Type D personality, quality of life, and physical symptoms in the general population: A dimensional analysis

Christie Stevenson and Lynn Williams

School of Social Sciences, University of the West of Scotland, Paisley, UK

Abstract

Objective: Type D personality, the interaction of negative affectivity (NA) and social inhibition (SI), has been associated with a range of adverse health-related outcomes in cardiac patients and healthy participants. However, recent studies which have adopted a dimensional approach to Type D found no effect of Type D (NAxSI) on mortality or quality of life, after controlling for its constituent elements. To-date, no study has determined if Type D is associated with negative health outcomes in healthy individuals when conceptualised as a dimensional variable. Design: A cross-sectional self-report study with 177 healthy participants. Main Outcome Measures: Physical symptoms and quality of life. Results: Using the traditional categorical analysis for Type D, it was found that Type D’s report significantly more symptoms and significantly lower quality of life than non-Type D’s. However, when analysed as a dimensional construct (NAxSI), using multiple regression analysis, Type D (NA x SI) was not a significant predictor of physical symptoms or quality of life, after controlling for the main effects of NA and SI separately. Conclusion: These findings support those of recent studies that have identified null effects of Type D on outcome when analysed as a dimensional construct.

Keywords

Type D, Social Inhibition, Negative Affectivity, Physical Symptoms, Quality of Life,
Introduction

Type D personality has been defined as the existence of a variety of negative emotions called negative affectivity (NA), paired with the conscious inhibition of the expression of these emotions termed social inhibition (SI). The presence of both NA and SI suggests that Type D’s not only experience negative thoughts and feelings but also inhibit the expression of these emotions social situations. Therefore, it was originally proposed that it is the synergy of the NA and SI traits that is key (Denollet, 2005).

Type D personality’s association with negative health outcomes has been well documented (e.g., Denollet et al., 1996; Denollet & Brutsaert, 1998; Denollet, Vaes & Brutsaert, 2000), with Type D being related to a threefold increased risk of poor prognosis and morbidity in cardiac patients (Denollet, Schiffer & Spek, 2010). As well as being linked to increased risk of mortality in cardiac patients, Type D personality has also been associated with patient reported outcomes, including lower perceived mental and physical health (Versteeg et al., 2011). A recent meta-analysis by O’Dell, Masters, Spielmans & Maisto (2011) found that Type D was associated with major adverse cardiac events and impaired quality of life.

Although Type D was initially investigated in cardiac patients, several studies have also found that Type D has a negative influence on health in healthy populations. A review by Mols and Denollet (2010) concluded that Type D has a negative impact on mental health status (e.g., symptoms of depression and anxiety) and on physical health status, including more somatic symptoms and lower health status. Similarly, a recent study by Williams and Wingate (2012) found that Type D was associated with increased physical symptoms and stress in the general population. In addition, several studies have identified a link between Type D and potential explanatory pathways in healthy individuals including poor health-related behaviours (e.g., smoking and alcohol use) (Bruce, Curren & Williams, 2013;
Gilmour & Williams, 2011; Svansdottir, van den Broek, Karlsson, Gudnason, & Denollet, 2012; Williams et al., 2008). In addition, there is also evidence of potential physiological mechanisms in the general population, including greater cortisol reactivity to stress (Habra et al., 2003) and higher cardiac output during an experimental stressor (Williams, O’Connor & O’Carroll, 2009).

Despite a large evidence base suggesting that Type D is associated with negative health outcomes, the utilisation of Type D as a dichotomous typology in the majority of these studies has been subject to recent criticism (Coyne et al., 2011; deVoogd, Sanderman & Coyne, 2012; Smith, 2011). Traditionally, the classification of Type D was determined by participant’s scoring above the established cut-off point (>10) for both traits (NA and SI) determining whether a participant was classified as Type D or non-Type D (Denollet, 2005). More recently, the use of a categorical approach to Type D has come under scrutiny. Based on their taxometric analysis, Ferguson et al., (2009) suggested that Type D is better represented as a continuous variable, as the multiplicative interaction terms of NA x SI, than as a dichotomous variable. Subsequently, it is then possible to control for the main effects of the constituent elements of Type D (NA and SI) in a regression analysis. Accordingly, the most appropriate test of the predictive utility of Type D is to determine if the multiplicative interaction of NA and SI predicts outcome after controlling for the main effects of the NA and SI. Denollet has proposed that the Type D consists of more than just the presence of negative emotions and that social inhibition is a moderator of the effects of NA on outcome (Denollet et al., 1996). Accordingly the interaction of NAXSI should predict outcome above and beyond the effects of NA and SI independently, if it is the synergistic effect of the constructs that is key. Therefore, analysing Type D as the interaction of NAXSI is arguably the most appropriate analytic method for the construct, and provides the most stringent test of its predictive utility.
The analysis of Type D in this way has resulted in several recent studies finding no association between Type D personality and mortality among individuals with congestive heart failure and coronary heart disease (Coyne et al., 2011; Grande et al., 2011). In a sample of 700 heart failure patients, Coyne et al., (2011) found that Type D was not associated with mortality. However, the prevalence of Type D in this study was unusually low (13% compared to the usual 27-34%) raising questions over the generalizability of the sample. At the same time, Grande et al., (2011) published data from a much larger study of 1040 participants which again found that Type D did not predict all-cause mortality.

