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Five-Factor Model Personality Traits as Predictors of Incident Coronary Heart Disease in the Community: A 10.5-Year Cohort Study Based on the Baltimore Epidemiologic Catchment Area Follow-Up Study

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Objective: *Certain personality and behavioral traits (e.g., type A and type D) have been reported to be associated with development and progression of coronary heart disease (CHD), but few have examined the relationship using a comprehensive assessment of personality along with a structured assessment of psychiatric disorders.* **Methods:** *Based on participants (age: 47.3 ± 12.8; female: 62.6%) of the Baltimore Epidemiologic Catchment Area follow-up study, we examined the relationship between the 5 major domains of personality traits (neuroticism, extraversion, openness, agreeableness, and conscientiousness) and incident CHD between Wave III (1993–1996) and Wave IV(2004–2005).* **Results:** *Incident CHD developed in 65 participants during the follow-up. Those with incident CHD had lower on openness (44.06 ± 9.29 vs 47.18 ± 8.80; p = 0.007) and extraversion (45.98 ± 9.25 vs 49.12 ± 8.92; p = 0.007) scores than those without. Logistic regression models revealed an inverse association (OR = 0.73; 95% CI = 0.54–0.98) between openness factor z-scores and incident CHD after adjusting for putative confounding factors, including DSM III-R Major Depressive Disorder.* **Conclusion:** *High openness appears to be an independent protective factor for incident CHD in the community. Future studies should examine behavioral and pathophysiologic mechanisms underlying this association.*

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INTRODUCTION

Short-term and long-term psychologic factors have been associated with both the incidence and the progression of coronary heart disease (CHD) in the community and in clinical settings.[1,2] In particular, depression is an independent risk factor for incident CHD in the community[3,4] and for morbidity and mortality in patients with established CHD.[5,6] Additionally, certain personality traits have been reported to be associated with cardiac morbidity and mortality; however, the role of personality traits in CHD is still controversial. Earlier studies reported an association

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between type A personality traits/behavioral patterns (characterized by competitiveness, anger, and hostility) and incident CHD,[7–9] but later reports, including 2 systematic reviews, found inconsistent associations.[10,11]

Meanwhile, other researchers have further narrowed their focus to examine the role of the prominent features of type A behavioral patterns, such as anger and hostility, on the development of CHD. In fact, the body of research investigating associations between anger and hostility and CHD development and progression has grown so much that Schulman and Stromberg[12] recently compared the outcomes of 7 previous meta-analytic reviews on this subject and concluded a lack of meaningful roles of anger and hostility in CHD owing to the varied criteria for study inclusion across the reviews. In contrast, a recent meta-analysis by Chida and Steptoe[13] based on 44 systematically selected prospective studies reported that anger and hostility were associated with increased CHD events in healthy population studies (combined hazard ratio: 1.19; 95% confidence interval [CI]: 1.05–1.35, $p = 0.008$) and with poor prognosis in the CHD population studies (Hazard ratio: 1.24; 95% CI: 1.08–1.42, $p = 0.002$).

Recently, the single-factor approach of analyzing and measuring a single psychologic construct (e.g., hostility) as a risk factor for physical disease has been under criticism as this approach ignores the clustering of psychosocial risk factors for physical disease, which may act synergistically.[1,14,15] In 2005 Suls and Bunde[16] reviewed the issues of the construct and measurement overlap among anger, anxiety, and depression and proposed that a general disposition toward negative affectivity may be more important for CHD risk than any specific negative affect. Along that line, Denollet et al.[17] introduced the "type D" or "distress-prone" personality which is reportedly associated with an increased risk of adverse outcomes in patients with congestive heart failure, acute coronary syndrome, or myocardial infarction.[17,18] However, the validity and usefulness of type D personality have recently been questioned because of the potential overlap between negative affectivity and depression and concern over the stability of this personality type over time.[19] Furthermore, although focusing on a specific personality type (A or D) based on short questionnaires seems expedient, this limited approach does not comprehensively address the relationship between personality and CHD.

The Five-Factor Model (FFM) of personality is a comprehensive personality model.[20] Although not universally accepted, this 5-factor structure of personality has been repeatedly confirmed across populations, geography, and time.[21] Several reviews have previously examined and supported the usage of the FFM as a guide to the comprehensive assessment of personality in studies of health outcomes, including CHD.[22–24] In fact, Denollet reported that type D personality consists of 2 domains—negative affectivity and social inhibition—that correlate positively with neuroticism and negatively with extraversion, 2 of the FFM dimensions.[25] However, we were unable to locate any previous study that examined the FFM as a predictor of incident CHD in the community so as to examine the other 3 domains (*openness*, *conscientiousness*, and *agreeableness*) along with *neuroticism* and *extraversion*.

The Baltimore Epidemiologic Catchment Area (ECA) follow-up study is a longitudinal study of community residents in East Baltimore.[26] As a part of this study, the FFM personality assessment, a structured psychiatric interview, and a detailed cardiac history were obtained for each participant. The goal of this analysis is to comprehensively examine the association between incident CHD and each of the 5 factors among community residents in the Baltimore ECA follow-up study between Wave III (1993–1996) and Wave IV (2004–2005) while controlling for psychiatric disorders. Based on previous literature on type D personality, we hypothesized that high *neuroticism* and low *extraversion* would be independently associated with incident CHD in the community.

METHODS

Sample

The details of the Baltimore ECA follow-up study and methods can be found elsewhere.[27,28] All the data collection procedures in the ECA study were approved by the Johns Hopkins School of Public Health Institutional Review Board. Briefly, of the 3481 original participants who completed the interview during Wave I (1980), 75% of the surviving cohort ($n = 1920$) were followed up during Wave III (1993–1996) and again reinterviewed during Wave IV (2004–2005; $n = 1071$). Of the 1920 Wave III participants, the personality traits of a subsample of 831 participants were assessed based on Revised NEO Personality Inventory (NEO-PI-R)[21] at various times between 1993 and 1999—50.1% of them ($n = 416$) during a project on Axis I psychologic