

Relation between personality, coping style and vital exhaustion

Objective: Vital exhaustion has been treated as a valid mental construct to predict coronary heart disease, but its dependence on personality has not been established. The purpose of this study was to examine longitudinally the relationship of personality and coping style with vital exhaustion.

Methods: Data were used from the Amsterdam Growth and Health Longitudinal Study (AGHLS) and analysed by generalised estimating equations. At the age of 42, the sample consisted of 335 participants (157 males), while at age 36 there were 374 participants (175 males). Vital exhaustion was defined as mental fatigue, demoralisation and increased irritability.

Results: In the 36-year age group, 25% of the participants experienced vital exhaustion, while in the 42-year-olds this was 19%. At age 42 years, 19% of the participants had a score > 13 on the Maastricht Vital Exhaustion Questionnaire compared with 63% in a patient population. The personality characteristics neuroticism, social anxiety, hostility and an emotional-oriented coping style were positively related to vital exhaustion at age 42: self-esteem was negatively related. The multivariable analyses and the analysis of change scores showed that neuroticism, self-esteem and E-coping significantly contributed to the association of vital exhaustion at the age of 42 years.

Conclusion: Neuroticism, self-esteem and an emotion-oriented coping style are longitudinally associated with vital exhaustion.

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Vital exhaustion is defined as a psychological state characterised by excessive fatigue, feelings of demoralisation and increased irritability (Appels, Hoppener, & Mulder, 1987; Appels & Mulder, 1988) and has been suggested to be a risk factor for cardiac disease. Vital exhaustion predicted the incidence of cardiac events (Williams et al., 2010) and was associated with a two- to three-fold higher risk of heart failure (Rod, Andersen, & Prescott, 2011). Although conclusive evidence of a biological link is still lacking (Bennett, Lane, & Lip, 2008) several mechanisms have been suggested, including higher serum triglyceride levels (Igna, Julkunen, & Vanhanen, 2011), impaired fibrinolysis (Von Kanel, Frey, & Fischer, 2004), a low cardiac parasympathetic nervous function at rest (Watanabe et al., 2002), elevated biomarkers of systemic inflammation (Melamed, Shirom, Toker,

Berliner, & Shapira, 2006) and a dysregulation of the hypothalamic-pituitary-adrenocortical axis (Nicolson & Van Diest, 2000).

The role of specific personality traits in the development of vital exhaustion is far from clear and there is an ongoing debate on the differentiation of vital exhaustion from other mood states such as depression. One study in a large community sample of 9563 men and women (Prescott et al., 2003) found a considerable overlap, but others found that in an exhausted but otherwise healthy sample depressed mood, the key symptom of depression, was rarely reported (Van Diest & Appels, 1991). Recently it was shown that in patients with myocardial infarction, exhaustion and somatic depressive symptoms may reflect a common origin (Vroege, Zuidersma, & De Jonge, 2012). Burnout, by some defined as a work-

related construct and characterised by emotional exhaustion, physical fatigue, and cognitive weariness (Schaufeli & Buunk, 2003), has also been suggested to overlap with vital exhaustion, probably because both constructs include components of fatigue and low energy levels. There is evidence that both burnout and vital exhaustion pose a cardiovascular risk through chronic overactivity or dysregulated activity of the stress system (Melamed et al., 2006). The concept of Type A personality has also been implicated in the pathogenesis of cardiovascular disease (Rosenman et al., 1975), a construct that was based on behavioural symptoms but without a clear conceptual basis in psychological theory. Although attention to Type A personality as a whole has waned, a recent meta-analytic review found the key elements of the construct, anger and hostility, to be significantly related to outcomes of coronary heart disease in both healthy and cardiac populations (Chida & Steptoe, 2009). In patients with myocardial infarction vital exhaustion was positively associated with a Type A behavioural pattern and with hostility measures (Meesters & Appels, 1996b). A different psychological concept also associated with cardiac disease, 'the distressed personality' (Type D), has been defined as the synergetic effects of negative affectivity and the tendency to inhibit the expression of this affect in social situations (Denollet, 2000; Denollet, Schiffer, & Spek, 2010). In a mixed group of cardiac patients Type D personality was a significant predictor of vital exhaustion (Pedersen et al., 2007; Pedersen & Middel, 2001) and correlational analyses in a healthy middle-aged working population have shown considerable overlap between these constructs (Kudielka, Von Kanel, Gander, & Fischer, 2004).

