



Personality features and cognitive level in patients at an early stage of Alzheimer's disease

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ABSTRACT

In this cross-sectional study, we explored the relationship between premorbid personality and its changes over 5 years, and cognitive deterioration in patients with mild Alzheimer's disease. The cognitive level of 54 patients was compared with that of 64 control subjects using the Mini Mental State (MMSE). Family members completed the NEO-PI-R (form R) twice, once to evaluate the participants' current personality and again to assess personality traits as they were remembered to be 5 years earlier. Furthermore, the family filled in the Informant Questionnaire on Cognitive Decline (IQCODE), the Activities of Daily Living (ADL), and the Instrumental Activities of Daily Living (IADL) scales to assess their proxies' cognitive level and daily living functioning. Regarding the relationship between personality characteristics and cognitive status, we observed trends for premorbid personality and significant links for personality changes in the clinical group. Thus, changes in neuroticism and conscientiousness were associated with cognitive deterioration, whereas decreased openness to experience and conscientiousness over time predicted loss of independence in daily functioning in the clinical group. Our study suggests that premorbid features can be considered as latent traits linked to the neuropathology underlying the disease process, while personality changes are probably the consequences of the pathological process.

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1. Introduction

According to the International Classification of Diseases, 10th edition (WHO, 1993), preclinical Alzheimer disease (AD) is defined as impairment in one or more cognitive domains (typically memory) that are insufficient to interfere with social and occupational functioning. The first symptoms are correctly attributed to something else than AD (ageing or stress). Detailed neuropsychological testing can reveal mild cognitive difficulties up to 8 years before a person fulfills the clinical criteria for diagnosis of AD. Thus, subtle problems with the executive functions of attention, planning, flexibility, and abstract thinking, or impairments in semantic memory (memory of meanings, and concept relationships) can also be symptomatic of the early stages of AD (Bäckman, Jones, Berger, Laukka, & Small, 2004). In this case, personality changes and language deficits (word-finding problems) are the first signs noticed by relatives. However, it is difficult to specify a date for the begin-

ning of these additional changes because deficits settle insidiously. The evolution is characterized by a gradual onset and continuing decline marked by the memory alteration and other cognitive perturbations as aphasia, apraxia, agnosia, disorders of executive functions, and a progressive reduction of patient autonomy to its immediate environment (DSM IV TR, 2000).

The possible link between personality traits and cognitive decline in AD has been little studied. Nevertheless, some authors suggest that *premorbid personality characteristics* may represent a risk factor for AD, and for this reason premorbid personality might differ between AD patients and controls (von Gunten, Pocnet, & Rossier, 2009). In particular, neuroticism as characterized by frequent negative affect and vulnerability to stress may be a risk factor for cognitive impairment. Thus, Wilson et al. (2003) found a link between "proneness to distress" and increased risk for AD. They measured proneness to distress prospectively at baseline by using the Neuroticism scale from the NEO Five-Factor Inventory (Costa & McCrae, 1992) in a sample of healthy control individuals from the Religious Orders Study. Individuals with the highest distress proneness were twice as likely to develop AD, as were individuals with the lowest distress proneness, when other risk factors were controlled for such as age, education, and depressive symptoms. Therefore, high neuroticism in older adults

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could be viewed as an indicator of brain exposure to chronic stress (Wilson et al., 2006) that may produce functional and structural changes to the hippocampal formation (Baker & Kim, 2002), leading to the erosion of episodic memory and to cognitive decline (Wilson et al., 2005). Depression is linked to premorbid neuroticism and also considered a risk factor of AD, either because patients experience it personally (Kokmen et al., 1991), or because there is a family history of it (Tsolaki, Fountoulakis, Chantzi, & Kazis, 1997). Other studies found an association between premorbid neuroticism and cognitive impairment (Crowe, Anel, Pedersen, Fratiglioni, & Gatz, 2007) or dementia (Persson, Berg, Nilsson, & Svanborg, 1991).

Moreover, people with AD often score lower than age-matched controls in the premorbid personality domains of openness, extraversion and conscientiousness. Generally, extraversion is associated with the use of more effective coping strategies and more efficient utilization of social support (Wang et al., 2009). Living in a rich social environment or having an active lifestyle was found to be associated with a reduced risk of dementia (Fratiglioni, Pailard-Borg, & Winblad, 2004). Low neuroticism in combination with high extraversion was related to the lowest dementia risk (Wang et al., 2009). Conversely, other studies (Seidler, Bernhardt, Nienhaus, & Frölich, 2003; Von Dras & Siegler, 1997) associate low extraversion with poor social activity and support, and with a higher risk of Alzheimer. Wilson, Scherr, Schneider, Li, and Bennett (2007) reported that subjects who developed AD scored lower on extraversion. However, extraversion is not an independent predictor of AD risk in multivariate analyses, perhaps because of its associations with neuroticism or conscientiousness. Higher openness was linked with cognitive activity and engagement (Costa & McCrae, 1992) and low openness with an increased risk for AD, even after accounting for the level of education (Duberstein et al., 2010). Conscientiousness refers to the capacity to plan ahead, delay gratification, and work steadfastly toward attaining goals (Costa & McCrae, 1992). High levels of conscientiousness were associated with an 89% risk reduction of AD compared with a low conscientiousness score in a longitudinal clinico-pathologic cohort study with up to 12 years follow-up of 997 nuns and priests of whom 176 developed AD over time (Wilson, Schneider, Arnold, Bienias, & Bennett, 2007).

