



Does type-D personality predict outcomes among patients with cardiovascular disease? A meta-analytic review

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ABSTRACT

Objective: Research generally indicates that psychological variables are stronger predictors of cardiovascular outcomes in healthy populations than in those with preexisting illness. Studies of Type-D personality, however, suggest that it may also be predictive of negative health outcomes in cardiovascular patient populations. To date, no independent, comprehensive meta-analysis centered specifically on Type-D has integrated this literature and provided quantitative estimates of these relationships. The present meta-analysis investigated the associations between Type-D personality and (a) major adverse cardiac events (MACE), (b) health-related quality of life (HRQOL) and (c) biochemical markers of cardiovascular disease among cardiovascular patients.

Method: Two independent reviewers abstracted data from 15 separate studies. A random effects meta-analytic model was utilized to calculate omnibus effect sizes for each set of related studies, i.e., for the MACE (N of patients=2903), HRQOL (N of patients=1263) and biochemical marker (N of patients=305) measures. **Results:** A positive association was found between Type-D personality and MACE, whereas a negative association was observed between Type-D personality and HRQOL. There was a trend toward significance in the association between Type-D personality and cardiovascular disease biomarkers.

Conclusion: Type-D personality is a promising construct for understanding psychological relationships with important outcomes among cardiovascular patients. Subsequent investigations undertaken by a more diverse group of unaffiliated scientists are important for further development in this line of research.

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Introduction

Type-D or “distressed” personality is characterized by the combination of two stable personality constructs: negative affectivity (NA) and social inhibition (SI). Negative affectivity is the tendency to consistently experience negative emotions such as dysphoria, anxious apprehension and irritability across time or situation, whereas SI is the tendency to inhibit the expression of emotions, experience high levels of insecurity in social situations and excessively control self-expression for fear of disapproval by others [1,2]. Type-D theorists suggest that it is the synergistic effect of high NA in combination with high SI that is most predictive of poor health and particularly poor cardiac prognosis [3]. The relationship between Type-D personality and depression has been a source of some discussion. Briefly, Type-D is posited as a personality trait or disposition and as such does not connote the presence of pathology, as is the case with depression, but

Type-D does connote temporal stability, which is not necessarily the case for depression. Furthermore, Type-D not only includes NA, a construct that is broader than depression, but also centrally includes SI, which is not a core characteristic of depression. Denollet and colleagues [4] provide further evidence for the construct validity and distinctiveness of Type-D in relation to depression among cardiac patients. Thus, though the construct of NA carries with it some overlap with depression, Type-D and depression are significantly different in important ways. Evidence exists for the stability of Type-D personality. For example, acute myocardial infarction patients were assessed for Type-D, depression and anxiety multiple times over 18 months. Variability in mood status and disease severity did not have an association with change in Type-D classification [5], which remained relatively stable. Current controversy regarding whether Type-D is a dimensional or taxonic construct [6,7] continues but is not central to this project and will not be further addressed here.

Previous studies suggest that Type-D predicts hard cardiac disease end points, known collectively in this manuscript as major adverse cardiac events (MACE) (i.e., cardiac death, myocardial infarction, coronary artery bypass grafting surgery or percutaneous coronary intervention), among individuals already diagnosed with cardiovascular

Abbreviations: MACE, major adverse cardiac event; NA, negative affectivity; SI, social inhibition; HRQOL, health-related quality of life; ES, effect size.

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disease. This research has been conducted in Europe by one large team of investigators, and notably, evidence also supports the assumption of synergistic effects noted above. For example, Denollet and colleagues [3] found that patients with high levels of NA and SI were more likely to experience MACE than patients who were classified only as having high levels of NA.

Recently, Suls and Bunde [8] reviewed the literature on affective dispositions as predictors of cardiovascular disease emphasizing depression, anxiety and the anger cluster (i.e., anger expression, anger experience, cynical hostility). Important for our present purposes is their finding of substantial overlap between the various affective dispositions, at both the construct and the measurement levels, that predict cardiovascular outcomes. This invites discussion of the potential relevance of the broader personality dimension, known as negative affectivity, that may underlie and serve as a predisposing factor for experience of these affective states. These investigators suggested that psychological research into predictors of cardiovascular disease would benefit from assessment of multiple psychological constructs within the same study. Type-D is important in these regards as it combines both NA and SI.

Previous evidence suggests that Type-D may also be associated with both psychological and physiological indicators of poor prognosis in cardiac patients. For example, Type-D patients with ischemic heart disease scored higher on assessments of vital exhaustion independent of other variables [9], and percutaneous coronary intervention patients characterized by Type-D had consistently higher scores on vital exhaustion assessments than non-Type-D patients [10]. Both vital exhaustion and Type-D personality are independently associated with inadequate heart rate recovery, another predictor of morbidity and mortality, in chronic heart failure patients [11]. Epithelial progenitor cells, necessary for the repair of vascular damage, were found to be reduced by 54% in Type-D chronic heart failure patients as compared to non-Type-D patients [12]. In research pertaining to potential disease pathways, it has been found that cardiac patients with Type-D personality may experience prolonged disruption of the hypothalamic–pituitary–adrenal axis after acute coronary events, resulting in increased cortisol output [13].

