psychological health, health-related quality of life, and in some cases, even rates of cardiovascular events [52,53].

Moreover, an increasing number of positive psychology interventions that are aimed specifically at boosting positive emotions, optimism, altruism and overall well-being have now been implemented in medical populations [54–59]. These have been very well-accepted by participants and have been found to improve well-being and mental health in patients with HIV [55,57], asthma [60] and Type 2 diabetes [54,61]. In patients with heart disease, these programs have also been linked to greater well-being, less depression and improved health-related quality of life [62,63].

However, thus far, the effects of positive psychological interventions on specific health behaviors have been more mixed. One randomized trial of a positive psychology program found no effects on glucose monitoring or exercise behaviors [54], while another study found that self-affirmations and inducing positive affect added no benefit – in terms of increased energy expenditure – to an educational intervention [64]. On the other hand, one study reported that a positive psychology intervention was linked with greater physical activity in people with heart disease [65] and at least one group has reported that a gratitude intervention increased physical activity [66]. A recent pilot study of a gratitude journaling intervention also demonstrated promising effects on an inflammatory biomarker panel, including reductions in C-reactive protein, IL-6 and TNF-α [67]. Furthermore, an exploratory trial in patients who recently underwent a cardiac procedure found that two different psychology programs both increased happiness and hope, and were associated with decreased C-reactive protein [68,69].

Of note, given that positive psychology interventions have been well-accepted in medical patients and linked to improved mental health – but thus far have had more mixed effects on key cardiac health behaviors or cardiac outcomes – it may be that these simple interventions are best combined with traditional health behavior interventions such as motivational interviewing or goal-setting programs that specifically address physical activity [70,71], which may be a particularly important health behavior given its effects on mood, energy and overall prognosis. This hypothesis is supported by the recent success of a combined stress management and physical activity program that
was more effective than cardiac rehabilitation alone [53]. This combined approach provides a possible improvement upon previous trials of cognitive behavioral interventions [41,43–44]. It may be that positive psychological interventions too, if they are proven to be effective, also need to be coupled with a physical activity focus for their full benefit [32]. An additional important aspect of future positive psychological interventions, whether used alone or in combination, will be durability. Many behavioral interventions have beneficial effects on mood or behavior during an intervention period, but to impact health in a longitudinal manner, interventions must help to build long-term skills and routines. Moving forward, positive psychological interventions must focus on translating specific exercises into regular habits that can induce and support well-being well beyond the intervention period.

Finally, while standard behavior change or cardiac rehabilitation programs can effectively improve health behaviors in those with heart disease or other chronic illnesses [72–75], a substantial proportion of patients may have difficulty engaging in – and completing – these existing interventions. The presence of depressive symptoms, limited self-efficacy and low expectations for improvement are linked with poorer engagement in these programs [76–78]. To address these potential risk factors for health behavior intervention nonresponse, positive psychology interventions may not only hold potential to provide direct benefits to mood and health, but also target these specific barriers and serve as a ‘booster’ to increase engagement with – and benefits of – known effective cardiac interventions. Undoubtedly, larger and rigorous trials will be necessary to determine the role that positive psychology interventions can play in enhancing key health behaviors and, ultimately, cardiac outcomes.

Conclusion
In short, there is increasing evidence that positive psychological well-being is linked to superior cardiac outcomes, independent of traditional risk factors and negative psychological syndromes like depression. Furthermore, positive psychological interventions consistently improve well-being and have been well accepted in patients with heart disease. Whether these interventions – alone or in combination with existing behavioral interventions – can ultimately lead to improved cardiac prognosis is an open question and one with important public health implications.

Future perspective
Over the next 5–10 years, several trials of positive psychology interventions in patients with heart disease and related conditions are due to be completed. These trials will inform the field regarding the feasibility, utility and broad applicability of these interventions. One imagines that – given the clear links between positive psychological well-being and cardiac health – these interventions will show substantial benefits on proximal outcomes (e.g., mental health, health-related quality of life), moderate effects on behavioral outcomes and smaller effects on ‘hard’ cardiac outcomes, suggesting that additional refinements to intervention content and delivery will continue to be needed before they are fully ready to be deployed widely in clinical settings.

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Executive summary

Negative psychological syndromes & adverse cardiac outcomes
- Depression and, to a lesser degree, anxiety disorders, are independently linked to adverse cardiac events and mortality.

Positive psychological well-being & cardiac health
- Positive psychological well-being – measured multiple ways – is linked with superior cardiac outcomes, independent of sociodemographics, medical factors and depression.
- This suggests that it is not simply the absence of negative psychological syndromes that leads to the benefits of well-being on heart health.

Interventions to promote positive psychological well-being
- Positive psychology interventions – systematic activities to promote well-being – have been linked to greater well-being and less depression in patients with and without medical illness.
- Such interventions have been tested in patients with heart disease to good effect, though it is less clear whether they can promote key changes in health behaviors and cardiac prognosis by themselves.
- Ongoing studies of these interventions alone – and in combination with existing behavioral interventions – will shed light on the utility of this approach in improving the prognosis of patients with heart disease.

References

Papers of special note have been highlighted as: ◆ of interest; ◆◆ of considerable interest


◆◆ This extensive review explores all aspects of positive psychological well-being and relevant associations with cardiovascular disease. Potential mechanisms, biological functions and cardiac outcomes are discussed.


- This meta-analysis evaluated the strength of the association between optimism and physical health across 83 studies. Optimism was found to be a significant predictor of health outcomes, with a mean effect size of 0.17.


- This systematic review of prospective observational studies assessed the effects of positive psychological constructs on subsequent health-related outcomes in patients with heart disease. Meta-analysis of 11 selected studies showed that positive constructs were associated with reduced rates of rehospitalization and mortality.


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- This randomized controlled trial assigned 49 patients either to a self-paced online intervention for Type 2 diabetes that teaches positive affect skills such as savoring, gratitude and acts of kindness or a wait list control. The intervention group showed decreased depression and the study demonstrated feasibility and acceptability for future larger trials.


- Details the background and pilot data of a positive affect intervention for people living with serious health-related stress. Findings in HIV patients included increased positive affect and decreased negative affect, as well as feasibility and acceptability for the intervention.


This randomized controlled trial assigned 242 patients who underwent percutaneous coronary intervention to an educational control or an educational program enhanced with positive-affect/self-affirmation induction. Patients in the intervention group achieved a clinically significant increase in physical activity by 12 months compared with controls.


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