Moreover, specific changes in personality profiles have been reported as preclinical symptoms of AD (Balsis, Carpenter, & Storrant, 2005) that reflect the impact of progressive brain damage. In this prospective, longitudinal study of non-demented older adults evaluated annually, substantial personality changes associated with dementia were observed. The most common personality changes in this group were increased rigidity, growing apathy, increased egocentricity, and impaired emotional control. These results add to prior research that has documented personality changes in dementia through retrospective reports by informants (Chatterjee, Strauss, Smyth, & Whitehouse, 1992; Pocnet, Rossier, Antonietti, & von Gunten, 2011; Siegler, Dawson, & Welsh, 1994; Smith-Gamble et al., 2002; Strauss & Pasupathi, 1994). Other studies suggest that conscientiousness and neuroticism are the personality domains that exhibit the most changes (Robins & Byrne, 2011) and may precede cognitive decline in AD (Duchek, Balota, Storandt, & Larsen, 2007). Kolanowski and Whall (1996), in a review of studies on personality changes, note that, although there are systematic personality changes in subjects with dementia, the individuals appear to maintain their model of premorbid personality traits. In other words, patients with dementia maintain models of adaptation they used in the past.

Given the controversial findings to date, the aim of this study was to investigate the possible relation between both premorbid personality and its changes over 5 years and global cognitive level in patients at an early stage of AD.

2. Materials and methods

2.1. Participants

Fifty-four patients diagnosed with mild AD were selected from patients attending an old-age psychiatric memory clinic (39 women, 15 men, $M_{age} = 76.9$ years, $SD_{age} = 8.5$ years), and 64 control subjects (35 women, 29 men, $M_{age} = 69.3$ years, $SD_{age} = 8.7$ years), without cognitive impairment, were recruited in the community through newspaper announcements and by word of mouth.

2.2. Personality assessment

Personality traits were assessed according to the Five-Factor Model, which is currently the most common dimensional approach to personality (Costa & McCrae, 1992; Digman, 1990). This model claims that personality can be described along five main independent dimensions called neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Each of these dimensions is composed of six lower-level personality facets. To assess personality, the *NEO Personality Inventory Revised* (NEO-PI-R, Form R) (Costa & McCrae, 1992), was used. It is a questionnaire composed of 240 items used for peer ratings. The NEO-PI-R is the result of extensive research on personality change and stability, and has well-established reliability and validity data in older populations (McCrae & Costa, 1987). For this study, proxies assessed both the current and previous personality of the participants. People with dementia often cannot inform reliably about their own personality due to amnesic difficulties. In addition, in the early clinical course of dementia insight and judgment are often impaired and self-reflective capacity reduced (Bozeat, Gregory, Ralph, & Hodges, 2000). Moreover, it may be difficult for people with dementia to be able to complete a lengthy questionnaire (Seiffer, Clare, & Harvey, 2005). Hence, we used the proxy rating according to many studies (e.g. Siegler et al., 1994). In our study, family members completed the NEO-PI-R (Form R) twice, once to evaluate the participants' current personality and again to assess their personality as it was remembered to be 5 years prior to the beginning of the cognitive decline.

2.3. Assessment of cognitive status and daily living functioning

The cognitive functioning status was evaluated using the following two well-validated tests or questionnaires: (1) The *Mini Mental State* (MMSE; Folstein, Folstein, & McHugh, 1975) permits a quick screening of the patient's cognitive deficits and the determination of the global cognitive level. It is composed of 30 questions that explore memory (time and space orientation, immediate and delayed memory of 3 words), attention and calculation, language and the reproduction of a drawing. (2) The *Informant Questionnaire on Cognitive Decline* (IQCODE, Jorm & Jacomb, 1989) evaluates a subject's cognitive and functional level change. It is a 16-item scale filled out by a relative. The meaning of scores in the two instruments is opposite. Thus, lower scores in MMSE and higher scores in IQCODE demonstrate cognitive dysfunction.

Daily living was evaluated using the following 2 scales: (1) The *Activities of Daily Living* (ADL; Katz, 1998), a hierarchical scale of 6 activities: bathing, dressing, going to the toilet, transferring, continence, and feeding. Good reliability and construct validity of this scale were reported. (2) The *Instrumental Activities of Daily Living* (IADL; Lawton & Brody, 1969) is an 8-item scale evaluating the patient's dependency level for activities including shopping, using the public transportation system, cooking, house cleaning, doing laundry, using the phone, taking medication or managing the budget. Relatives completed both scales.

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