# A critical analysis of the assumptions of Type D personality: Comparing prediction of health-related variables with the Five Factor Model☆

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## ABSTRACT

The present study critically evaluated several assumptions related to Type D personality within the context of predicting health-related variables. Specifically, it compared categorical with continuous representations of Type D personality, assessed evidence for interactive effects of the Type D subscales (negative affectivity and social inhibition), and compared the predictive validity of Type D personality with the Big Five. Healthy adults (n = 224) completed the DS14 and the NEO-PI-R, as well as measures of health behaviors, social support, physical symptoms, and psychological symptoms. Categorical Type D had much poorer prediction than the continuous subscales of social inhibition and negative affectivity, and there was no interaction between the subscales. While negative affectivity and social inhibition were effective at predicting health-related variables, the prediction was equivalent to that achieved by neuroticism and extraversion. Conscientiousness was found to be an important predictor that was missing from Type D. There are reasons to prefer the use of the Big Five over Type D personality when the aim is to predict health-related variables. Where the DS14 is used, it is recommended to also include a measure of conscientiousness.

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## 1. Introduction

Type D personality is defined as the presence of high levels of both negative affectivity and social inhibition, and represents a personality typology that denotes a propensity to experience elevated levels of psychological distress (Denollet, 2005). Theory and research suggests that Type D personality is a risk factor for increased morbidity and mortality in several chronic illnesses including coronary artery disease (Svansdottir et al., 2013) and type 2 diabetes (Nefs et al., 2015). Various mechanisms have been proposed to explain the relationship between Type D and chronic illness, including greater levels of negative health behaviors (Horwood, Anglim, & Tooley, 2016), lower levels of social functioning (Grande, Romppel, Michal, & Brähler, 2014), and a tendency to adopt poorer coping strategies (Booth & Williams, 2015).

Nonetheless, it is unclear whether using the domain-specific Type D measure of personality offers any benefits over a general personality framework like the Big Five (i.e., extraversion, neuroticism, conscientiousness, agreeableness, openness) (Digman, 1990). Furthermore, there are various active methodological debates that are relevant to the inclusion of personality into models of health behaviors. These include (a) whether personality should be conceptualized categorically in terms of personality types (Ferguson et al., 2009), (b) whether traits have interactive effects on criteria (Atherton, Robins, Rentfrow, & Lamb, 2014), and (c) the extent to which narrow personality facets incrementally improve prediction over and above broad personality factors (Anglim & Grant, 2014). The Type D personality construct implies that personality types are meaningful and useful, traits have interactive effects, and that the narrow traits of negative affectivity and social inhibition are more relevant than broad traits such as neuroticism and extraversion. While a few studies have challenged the assumptions of Type D personality regarding its status as a categorical variable (Ferguson et al., 2009; Howard & Hughes, 2012; Kelly-Hughes, Wetherell, & Smith, 2014) and its interactive effects (Horwood et al., 2016; Kelly-Hughes et al., 2014), almost no research has examined the ability of Type D personality to predict health-related variables in comparison to a comprehensive hierarchical framework of personality based on the Big Five. Thus, the present study sought to address these issues by comparing the predictive validity of various representations of Type D personality with the Five-Factor Model (Costa & McCrae, 1992). Specifically, it focused on the ability to predict the four health-related outcome variables of health behaviors, social support, physical symptoms, and psychological symptoms.

### 1.1. Challenges to the assumptions underpinning Type D personality

Several assumptions of Type D personality have been challenged in the personality literature. First, Type D personality is a dichotomous variable scored using cut-off scores for the subscales of negative affectivity

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and social inhibition. Treating traits as dichotomous variables is contrary to current thinking in personality literature and taxonomic research (Ferguson et al., 2009; Kelly-Hughes et al., 2014). Research shows that dichotomizing an interval scale reduces correlations (Aguinis, Pierce, & Culpepper, 2009; Rucker, McShane, & Preacher, 2015). Demonstrating this general point, Horwood et al. (2016) found that treating Type D as a dichotomous variable reduced predictive validity relative to a continuous representation of Type D.

Second, the scoring of Type D personality requires an individual to score above a threshold on both negative affectivity and social inhibition. Consistent with how Type D is theorized to operate, this multiple hurdle approach implies that the two subscales have an interactive effect over and above the main effects (Denollet, Pedersen, Vrints, & Conraads, 2013). Given the overlap of the Big Five traits of neuroticism ($+$) and extraversion ($-$) with negative affectivity and social inhibition respectively, if Type D theory was correct, then we might also expect interaction effects to be present between neuroticism and extraversion. There is almost no evidence that traits such as neuroticism and extraversion have interactive effects (Atherton et al., 2014), nor is there evidence that the two subscales of negative affectivity or social inhibition have interactive effects in predicting health-related variables (Horwood et al., 2016; Kelly-Hughes et al., 2014).

