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Cognitive abilities and personality traits in old age across four years: More stability than change



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ABSTRACT

The current study ($N = 236$) examined stability and change of six cognitive abilities and three personality traits in old age ($M = 74.12$ years, $SD = 4.40$) over four years. Furthermore, we investigated whether levels of one domain were related to the other domain (and vice versa) four years later. The results showed a mean-level decline for processing speed and a mean-level increase for neuroticism. Cross-lagged effects indicated that reasoning was related to openness and conscientiousness was related to verbal knowledge four years later. In general, few and weak associations between the two domains were found. The findings showed that the development of cognitive abilities and personality traits in old age is marked more by stability than by change.

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1. Introduction

Old age is characterized by individual changes in various life domains such as health, cognition, and social environment. As people age, they become more susceptible to individual and environmental changes and non-normative events (Baltes, Lindenberger, & Staudinger, 2006). For example, research suggests that cognitive decline is a natural part of aging. Diverse cognitive abilities tend to decline in old age, mainly those considered to represent fluid abilities such as reasoning (Singh-Manoux et al., 2012) and processing speed (Salthouse, 1996). Nevertheless, individuals differ with respect to their cognitive performance (Matthews, 2009) and show substantial interindividual variability in cognitive decline (Wilson et al., 2002). This issue leads to the question why individuals maintain, improve or deteriorate their cognitive abilities. A considerable amount of studies identified different factors which could explain individual differences in change in cognitive abilities in old age (see Daffner, 2010, for a review). Among these studies, there has been an increased interest in examining the role of personality traits in cognitive aging.

Cognitive abilities and personality traits are core domains of individual functioning. Neither cognitive abilities nor personality

traits develop solely as a function of brain development; both also rely on experience (Hofer & Alwin, 2008; Roberts & Mroczek, 2008). Both domains are moderately heritable and develop across the lifespan, but compared to cognitive abilities, developmental, social, and institutional pressures on personality unfold more slowly over the lifespan (Briley & Tucker-Drob, 2017). Furthermore, they show different normative developmental trajectories over time. That is, cognitive abilities tend to increase throughout early adulthood and then begin to show declines (cf. Craik & Bialystok, 2006). In old age, certain cognitive abilities show at least a small decline with advanced age in many, but not all, healthy individuals. Furthermore, these changes can be subtle and do not need to translate into impairment of daily activities (Howieson, 2015). Regarding personality traits, most mean-level change occurs between the ages of 20 and 40 years (cf. Roberts, Walton, & Viechtbauer, 2006). However, personality traits continue to change even in old age (e.g., Allemand, Zimprich, & Martin, 2008; Kandler, Kornadt, Hagemeyer, & Neyer, 2015; Wortman, Lucas, & Donnellan, 2012), thus tending to slightly decrease in late life (e.g., Lucas & Donnellan, 2011), except for neuroticism which again tends to increase (e.g., Kandler et al., 2015).

Although there is some empirical evidence for smaller, albeit inconsistent cross-sectional associations between the two domains of individual functioning (e.g., Baker & Bichsel, 2006; Soubelet & Salthouse, 2011), less is known about the longitudinal associations between cognitive abilities and personality traits in old age (e.g., Curtis, Windsor, & Soubelet, 2015). This study thus

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examined stability and change of six cognitive abilities (memory, processing speed, reasoning, verbal knowledge, verbal learning, and working memory) and three personality traits (openness, neuroticism, and conscientiousness) as well as their longitudinal associations across four years in old age.

Understanding the longitudinal associations between cognitive abilities and personality traits in old age is important for the following reasons. First, it is of interest whether stabilities and changes in one domain are related to the other domain, because both domains are central concepts defining daily functioning in old age. Personality traits describe individual differences in typical cognitive and affective experiences and behaviors. Therefore, specific traits such as openness may help older adults to maintain their cognitive abilities as they age (Baker & Bichsel, 2006), but they may also serve as a source of vulnerability with regard to cognitive decline and cognitive impairment (Chapman et al., 2012; Terracciano, Stephan, Luchetti, Albanese, & Sutin, 2017). It is also reasonable to assume that cognitive abilities are a requisite condition for personality traits to remain stable or to change in old age (cf. Moutafi, Furnham, & Crump, 2003). Second, knowing which personality traits or cognitive abilities have maintenance functions for the respective domains may help to strengthen these particular personality traits and cognitive abilities, respectively. For instance, Graham and Lachman (2012) found that stability in neuroticism and openness (compared to change in either direction) was related to better reasoning performance and faster reaction time. This indicates that maintaining a stable personality may be more beneficial than even socially desirable change (such as decline in neuroticism) for some variables (except for neuroticism and reaction time, for which decreases were also adaptive). Third, shedding light on the associations between cognitive abilities and personality traits can provide guidance for researchers to develop specific interventions such as personality interventions depending on cognitive characteristics or cognitive interventions for different personality types (Graham & Lachman, 2014).