Although the above-mentioned studies have shown that associations with vital exhaustion exist in the psychological domain, it remains unclear which personality structure is the crucial mental precursor of vital exhaustion. In the present study, we addressed this issue by exploring the association between vital exhaustion and seven personality dimensions: neuroticism, social anxiety, rigidity, hostility, self-sufficiency, dominance and self-esteem (Luteijn, Starren, & Van Dijk, 1985). Previous reports have shown strong associations between neuroticism and vital exhaustion both in cardiac and non-cardiac patients (Bennett, Smith, & Gallacher, 1996). Therefore, it is hypothesised that a similar association exists in a population of healthy individuals. Following on from personality, coping style, defined as the persistent way a person responds to stressful events, could also be potentially associated with vital exhaustion. If vital exhaustion is regarded as an indicator of long-term mental stress (Ingles, Eskes, & Phillips, 1999), then the impact of stress is likely to be differently influenced by coping

resources. An emotion-focused strategy is considered to be passive and maladaptive, as opposed to problem-focused coping, generally assumed to be a more active and adaptive coping style (Lazarus & Folkman, 1984). Previous studies have shown that individuals qualified as emotional copers had higher vital exhaustion scores than problem copers (Vingerhoets, 1985). Therefore, we predicted that the participants in our study with high vital exhaustion levels would tend to use more emotion-focused coping strategies.

The data for this study were collected at two consecutive time points, at the age of 36 and 42, as part of the Amsterdam Growth and Health Longitudinal Study (AGAHLS), a longitudinal study of repeated measurements on people aged 13 years or older over a period of 29 years (Kemper, 2004). The aim of this study was to examine the relationships between various personality dimensions as measured by the Dutch Personality Index and vital exhaustion as measured by the Maastricht Questionnaire, the change over time and to assess whether these associations were affected by coping strategy.

Methods

Participants and design

We used the data from the Amsterdam Growth and Health Longitudinal Study (AGAHLS), which has been described in detail elsewhere (Kemper et al., 1997; Kemper, 2004; Twisk, Kemper, Van Mechelen, & Post, 2001). In brief, this study was an observational longitudinal study that started in 1977 with 698 boys and girls from a secondary school in Amsterdam, the Netherlands. No selection criteria were employed. The study was originally launched to describe the natural development of health and lifestyle factors in adolescents and to assess longitudinal relations between physical and psychological variables. Between 1976 and 2006, ten repeated measurements were completed. All of the variables used in the analysis of the present study were obtained at age 36 and these measurements were repeated at age 42. The AGAHLS was approved by the Medical Ethical Committee of the VU University Medical Centre in Amsterdam, the Netherlands. All participants gave their written informed consent.

Psychological measures

Personality characteristics

We administered the Dutch Personality Inventory (DPI) to assess personality characteristics (Luteijn, 1974; Luteijn et al., 1985). The DPI is a self-report questionnaire based on the California Psychological Inventory (Gough, 1964) and has considerable

similarity with the Five Factor Personality Inventory (Barelds & Luteijn, 2002). The DPI includes the following seven subscales:

1. Neuroticism: Vague fears, depressed mood, vague physical and psychosomatic complaints and feelings of insufficiency.
2. Social anxiety: Restraint, less capable of maintaining social relationships, avoiding unfamiliar people, neurotic shyness. This subscale is highly related to the well-known concepts introversion and extraversion (Barelds & Luteijn, 2002).
3. Rigidity: A need for extreme planning, fixed habits and principles, a sense of duty, the need and urge to control, the preference for predictability.
4. Hostility: Impatience, a lack of empathy, hostile attitude, distrust of other people.
5. Egoism: Self-contentment, the tendency to criticise others, feelings of independence.
6. Dominance: Self-reliance, prone to take the initiative and to exert influence.
7. Self-esteem: A general positive attitude, cheerful, high adaptability and taking an active stance.