Third, the traits that underpin Type D Personality (negative affectivity and social inhibition) are assumed to be sufficiently different to other well-known constructs (i.e. neuroticism and extraversion) that the measure can be considered unique. This assumption has been criticized in the literature (Coyne & de Voogd, 2012). A meta-analysis (Horwood, Anglim, & Tooley, 2015) found relatively large mean correlations between negative affectivity and neuroticism of $r = 0.74$ and between social inhibition and extraversion of $r = -0.63$.

### 1.2. Type D personality and the big five as predictors of health outcomes

There is substantial evidence that Big Five personality traits such as neuroticism and extraversion can predict behavioral risk factors for chronic illness such as excess weight (Armon, Melamed, Shirom, Shapira, & Berliner, 2013), tobacco smoking (Cheng & Furnham, 2016), and alcohol and drug abuse (Lackner, Unterrainer, & Neubauer, 2013). Likewise, conscientiousness is a strong predictor of healthy behaviors such as commitment to a healthy lifestyle (Lodi-Smith et al., 2010) abstaining from alcohol consumption (Roberts, Walton, & Bogg, 2005), and adhering to long-term health goals (Booth-Kewley & Vickers, 1994). Not surprisingly given the overlap with neuroticism and extraversion, Type D research has shown relationships with health behaviors (e.g. adequate physical activity, Nefs et al., 2015) and social support (Williams & Wingate, 2012). Nonetheless, the lack of overlap with conscientiousness in particular is likely to yield poorer prediction of health behaviors.

### 1.3. The current study

Collectively, these issues raise a number of questions about the utility of Type D personality in predictive models of health-related variables. The present study sought to address these issues by comparing the validity of various representations of Type D personality with the Five-Factor Model. Both Type D personality and the Big Five were used to predict health behaviors, social support, physical symptoms and psychological symptoms. Health behaviors and social support are two theorized mechanisms by which Type D personality is expected to influence health outcomes, and physical and psychological symptoms provide a measure of health outcomes. The study examined four assumptions related to Type D personality: (a) that personality traits have an interactive effect that is greater than the main effects, (b) that the effect of traits are discontinuous (as implied by cut-off scores on negative affectivity and social inhibition), (c) that negative affectivity and social inhibition are the most important personality traits for predicting health-related variables, and

(d) using the specific traits of negative affectivity and social inhibition is better or at least as good as using the big five.

## 2. Method

Item-level data, the data analysis script, and selected materials are available from the Open Science Framework at https://osf.io/vb4ve.

### 2.1. Participants and procedure

Participants were recruited through online forums including university websites, social media, and online health and wellbeing forums. Participants completed measures of demographics, personality, and the health-related variables: i.e., health behaviors, social support, physical symptoms, and psychological symptoms. After removing nine cases due to missing data or careless responding, the final sample consisted of 244 adults (76% female) with ages ranging from 18 to 70 years ($M = 32.6$, $SD = 12.8$). Almost all participants resided in Australia. A previous study that used this sample examined the correlations between Type D and the factors and facets of the NEO-PI-R, but this previous study did not examine health-related variables and did not compare the predictive validity of different models of personality (Horwood et al., 2015).

### 2.2. Measures

#### 2.2.1. Type D personality

The DS14 is the original and standard measure of Type D personality (Denollet, 2005). The measure consists of two 7-item subscales, negative affectivity and social inhibition, which are scored as the sum of respective items after any necessary item reversal. Each item is rated on a 5-point scale from 0 = false to 4 = true. An individual is classified as having Type D personality if they score 10 or more on both subscales (Denollet, 2005). A continuous Type D scale was also calculated as the sum of social inhibition and negative affectivity.

#### 2.2.2. Personality

The NEO Personality Inventory - Revised (NEO-PI-R) is a 240-item measure of the Big Five Factors each with six nested facets (Costa & McCrae, 1992). Items are rated on a 5-point scale ranging from 1 = strongly disagree to 5 = strongly agree. Factor and facet scores were obtained by taking the mean of constituent items after any necessary item reversal.

#### 2.2.3. Health behaviors

The General Preventive Health Behaviors Checklist (Amir, 1987) measures preventative health behaviors and provides a global index of health behavior. Each item is originally rated on a 3-point scale: 0 = do not do it, 1 = sometimes do it, and 2 = yes always, or almost always do it. A health behavior score was computed as the mean of seven items that assessed eating, sleeping, smoking, exercise, alcohol intake, weight control, and medical check-ups.

#### 2.2.4. Social support

The Quality of Social Network and Social Support Scale (Dalgard, Bjørk, & Tambs, 1995) was used to measure perceived social support. Following Williams et al. (2008), the support from neighbors subscale was excluded, leaving nine items that measured perceived support experienced from friends and family. An overall social support score was formed by taking the mean of all items.

#### 2.2.5. Physical and psychological symptoms

The Rotterdam Symptom Checklist (De Haes & Van Knippenberg, 1990) is a 35 item scale that measures the number of self-reported physical and psychological symptoms a person has experienced in the previous week. The measure uses a 4-item response scale where 1 = not at all,