



Distress proneness and cognitive decline in a population of older persons

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Received 17 October 2003; received in revised form 23 April 2004; accepted 26 April 2004

KEYWORDS

Longitudinal studies;
Population studies;
Cognitive function;
Psychological distress;
Personality

Summary The association between distress proneness and cognitive decline was examined in older residents of a biracial community in Chicago. At baseline, participants completed four cognitive tests that yielded a global measure (baseline mean = 101.2; standard deviation (SD) = 7.8), and a brief measure of the tendency to experience negative emotions (mean = 16.5; SD = 6.7) based on the Neuroticism scale of the NEO Five-Factor Inventory. Cognitive testing was repeated twice at three-year intervals. In mixed models that controlled age, sex, race, and education, for each point on the distress proneness scale, global cognitive score was 0.12 unit lower at baseline ($p < 0.001$) and annual rate of decline increased by 0.01 unit ($p = 0.002$), or about 2%. Thus, cognitive decline was about 30% faster in a person highly prone to distress (score = 24, 90th percentile) compared to the one low in distress proneness (score = 9, 10th percentile). This effect was unchanged after controlling for level of cognitive activity or excluding people with cognitive impairment at baseline, but it was reduced to a trend ($p = 0.059$) after controlling for depressive symptoms. The results suggest that the tendency to experience psychological distress is associated with increased cognitive decline in old age.

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1. Introduction

People differ in the tendency to experience negative emotional states like depression, anger, and shame. Because this trait, variously referred to as distress proneness, neuroticism, or negative affectivity (Watson and Clark, 1984; Goldberg,

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1990; Costa and McCrae, 1992), is very stable throughout adulthood (Costa and McCrae, 1988; Hultsch et al., 1999), it is an indicator of the cumulative level of distress experienced by an individual (Watson and Clark, 1984; Depue and Monroe, 1986; Ormel and Wohlfarth, 1991; Magnus et al., 1993). In this article, we use the term distress proneness because it succinctly specifies the central feature of the trait.

Several lines of evidence suggest that distress proneness may contribute to cognitive decline and dementia in old age. Chronic stressful experience in animals has been associated with structural changes in neural systems that regulate the hypothalamic-pituitary-adrenal axis (e.g. hippocampus) and in forms of memory and cognition mediated by these systems (Sapolsky et al., 1985; Magarinos et al., 1997; Gould et al., 1998; Baker and Kim, 2002). In humans, negative events across the life span have been associated with increased risk of dementia in old age (Persson and Skoog, 1996). In addition, distress proneness has been negatively associated with level of cognitive function in older persons with and without dementia (Jorm et al., 1993; Meier et al., 2002; Wilson et al., 2004a).

Prospective studies provide a more direct opportunity to observe an association between distress proneness and cognitive decline, but few have been conducted and their results have been mixed. One study found that older persons who were more prone to experience psychological distress experienced more rapid cognitive decline than persons less prone to distress during five to six years of follow-up (Wilson et al., 2003b), but the association was not observed in three other studies (Hultsch et al., 1999; Wetherell et al., 2002; Jelicic et al., 2003). However, methodological factors like the duration of the follow-up period and the level of follow-up participation may have contributed to the null results. Another issue is that most previous studies have been conducted on selected groups of older persons, likely limiting the spectrum of distress proneness and the opportunity to detect an association between distress proneness and clinical outcomes.

In the present study, we used data from the Chicago Health and Aging Project to examine the relation of a brief measure of distress proneness to cognitive decline in old age. Older residents of a biracial community on the south side of Chicago underwent cognitive function testing at three-year intervals for a mean of 5.3 years. At baseline, they completed a brief measure of distress proneness. We used mixed models to test the association of distress proneness with baseline level of cognition

and annual rate of cognitive decline controlling selected demographic and clinical variables.

2. Methods

2.1. Participants

Beginning in 1993, we conducted a census of all households in a geographically defined community in Chicago as part of the Chicago Health and Aging Project (Evans et al., 2003; Morris et al., 2002; Wilson et al., 1999, 2002b). Persons aged 65 years or older were asked to participate in an in-home interview, and 6158 of 7826 eligible persons (79%) did so. The interview was subsequently repeated twice, at approximately three-year intervals. The study was approved by the Institutional Review Board of Rush University Medical Center.

Of 6158 persons at baseline, 1175 died before the first follow-up. Of the remaining 4983 persons, 4392 (88%) completed at least one follow-up, with a mean of 2.6 evaluations per person during a mean of 5.3 years of observation. They had a mean age of 73.9 years (standard deviation (SD)=6.5) and a mean of 12.0 years of education (SD=3.7); 62% were women, and 62% were black.

2.2. Assessment of distress proneness

Distress proneness was assessed at baseline with four items from the 12-item Neuroticism scale of the NEO Five-Factor Inventory (Costa and McCrae, 1992): I am not a worrier; I often feel tense and jittery; I often get angry at the way people treat me; I often feel helpless and want someone else to solve my problems. Participants rated their level of agreement with each statement. Item scores, which ranged from 0 to 4 with higher scores indicating more distress proneness, were summed and then multiplied by three to make the score more comparable to the original 12-item version of the scale.

2.3. Assessment of cognitive function

Cognitive function was assessed with four tests at each evaluation. The Symbol Digit Modalities Test is a measure of perceptual speed in which participants try to match as many symbol digit pairs as possible in 90 s (Smith, 1982). Persons were read a brief story and then asked to recall it immediately and again after an approximately 3-min delay (Albert et al., 1991). Scores for immediate and delayed retention were the

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