Reliability coefficients (Cronbach's alpha) at age 42 were: neuroticism 0.82; social anxiety 0.86; rigidity 0.69; hostility 0.76; egoism 0.62; dominance 0.81; and self-esteem 0.73. These values had acceptable levels of internal consistency and are comparable to those seen in a Dutch normative sample (Barelds & Luteijn 2002).

Vital exhaustion

We used the 23-item version of the Maastricht Questionnaire (MQ) to assess levels of vital exhaustion (Appels et al., 1987). The questionnaire contains 23 items relating to unusual fatigue, feelings of general malaise, lack of energy and increased irritability and sleeping difficulties. Items can be answered either by yes (2 points), question mark (1 point), or no (0 points). Reliability coefficients (Cronbach's alpha) at age 36 and 42 were 0.89 and 0.90, respectively, indicating good internal consistency.

Coping

At age 36 coping behaviour was assessed with the Utrecht Coping Scale (UCL) (Schreurs, Van de Willige, Tellegen, & Brosschot, 1988), a list that is based on the Ways of Coping Checklist (WCC) of Folkman and Lazarus (Folkman & Lazarus, 1980). In this list participants are asked whether they had used certain thoughts and activities when dealing with stressful situations in general. The questionnaire consists of 68 dichotomous items with the response categories yes (1) and no (0). In this list two main coping strategies can be discerned: emotion focused (E-coping) and problem focused (P-coping). At age

42 a shortened 21-item version of the original UCL-coping list was used with a similar proportion of items referring to either E-coping or P-coping with yes (1) and no (0) as response categories (Van Heck & Vingerhoets, 1989). Cronbach's alphas indicate satisfactory internal consistency for each of the two coping lists measured at age 36 and 42, namely 0.73 and 0.77, respectively.

Data analysis

Characteristics of the population under study are presented as means and standard deviations at age 36 and 42 and analysed by paired-wised comparisons and paired-sample correlations. We used generalised estimating equations (GEE) to study the association between personality characteristics and coping style on the one hand and vital exhaustion on the other throughout a six-year period (i.e. from ages 36 to 42). GEE is an extension of a general linear model that adjusts for the correlation between repeated observations taken in the same individuals and has the advantage of managing repeated data of individuals with varying numbers and unequally time-spaced observations (Twisk, 2003). We used a backward elimination procedure with a predefined elimination criterion of 10%: all variables with a p-value below .10 remained in the multivariable model. Vital exhaustion was considered a continuous variable for analysis, but because of its skewed distribution, the natural logarithm of vital exhaustion scores was used. Multiple linear regression analysis was used to examine the changes over time. These scores were not transformed because they were normally distributed. All the univariable and multivariable analyses were adjusted for sex, body mass index, physical activity level and smoking status (Kemper, 2004). All statistical analyses were performed using SPSS version 18.0.

Results

Table 1 shows the characteristics of the study population. A total of 374 participants were measured at the age of 36; of these, 335 participants were measured at the age of 42. In general, the scores on the DPI subscales and the MQ measuring vital exhaustion were lower at age 42 as compared with those at age 36. The pair-wise correlations across the ages were moderate for the DPI and the MQ, but low for the coping questionnaires.

The GEE approach was used in the longitudinal data analysis. In the crude univariable analyses vital exhaustion was positively associated with neuroticism, social anxiety and hostility and inversely with dominance and self-esteem (**Table 2**). Vital exhaustion was also positively associated with E-coping but inversely with a P-coping. After

Table 1 Characteristics of study population at mean ages of 36 (n = 374) and 42 (n = 335)

| | Age 36 (n = 374) ^a | Age 42 (n = 335) ^a | P value ^b | Correlations ^c |
|------------------|----------------------------------|----------------------------------|----------------------|---------------------------|
| Men/women | | | | |
| Vital exhaustion | 9.0 (9.6) | 7.7 (8.7) | <.003 | .61 |
| Neuroticism | 7.8 (6.7) | 6.7 (5.8) | <.001 | .73 |
| Social anxiety | 7.7 (6.8) | 7.3 (6.6) | .095 | .80 |
| Rigidity | 23.0 (7.0) | 22.7 (6.9) | .343 | .76 |
| Hostility | 13.2 (6.3) | 12.2 (6.6) | .001 | .76 |
| Egoism | 9.1 (4.3) | 9.2 (4.3) | .741 | .67 |
| Dominance | 17.1 (6.7) | 17.0 (6.9) | .449 | .82 |
| Self-esteem | 29.8 (5.5) | 30.3 (5.2) | .037 | .73 |
| P-coping | 16.4 (2.8) | 27.5 (5.2) | NA | .29 |
| E-coping | 18.1 (4.9) | 21.0 (7.2) | NA | .34 |