Recently, Williams, O’Connor, Grubb & O’Carroll (2012) investigated the relationship between Type D and psychosocial outcomes in post-MI patients using both the categorical and continuous data analysis strategies found that in a sample of myocardial infarction (MI) patients Type D individuals did report lower quality of life and higher functional impairment than non-Type D individuals when Type D was analysed as a dichotomous typology. However, when analysing through additional regression analyses using the interaction of NA and SI, no significant associations were found between Type D and quality of life. Interestingly, the NA component of Type D was associated with poor quality of life, but the NAxSI interaction term did not predict outcome, nor did the SI component, prompting Williams et al., (2012) to suggest that the NA component of Type D may be the driving force behind the associations found between Type D and subjective outcomes in previous studies.

To-date, all previous research on Type D and subjective outcomes in the general population has analysed Type D status using a categorical typology. Therefore, in line with recent findings, (e.g. Coyne et al., 2011; Williams et al., 2012) the central aim of the current study is to examine for the first time in a non-clinical sample if Type D is associated with subjective outcomes (i.e. physical symptoms and quality of life) when treated as a dimensional variable.
in standard regression analyses, after controlling for the main effects of negative affectivity and social inhibition.

**Methods**

*Participants and Procedure*

The sample consisted of 177 staff and students from a Scottish University, recruited on campus via convenience sampling. The sample consisted of 32 males and 145 females with a mean age of 30.0 (age range 17-89). They were given a brief introduction of what the study would require and invited to participate by completing the questionnaire pack. Ethical approval had been obtained from the psychology department’s ethics committee prior to testing.

**Measures**

*Type D personality*

Type-D personality was measured using the DS14 (Type D Personality Scale: Denollet, 2005), a 14-item scale which measures the two personality traits of Negative Affectivity (e.g. ‘I take a gloomy view of things’) and Social Inhibition (e.g. ‘I often talk to strangers’) in two 7-item subscales. Each statement requires the participant to rate how accurate a reflection of their personality they believe this to be, from 0 (False) to 4 (True). To assess both personality traits individually, the subscales of Social Inhibition and Negative Affectivity can be scored as continuous variables with a range of 0 to 28. Traditionally, participants were classified as having a Type D personality when both SI and NA were ≥10 (Denollet, 2005). However, using the methods proposed by Ferguson et al. (2009) and treating both SI and NA as continuous variables, we also tested the Type D interaction term (NAXSI). Cronbach’s α was
0.86 and 0.82 respectively for NA and SI in the current study, demonstrating a good level of internal consistency.

**Physical Symptoms**

The Cohen-Hoberman Inventory of Physical Symptoms (CHIPS: Cohen and Hoberman, 1983) is a scale consisting of 33 statements that measure the level of distress or discomfort each of the physical symptoms (e.g., stomach pain) give the participant over a period of 2 weeks, including the day that the questionnaire was completed. Participants indicated this on a Likert scale ranging from 0 (not at all been bothered by the problem) to 4 (the problem has been an extreme bother). Excellent levels of consistency were found for this measure, with a Cronbach's $\alpha$ of .92 in the current study.

**Quality of Life**

The World Health Organisation Quality of Life Questionnaire (WHOQOL-BREF: WHO, 1996) is a 25-item measure that was used to measure the participant’s perceived quality of life. On a 5-point Likert scale, participants answered questions indicating how much, how completely and how satisfied they are with each ‘domain’ of their life. The domains were: Physical Health (e.g. ‘Do you have the energy for everyday life?’), Psychological (e.g. ‘Are you able to accept your bodily appearance?’), Social Relationships (e.g. How satisfied are you with your sex life?’) and Environment (e.g. ‘Have you enough money to meet your needs?’). Scores are then summed across the domains with scores being scaled in a positive direction (i.e., higher score= higher quality of life). Cronbachs $\alpha$ was .86 for the current study, indicating a high level of internal consistency.