2. Cognitive abilities and personality traits

Previous research examined cross-sectional associations between cognitive abilities and personality traits but the findings are mixed (Ashton, Lee, Vernon, & Jang, 2000; Gignac, Stough, & Loukomitis, 2004; Zimprich, Allemand, & Dellenbach, 2009). Some of the inconsistency can be attributed to differences in measures of cognitive abilities and personality traits, different age groups with respect to old age, and the inclusion of different covariates, mediators and moderators across studies (cf. Luchetti, Terracciano, Stephan, & Sutin, 2016).

The most consistent personality–cognition associations were found for openness and neuroticism, whereas openness is positively related to measures of cognitive abilities, and neuroticism is negatively associated with measures of cognitive abilities (e.g., Graham & Lachman, 2012; Schaie, Willis, & Caskie, 2004). Correlation coefficients for the associations between openness and cognitive abilities ranged between 0.18 and 0.70 depending on the ability one considered (Graham & Lachman, 2014; Schaie et al., 2004; Soubelet & Salthouse, 2011; Zimprich et al., 2009). Correlation coefficients for associations between neuroticism and cognitive abilities ranged between -0.16 and -0.50 (cf. Curtis et al., 2015; Gow, Whiteman, Pattie, & Deary, 2005). Correlation coefficients for the associations between conscientiousness and cognitive abilities were around -0.20 to 0.16 (Booth, Schinka, Brown, Mortimer, & Borenstein, 2006; Soubelet, 2011), alluding to inconsistent associations.

Indeed, the correlation coefficients reported in literature indicate a wide range, but on average, the associations between

cognitive abilities and personality traits seem to be rather weak. A possible explanation for these weak associations may be that cognitive abilities and personality traits are assessed on different scales. That is, individuals show what they are able to perform (maximal performance) while solving cognitive tasks, and they describe their behaviors and attitudes (typical behaviors) while completing a personality questionnaire. Early work already pointed out that cognitive tests measure maximal performance in contrast to personality questionnaires which provide measures of typical performance (e.g., Ackerman, 1994; Ackerman & Heggstad, 1997).

Although recent studies reported significant, albeit weak cognition–personality associations, less is known about these associations with respect to old age, and the few existing findings show mixed results. One reason is that most previous work had cross-sectional study designs. Another reason is that the sparse longitudinal studies on the cognition–personality associations focused on unidirectional effects (i.e., personality traits only at one measurement occasion as predictors of cognitive abilities). Finally, previous work typically focused on a limited range of cognitive abilities. This study thus sought to address these limitations.

2.1. Cognitive abilities and openness

Individuals high in openness generally tend to be curious, creative, sensitive to aesthetics, as well as open to new ideas and experiences (Costa & McCrae, 1992). Hence, there are at least three arguments for a positive association between openness and cognitive abilities. First, openness may influence the engagement in intellectual activities, thus supporting the maintenance of cognitive functioning or even increase the levels of cognitive abilities. Second, as openness is characterized by flexible and open-minded thinking, individuals may solve problems more creatively. Third, higher levels in cognitive abilities may promote the interest in intellectual activities which results in higher openness scores. The majority of studies have reported that higher openness is linked to better cognitive performance, although the effects are generally small (cf. Curtis et al., 2015). As such, it is likely that open individuals are more prone to engage in cognitively stimulating activities such as reading newspapers, solving cross-word puzzles, or using the computer. In turn, these activities may positively affect cognitive abilities, contribute to cognitive reserve, and help to maintain cognitive functioning in old age (Chapman et al., 2012; Gow et al., 2005; Sharp, Reynolds, Pedersen, & Gatz, 2010). It may also be that cognitive abilities influence the development and maintenance of openness. For example, individuals with lower cognitive abilities may have more difficulties to cope with novel situations or challenging experiences, thus they are less open to new experiences than individuals with higher cognitive abilities (Moutafi et al., 2003).

2.2. Cognitive abilities and neuroticism

Individuals high in neuroticism tend to experience negative emotions such as anger, anxiety, and depression, and to be emotionally unstable (Costa & McCrae, 1992). Therefore, it is reasonable to expect negative associations between neuroticism and cognitive abilities in old age, because negative emotions may impair cognitive performance. Most studies have reported that higher neuroticism is linked to poorer cognitive performance (see Curtis et al., 2015, for a review), but several studies did not find significant cross-sectional associations between neuroticism and measures of cognitive abilities (e.g., Jelicic et al., 2003). One hypothesis is that neurotic individuals are more anxious and prone to intrusive thinking as well as to distraction that could impair their ability to focus on cognitive performance tasks, which then

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