^aSample sizes varied slightly across variables because of occasional missing values; ^bp values are of paired t-test; ^cpaired-sample correlations; P-coping = problem-focused coping; E-coping = emotion-focused coping; NA = not applicable because at age 42 a shortened version of the Dutch WCC was used

Table 2 Univariable and multivariable associations between personality characteristics, coping behaviour and vital exhaustion obtained by generalised estimating equations (GEE). Results are expressed as regression coefficients (B), 95% confidence intervals (CI) and P values

| | Univariable analysis ^a | | | Multivariable analysis | | | | | |
|----------------|-----------------------------------|-----------------|---------|------------------------|-----------------|---------|--------|-----------------|---------|
| | Crude model | Adjusted model | | Adjusted model | | | | | |
| | B | 95% CI | P value | B | 95% CI | P value | B | 95% CI | P value |
| Neuroticism | 0.027 | 0.025 – 0.029 | 0.001 | 0.027 | 0.025 – 0.030 | 0.001 | 0.023 | 0.020 – 0.026 | 0.001 |
| Social anxiety | 0.011 | 0.008 – 0.015 | 0.001 | 0.011 | 0.008 – 0.014 | 0.001 | - | - | - |
| Rigidity | 0.002 | -0.001 – 0.006 | 0.127 | 0.002 | -0.002 – 0.005 | 0.342 | - | - | - |
| Hostility | 0.010 | 0.007 – 0.013 | 0.001 | 0.009 | 0.006 – 0.013 | 0.001 | - | - | - |
| Egoism | 0.000 | -0.005 – 0.004 | 0.841 | 0.002 | -0.003 – 0.006 | 0.505 | - | - | - |
| Dominance | -0.004 | -0.007 – 0.000 | 0.025 | -0.003 | -0.006 – 0.001 | 0.104 | - | - | - |
| Self-esteem | -0.023 | -0.026 – -0.019 | 0.001 | -0.022 | -0.025 – -0.018 | 0.001 | -0.006 | -0.010 – -0.002 | 0.001 |
| E-coping | 0.009 | 0.006 – 0.012 | 0.001 | 0.009 | 0.006 – 0.012 | 0.001 | 0.003 | 0.000 – 0.005 | 0.029 |
| P-coping | -0.002 | -0.004 – -0.001 | 0.012 | -0.002 | -0.005 – 0.000 | 0.053 | - | - | - |

^aVital exhaustion scores were log-transformed because of their skewed distribution; ^bAdjusted for sex, body mass index, physical activity and smoking status

Table 3 Univariable and multiple linear regression analysis with the change in vital exhaustion as dependent variable and the change in personality characteristics and coping behaviour as independent variables. Results are expressed as regression coefficients (B), 95% confidence intervals (CI) and P values

| | Univariable analysis ^a | | | Multivariable analysis | | |
|----------------|-----------------------------------|-----------------|---------|------------------------|-----------------|---------|
| | B | 95% CI | P value | B | 95% CI | P value |
| Neuroticism | 0.822 | 0.628 – 1.017 | 0.001 | 0.696 | 0.492 – 0.899 | 0.001 |
| Social anxiety | 0.330 | 0.094 – 0.567 | 0.006 | - | - | - |
| Rigidity | -0.114 | -0.321 – 0.094 | 0.282 | - | - | - |
| Hostility | 0.160 | 0.065 – 0.385 | 0.164 | - | - | - |
| Egoism | 0.273 | -0.013 – 0.559 | 0.061 | - | - | - |
| Dominance | -0.030 | -0.270 – 0.211 | 0.808 | - | - | - |
| Self-esteem | -0.633 | -0.871 – -0.395 | 0.001 | -0.328 | -0.566 – -0.099 | 0.005 |
| E-coping | -0.197 | -0.332 – -0.062 | 0.004 | -0.165 | 0.284 – -0.046 | 0.007 |
| P-coping | -0.093 | -0.282 – 0.095 | 0.330 | - | - | - |