**Statistical Analyses**
We analysed the data from this study using two methods, first using the traditional method of classifying individuals as Type D if they scored above the recommended cut-off (≥10) on both NA and SI (Denollet, 2005). Second, we treated both NA and SI as continuous variables and used the multiplicative term of SI×NA. Initially, an analysis of Type D as a categorical construct was carried out, with independent samples t-tests investigating differences between Type D and non-Type D individuals in physical symptoms and quality of life. In addition, a multiple regression analyses were used to examine if categorical Type D (dummy-coded) predicted physical symptoms and quality of life. Second, Type D was analysed as a dimensional construct, consistent with Ferguson et al. (2009) and correlations were carried out to determine any significant associations between dimensional Type D (NAxSI), NA, SI, physical symptoms and quality of life. Following this, multiple regression analyses were carried out to determine which factors were predictive of quality of life and physical symptoms. Demographic factors (i.e. gender and age) were entered into step 1 of the hierarchical regression, followed by the Type D subscales (NA and SI separately) in step 2. Finally, the dimensional Type D (NAxSI) was entered into the final step. All continuous predictor variables were mean centred before entry into the regression analyses (to control for multicollinearity, as recommended by Aiken and West (1991)).

Results

Prevalence of Type D Personality

From the sample of 177 participants, 62 (7 males and 55 females) were classified as Type D (35%) according to the recommended cut-off points of ≥10 for the subscales of NA (M= 15.39; S.D= 4.67) and SI (M= 14.4; S.D= 4.48).

Categorical Analysis
Results from a standard independent samples t-test indicated that Type D individuals have significantly lower quality of life (M=84.68; S.D=10.49) than non-Type D individuals (M=93.65; S.D=9.11), $t(175) = 5.91$, $p<.001$ (Cohen’s d is 0.89, indicating a large effect size). In addition, significantly more physical symptoms were experienced over the last 3 months by Type D’s (M=28.23; S.D=15.83) than non-Type Ds (M=18.29; S.D=15.14), $t(175) = 4.09$, $p<.001$ (Cohen’s d is 0.62, indicating a medium effect size).

To investigate if categorical Type D predicted quality of life and physical symptoms, two regression analyses were conducted. The effects of demographic factors (age and gender) were controlled for in step 1, and categorical Type D was entered in step 2. In the first step, demographic factors predicted only 0.8% of the variance in quality of life, with neither factor emerging as a significant predictor. However, in step 2, categorical Type D was found to be a significant predictor of quality of life, $\beta =-.238$, $t(176) = -3.2$, $p<.01$, explaining 6.4% of the variance (Cohen’s $f^2$ is 0.07 for the final model, indicating a small effect size). For physical symptoms, age and gender accounted for a significant 6.9% of variance in the total symptoms at step 1. In Step 2, categorical Type D was a significant predictor of physical symptoms, $\beta =.174$, $t(176) = 2.4$, $p<.05$, explaining an additional 3% of the variance (Cohen’s $f^2$ is 0.03 for the final model, indicating a small effect size).

**Dimensional Analysis**

In order to examine Type D as a dimensional construct, correlations were carried out examining the relationship between each of the dependent variables (quality of life and physical symptoms) and the synergy between both negative affectivity and social inhibition (NA x SI) as well as the individual NA and SI components. NA was negatively correlated with quality of life $r = -.554$, $p<.001$ and positively correlated with symptoms $r = .325$, $p<.001$. In addition, SI was negatively correlated with quality of life $r = -.437$, $p<.001$ and
positively correlated with symptoms, \( r = .232, p < .01 \). Finally, Type D (NAxSI) was significantly inversely correlated with the quality of life, \( r = -.243, p < .001 \), and was significantly positively associated with physical symptoms, \( r = .205, p < .005 \), demonstrating that higher levels of NA, SI and Type D (NAxSI) were associated with higher levels of physical symptoms and lower levels of quality of life.

To further investigate whether Type D (NAxSI) predicted quality of life, a hierarchical regression was carried out. The effects of demographic factors were controlled for in step 1 (gender and age), followed by NA and SI entered independently in step 2. Type D was then entered at step 3, as the NA x SI multiplicative term.

