Original article

Trait anxiety and somatic concerns associate with increased mortality risk: a 23-year follow-up in aging men

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ABSTRACT

Purpose: We aimed to examine the impact of anxiety and somatic concerns on the mortality risk during a 23-year follow-up of a representative sample of men.
Methods: Finnish men aged 42–61 years ($n = 2388$) were followed up for a median of 23.4 years. Anxiety was assessed using baseline scores for the Minnesota Multiphasic Personality Inventory Psychasthenia subscale and somatic concerns were measured with the Hypochondriasis subscale. Mortality data were obtained from the National Population Register.
Results: All-cause, injury, disease, cardiovascular, and cancer mortalities were examined as endpoints. Adjustments were performed for age, smoking, alcohol consumption, physical activity, low- and high-density lipoprotein cholesterol, body mass index, systolic blood pressure, a history of cardiovascular disease, marital status, socioeconomic status, the Framingham Type A Behavior Pattern Scale, and life events during the 12 months before the baseline examination. Anxiety and somatic concerns predicted the all-cause mortality risk after full adjustments for sociodemographic background, lifestyle factors, and descriptors of somatic health. Regarding other forms of mortality, the risk ratios were significant after full adjustments in anxiety for injury and in somatic concerns for disease death.
Conclusions: This study supported previous findings of anxiety predicting the all-cause mortality risk in men. Somatic concerns are a novel factor that needs to be taken into account while examining associations between personality and the risk of increased mortality.

Introduction

Anxiety associates with an increased incidence of cardiovascular disease (CVD) [1,2] and increased mortality among those with cardiac coronary disease [3] and chronic obstructive pulmonary disease [4]. In a few studies, anxiety disorders have also been linked to an increased mortality risk in the general population. In particular, it has associated with increased all-cause mortality [5,6], CVD mortality [6], and cancer mortality [5]. Furthermore, phobic anxiety has associated with increased CVD death [7–9]. In one study, neither anxiety disorders nor mixed anxiety–depression associated with increased mortality [10], whereas in another study, the

relationship between anxiety symptoms and mortality was more complex, with a U-shape [11]. Of these studies, only one has focused on trait anxiety [12].

Several mechanisms may underlie the previously described associations. Anxiety leads to activation of the sympathetic nervous system, which manifests as reduced heart rate variability [8]. It also activates the hypothalamic–pituitary axis, causing hypercortisolemia and increased levels of proinflammatory cytokines. These may further enhance each other, leading to a vicious circle [13]. These neurohormonal alterations may lead to a wide variety of physiological responses [14]. People with anxiety may also be prone to an unhealthy lifestyle, including a poor diet, smoking, a lack of physical exercise, and alcohol consumption [15].

Somatic concerns refer to experiences of somatic symptoms, which may in some cases have an underlying somatic background, but may also represent psychosomatic or stress-related symptoms. Costa and McRae [16] suggested that "even among psychiatrically

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normal individuals, the personality dimension of neuroticism is systematically related to the number of medical symptoms reported, and that neuroticism-related complaints are best viewed as exaggerations of bodily concerns rather than as signs of organic disease." Recently, Weiss et al. observed an association between somatic complaints and all-cause mortality using the Minnesota Multiphasic Personality Inventory (MMPI) with principal component analysis. It has also been suggested that depressed patients with somatic complaints might form a subgroup with pronounced vulnerability to mortality [17].

With the advantage of a relatively long follow-up time of 23 years and a large variety of potential confounding or mediating lifestyle, somatic, and psychosocial factors as covariates, we investigated whether traits of anxiety or somatic concerns measured with the Psychasthenia and Hypochondriasis subscales of the MMPI predict increased mortality. To avoid the bias induced by somatic diseases, we excluded participants with a history of cancer at baseline and adjusted our models for a history of CVD and several descriptors of somatic health. Moreover, we examined whether the possible effect of personality factors has a distinct influence on different causes of death.

Methods

Study population

Participants in the Kuopio Ischemic Heart Disease Study were randomly selected from the general population in two cohorts [18]. Baseline data were collected between 1984 and 1989 from 2682 (participation rate 82.9%) men aged 42, 48, 54, and 60 years residing in the city of Kuopio and surrounding rural communities in Eastern Finland. Those who reported having been diagnosed with cancer ($n = 51$) were excluded, leaving a total of 2631 participants. After exclusion of those with missing variables and to reduce the possibility of reverse causation, those who died during first 2 years after the baseline, we had a total of 2388 participants to be analyzed.