^aAdjusted for sex, body mass index, physical activity and smoking status

adjusting for potential confounders (sex, body mass index, physical activity and smoking status), dominance and P-coping were no longer significant, but all the other variables remained significantly associated with vital exhaustion. In the final adjusted multivariable analyses using a backward selection procedure, neuroticism, self-esteem and E-coping behaviour remained significantly associated with vital exhaustion. The univariable linear regression analysis of a time effect (adjusted analysis) revealed that the changes over time in neuroticism, social anxiety, self-esteem and E-coping were significantly related with the change in vital exhaustion (Table 3). The final adjusted multivariable analysis showed that the changes over time remained significant for neuroticism, self-esteem and E-coping.

Sensitivity analysis

Focusing on individual items of the MQ and the neuroticism subscale of the DPI, the two questionnaires contain tautological items that may have led to spurious findings. The neuroticism item 'I often feel tired' is comparable with the MQ item 'Do you often feel tired?' We performed a sensitivity analysis to evaluate the influence of these items. The regression coefficient in the regression analysis omitting these items ($B = 0.029$) hardly differed from the coefficient in the analysis containing these items ($B = 0.027$; see Table 2). Moreover, we also looked at the influence of the items with the highest correlations. The highest correlation ($r = .66$) was found between the MQ item 'have you experienced a feeling of hopelessness recently?' and the neuroticism item 'I have a constant sense of failure'. Omitting these items resulted in an identical regression coefficient. Because vital exhaustion data were right-skewed and log-transformed for analyses to achieve normal distribution, we also repeated the analyses using a non-transformed dataset. A difference was observed in the final multivariable model analysed by GEE: after using a non-transformed dataset vital exhaustion was no longer significantly associated with E-coping ($p = 0.067$).

Discussion

In this study, we investigated longitudinal relationships between personality characteristics, coping behaviour and vital exhaustion in a general healthy population studied at ages 36 and 42. The study provides clear evidence for an association between neuroticism and vital exhaustion since both the univariable and the multivariable results substantiated this association. The overall emerging personality profile in the multivariable analyses appears to be dominated by neuroticism, low self-esteem and a tendency to choose an emotion-oriented rather than a problem-oriented coping strategy in stressful situations. A similar personality

profile emerged from the analysis of change scores, supporting the view that these personality traits seem to be essential to vital exhaustion. The concordance of the inverse relations between self-esteem and neuroticism is consistent with the literature (Hembree, 1988) and in line with interrelations among the five-factor model of personality (Watson, Suls & Haig, 2002). It should be noted here that the neuroticism subscale of the Dutch Personality Index we used in this study is highly related ($r = .85$) to the neuroticism dimension of the NEO-PI-R (Hoekstra, Ormel, & De Fruyt, 2003), a widely used instrument to measure the Big-Five (Costa & McCrea, 1992). It could be argued, therefore, that our findings provide convincing evidence for the predictive value of neuroticism in individuals with high levels of vital exhaustion, a personality aspect that most theorists termed neuroticism-emotional instability and have agreed on to be a fundamental, higher order personality dimension (Becker, 1999; Eysenck, 1990). Our main findings are partly confirmed by other studies using different populations. Roll and Theorell (1987) found that a patient group attending the emergency care unit because of chest pain without any obvious organic cause had significantly higher scores for neuroticism, vital exhaustion and Type A behaviour in comparison with healthy controls. Others also found a link between neuroticism and vital exhaustion in a cross-sectional study comparing cardiac and non-cardiac patients (Bennett et al., 1996). Thus, neuroticism and vital exhaustion seem to be related to symptom reports or health complaints but, as we have shown, not necessarily to actual illness.