Quality of life

The broad dimensions assessed by health-related quality of life (HRQOL) measure degree of functionality or impairment in important aspects of life often overlooked by traditional medical measures. Although the significance of HRQOL is a relatively recent development in health outcomes research, improvement in HRQOL is now widely recognized as a major indicator of beneficial results for treatments such as percutaneous coronary intervention and coronary artery bypass graft. Health-related quality of life also is a main focus of treatments for chronic heart failure, peripheral artery disease and myocardial infarction [14,15]. Poor HRQOL has been associated with mortality in chronic heart failure patients [16] and has been found to be a possible source of variance between patients with the same degree of illness who experience different disease outcomes [17].

Type-D personality has been associated with poor HRQOL in chronic heart failure [18,19], peripheral artery disease [20,21], heart transplant [22] and implantable cardioverter–defibrillator patients [23]. Impaired HRQOL has also been observed both in Type-D coronary artery bypass grafting surgery patients [24] and in a sample of Type-D coronary artery disease patients both pre- and post-cardiac-rehabilitation as compared to non-Type-D patients [25]. Impaired emotional HRQOL is also associated with Type-D personality in primary care heart failure patients [26]

Biochemical markers

Biological indicators of prognosis in cardiovascular disease include proinflammatory cytokines. Two important proinflammatory cytokines

are tumor necrosis factor- α (TNF- α) and interleukin-6 (IL-6). Proinflammatory cytokines are often up-regulated in heart failure patients (most notably TNF- α and its soluble receptors sTNFR-1 and sTNFR-2). High levels of TNF- α , sTNFR-1, sTNFR-2 and IL-6 have consistently been linked to severity of heart failure and cardiac mortality, with sTNFR-2 levels being the most accurate predictor of cardiac mortality [27–30]. Increased levels of proinflammatory cytokines are also associated with the pathogenesis of both atherosclerosis and chronic heart disease [31]. Anti-inflammatory cytokines aid in regulation of the inflammatory immune response. Two notable anti-inflammatory cytokines are interleukin-10 (IL-10) and interleukin-1 receptor antagonist (IL-1ra). A balance of pro- and anti-inflammatory cytokines is vital to ensure a fully functional and healthy immune system. Disruptions to this balance are detrimental and result in excessive inflammation and disease progression [32].

Previous studies have found associations between Type-D personality and increased TNF- α activity as evidenced by elevated sTNFR-1 and sTNFR-2 levels in chronic heart failure patients [33–36]. Type-D personality has also been associated with decreased levels of anti-inflammatory IL-10 in chronic heart failure patients [34].

Summary and purpose of this study

There is noteworthy research examining Type-D personality as a predictor of outcomes in cardiac patients using MACE, HRQOL and biochemical marker end points. Though primary investigations have been conducted, no independent, comprehensive meta-analysis centered specifically on Type-D has been published in this area. At the time we submitted our manuscript for publication, no meta-analyses of the Type-D literature had been published, but during the review process, a meta-analysis by Denollet, one of the primary investigators of Type-D, and colleagues [37] was published, as was a similar meta-analysis of personality traits and medical outcomes that included Type-D [38]. Meta-analytic findings are important because they allow for a quantitative evaluation of the size of the relationship of Type-D with important indicators of functioning in cardiac patients and assess the homogeneity of the research findings. The primary purpose of this study was to evaluate the strength of the relationships between Type-D personality and three indicators of functioning in cardiac patients – (a) MACE, (b) HRQOL and (c) biochemical markers – and to determine the degree of homogeneity in the literature.

Method

Study search procedure

Two search procedures were utilized. First, a keyword search limited to publications in the English language and primary empirical studies was conducted on the PsycINFO and PubMed databases. For the computer search, all publications through February 2009 were eligible. The keyword combinations were Type-D personality+coronary artery disease, Type-D personality+cortisol, Type-D personality+heart, Type-D personality+mortality, Type-D personality+cardiac mortality and Type-D personality+left ventricular ejection fraction. All titles and abstracts were examined, and potential candidates for the meta-analysis were collected. Next, an ancestral search was conducted beginning with Schiffer et al. [39] due to its status as the most recent major publication at the time, although reference lists of all articles obtained during the keyword search were examined for potential studies. Relevant titles were identified, and their abstracts were reviewed for possible inclusion. One additional study [26] was serendipitously identified as a result of editorial work by K.S.M. During the review process, two additional studies that reviewers suggested and that met inclusion criteria were added [40,41].

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