Baseline examinations were conducted between March 1984 and December 1989. Sociodemographic and other background characteristics of the sample have previously been described in detail [18,19]. When the study was initiated in 1984, Finland and Eastern Finland in particular was considered to be an area of high CVD [20]. The study's initial focus was on CVD in men, and only men were thus included.

Outcome

All-cause mortality, including deaths due to diseases, injuries, suicides, and homicides, was ascertained by linkage to the national death registry using the Finnish social security number. Deaths were classified according to the 9th and 10th International Classification of Diseases (ICD-9 and ICD-10). All deaths between the baseline assessments and 31 December 2011 were included.

The coverage of the Finnish national death registry is considered to be excellent. All medical students are taught how to report death and the cause of death. Autopsy rates are high for both medicolegal and clinical deaths. Death certification and cause of death determination at local and provincial levels are directed, supervised, and partly carried out by medical examiners. In the case of ambiguous or incomplete medical information in death certificates, the death certificate panel of Statistics Finland queries the certifying physician [21].

Minnesota Multiphasic Personality Inventory

The MMPI is probably the most widely used measure for personality assessment. The original questionnaire consists of 566 true

or false items (of which, 16 are repeated) covering a large variety of physical and mental symptoms, thoughts, beliefs, attitudes, and life experiences. The same item can be used in several scales, causing item overlap [22]. When our study was initiated, only the original version, MMPI-I, was available. The revised MMPI-2 was released in 1989 [23]. To enhance the clarity and interpretability of our findings, we used the SDs of the MMPI scales in the analyses. The subscale names have been capitalized throughout this article to distinguish them from the general use of the same concepts.

We measured trait anxiety with the original Psychasthenia subscale, which has been referred to as anxiety in some previous studies, as "psychasthenia" is an old concept that is no longer in clinical use [12,24]. The scale consists of 48 questions related to symptoms such as a lump in the throat, lacking in self-confidence, worrying about something, great restlessness, being easily embarrassed, becoming impatient, feeling anxiety, having difficulty falling asleep, being afraid of things, being frightened, taking things hard, and feeling lonely. In our data, question 15 ("once in a while I think of things too bad to talk about") was missing. In the present sample, Cronbach alpha for Psychasthenia was 0.89.

Somatic concerns were examined with the original subscale Hypochondriasis. This covers features defined as "a high concern for disease, expressing hostility indirectly, vague and diffuse complaints of physical difficulties, pessimism, and narcissism." The scale consists of 33 questions related to symptoms such as feeling fresh and rested, hands and feet being warm, physical health, body feelings, bowel movement, twitching muscles, fullness in the head, being well, tender feelings in the head, a tired feeling in the eyes, a tight band around the head, headaches, and nausea and vomiting. Cronbach alpha for Hypochondriasis was 0.86.

Other characteristics

Participants completed questionnaires relating to their socio-demographic background, smoking (yes/no), alcohol consumption (grams per week), education (years), and marital status (married or living with a partner vs. living alone) at the baseline examination. A variety of indicators of adulthood socioeconomic status were available, including current income, current and previous occupations, the highest level of education, the perception of financial security, and housing tenure. In addition, summing of the number of material possessions from a list of 12 was used to create an index of material living conditions. The variable "adulthood socioeconomic status" was formed from these indicators [25]. The Framingham Type A Behavior Pattern Scale (FTAS) consists of 10 self-reported items and was derived from the analysis of the Framingham Heart Study (Haynes et al. 1978). Five of these items reflect characteristics of being hard-driving and competitive, pressed for time, bossy and dominating, needing to excel, and eating too quickly. The response options are that the characteristic describes the person "not at all," "somewhat," "fairly well," or "very well" (scored 1–4, respectively). Another five items reflect work orientation and time pressure. For these, the response options are "agree" or "disagree" (scored 1 or 0, respectively). FTAS scores strongly correlate with experienced daily stress, emotional lability, tension, anger symptoms, and ambitiousness [26]. We measured the level of current stress with the Social Readjustment Rating Scale. The original scale consists of 43 questions concerning significant life events such as retirement, being fired from work, the death of a close friend, and divorce. The questions are weighted on a scale from 11 to 100, depending on the expected impact of the event [27]. We used an abbreviated version with the 24 questions most relevant to Finnish culture.

A research nurse measured the weight and height of the participants, and body mass index (kilogram per square meter) was