As evident in Table 1, step 1 accounted for 0.8% of the variance in quality of life with neither age nor gender being a significant predictor. However at step 2, NA, \( \beta = -.447, t (176) = -6.35, p < .001 \) and SI, \( \beta = -.230, t (176) = -3.3, p < .001 \) were significant predictors of quality of life, explaining an additional 34.2% of the variance. In the final stage, Type D (NAxSI) was not a significant predictor of quality of life \( \beta = -.119, t (176) = -.520, \text{ns} \). NA remained the only significant predictor in the final model. (Cohen’s \( f^2 \) for the final model is 0.54, indicating a large effect size)

Insert Table 1 here

Next, we conducted a second multiple hierarchical regression analysis to determine whether Type D (NAxSI) predicted physical symptoms. As shown in Table 2, step 1 (age and gender) accounted for 6.9% of variance in the total symptoms experienced with both gender and age being significant predictors. NA was a significant predictor of physical symptoms at step 2, \( \beta = .260, t (176) = .3.26, p < .001 \). Type D (NAxSI) was entered at step 3, but was not a significant predictor of physical symptoms (Cohen’s \( f^2 \) for the final model is 0.2, indicating a medium effect size). NA, age, and gender were significant predictors in the final model.
Discussion

The current study found that Type D was significantly associated with lower quality of life and higher physical symptoms when analysed using the traditional categorical approach. However, there was no evidence that Type D personality was associated with quality of life and physical symptoms when Type D was analysed as a continuous variable, using the interaction of NA and SI. On the other hand, there was a significant main effect of negative affectivity on both quality of life and physical symptoms. These findings suggest that in the current study it is the NA component of Type D that is driving the relationship between Type D and negative outcome that was identified in the first categorical analyses.

Significant associations between Type D and quality of life have been found in previous research, when Type D was analysed using a dichotomous typology (e.g., Mols & Denollet, 2010). As the findings of the current study, based on the initial categorical analysis, also found significantly lower reported quality of life in Type D individuals compared to non-Type Ds, they are consistent with past research into this area (Aquarius et al., 2007; Mols & Denollet, 2010; Pedersen et al., 2007). However, it should be noted that categorical Type D explained only small amounts of the variance in quality of life (6.4%) and physical symptoms (3%) in the current study. Whereas the dimensional components explained a larger amount of variance (35% of the variance in quality of life, and 10% of the variance in physical symptoms). In addition, the effect sizes also demonstrate that the dimensional components have a larger effect on the outcome measures than the categorical construct, thus demonstrating that the continuous components of Type D construct have more explanatory power than the categorical construct.
The focus of the current study was to examine Type D using what we deem as a more appropriate analysis strategy. Initial correlational analysis found significant relationships with dimensional Type D (NAxSI) and quality of life. However, when analysed further using regression analyses, and controlling for the main effects of NA and SI, Type D (NAxSI) was not found to predict outcome. These findings coincide with some of the more recent findings in the Type D literature (which have employed the same analysis strategy) showing null effects when analysing Type D as a dimensional construct (e.g., Coyne et al., 2011; Grande et al., 2011; Williams et al., 2012).

The findings on physical symptoms follow a similar pattern. A previous study by Williams and Wingate (2012) found that Type D was associated with physical symptoms in a healthy sample. Although Type D was analysed as both a categorical and continuous variable in that study, the analysis did not control for the main effects of NA and SI in a regression analysis. In the current study we found that Type D did not predict physical symptoms, but NA was found to be a significant predictor. The importance of NA for symptom reporting has been previously identified by Watson and Pennebaker (1989) who suggested that NA made individuals more likely to interpret their symptoms as indicative of disease and openly express such concerns.

There are several limitations to the current study which should be noted. First, there is a gender imbalance in the study; with only 18% of the sample investigated being males, thus the generalizability of the results may be limited. Second, as the sample is relatively young in age, the findings may not be generalizable to an older population. In addition, as the study is cross-sectional in design it is not possible to draw any firm conclusions about cause and effect. The study is also limited by its reliance on self-report measures of health outcomes; it would be useful for future studies to include more objective measures of physical health.
The present study is the first to investigate the relationship between Type D and health outcomes in a healthy sample, using both the traditional categorical approach and more recent dimensional methods of analysing Type D. With one exception (Williams et al., 2011), all of the studies that have recently analysed Type D as a continuous variable have found null effects for the construct on both mortality and morbidity in cardiac patients. The current study adds to this body of research by suggesting Type D may not be a predictor of subjective health outcomes in a general population sample, when analysed dimensionally. Taken together, the current findings and those of Williams et al., (2012) suggest that it is the NA component of Type D that may be the key predictor of subjective health outcomes in both cardiac and healthy samples. However, it may be the case that Type D is predictive of more objective health outcomes in particular patient groups. Furthermore, given the limitations of the current study future research should examine if Type D predicts objective health outcomes in healthy samples over time.

References


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Table 1. Hierarchical Regression Analysis for Quality of Life

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<th>β Step 1</th>
<th>β Step 2</th>
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<th>Δ R² for step</th>
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