It has been acknowledged that one of the components of Type D, negative affectivity, and neuroticism are strongly and positively correlated (De Fruyt & Denollet, 2002; Denollet & Brutsaert, 1998), while others have expressed concern about the distinctness of these traits by arguing that Type D is just another measure of neuroticism (Lesperance & Frasare-Smith, 1996). Although we did not test this directly, the accumulating circumstantial evidence suggests that these concepts are intertwined because both Type D personality and vital exhaustion are characterised by high neuroticism. This similarity does not imply that the concepts are identical (Denollet et al., 2010) or that these cases should be receiving the same psychological treatment. Moreover, we found that social anxiety, a trait akin to the other component of Type D, social inhibition, was not associated with vital exhaustion in the multivariable analysis. Nevertheless, neuroticism is standing out in both these cardiovascular risk indicators, and although this trait remains relatively stable over time, it could specifically be targeted in behavioural interventions. The present results suggest that, when vital exhaustion is used as an

outcome variable, controlling for the effects of neuroticism seems warranted.

Coping

On the basis of a stress model similar to that of Lazarus and Folkman (1984), we expected the response to stress to be affected by a person's propensity to using E- or P-coping styles. Indeed, we found a positive association between E-coping and vital exhaustion. This corroborates the findings in a study where individuals qualified as E-copers had higher vital exhaustion scores than P-copers (Vingerhoets, 1985). The present results are also relevant to findings of other studies comparing individuals low and high in neuroticism, with the latter tending to report more maladaptive, emotion-oriented coping strategies (Deary et al., 1996; Gunthert, Cohen, & Armeli, 1999; Polman, Borkoles, & Nicholls, 2010). Phrasing these outcomes as a *tendency* toward a maladaptive coping style, and not as a fixed trait, is meaningful within the context of behavioural intervention. When proneness to a certain coping style becomes detrimental to an individual this may be more susceptible to change by psychological treatment than a rather stable personality characteristic as neuroticism. In general, it is assumed that depending on the stressor, problem-oriented strategies are seen as constructive ways of dealing with stress whereas emotion-oriented coping strategies are seen as maladaptive (Folkman, 1984). Indeed, in the present study we found that high levels of vital exhaustion were related to higher E-coping and lower P-coping levels.

Limitations

The longitudinal effect of this study may be limited by the use of two measurements six years apart, whereas a study design covering different life stages may provide additional insights into the processes by how vital exhaustion emerges. Another potential limitation is the use of the MQ to assess vital exhaustion in a *healthy* sample and that we did not address the issue of cardiovascular risk factors. The questionnaire we used was originally developed for cardiovascular patients and has been shown to have

less discriminating power and allows more false positives than the interview specifically designed to assess vital exhaustion in diagnostic tests (Meesters & Appels, 1996a). On average, in the present study fewer participants met the criteria for vital exhaustion compared with cardiac patients: only 25% of subjects at age 36 and 19% at age 42 had a score > 13, a criterion used for exhaustion, compared with 63% in a patient population (Appels et al., 2005). Nevertheless, our finding of a link between neuroticism and vital exhaustion has been confirmed by others (Bennett et al., 1996). Interestingly, in that study the MQ failed to discriminate between patients and controls. This casts doubt on the value of the MQ as a screening instrument: The link between neuroticism and exhaustion may merely be general symptom awareness and a tendency to report them. The question is therefore what the relevance is of our findings regarding vital exhaustion as a risk factor for cardiovascular disorders. Vital exhaustion has been considered a relatively short-term precursor of myocardial infarction (Appels & Mulder, 1989) and is believed to occur episodically rather than chronically (Kop, 1999). Moreover, it has been proposed that individuals should be excluded from analysis if longstanding complaints of exhaustion merely reflect personality traits or psychiatric disorders such as depression, as a result of which these individuals are less representative of those who are at risk for myocardial infarction (Meesters & Appels, 1996b). However, our findings that vital exhaustion is longitudinally associated with neuroticism could be of clinical relevance, because it has been shown that neuroticism is associated with cardiovascular disease (Suls & Bunde, 2005) and the resulting economic costs of the immense use of somatic and mental health care have been well documented (Cuijpers et al., 2010).

In conclusion, this study suggests that the personality trait neuroticism is associated with vital exhaustion. Taken together with the finding that vital exhaustion is also accompanied by an emotion-oriented coping style, our findings suggest that both the affect and behavioural components of neuroticism are longitudinally associated with vital exhaustion.

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