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Is the relationship between subjective age, depressive symptoms and activities of daily living bidirectional?

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ABSTRACT

Objectives: The aim of the current study was to investigate the prospective association between subjective age and depressive symptoms and activities of daily living (ADLs), and to test for reciprocal relationships.
Methods: We used data from 9886 respondents aged 50 years and over who participated in the English Longitudinal Study of Ageing (ELSA). We fitted a series of multiple regression models to analyse the relationships between subjective age, depressive symptoms, and ADL limitations over a four-year period.
Results: Following adjustment for demographic, social, cognitive, lifestyle, and health factors, we found that having an older subjective age independently predicted increased ADL limitations ($B = -0.16$, 95% *CI* -0.25, -0.07) and greater depressive symptoms ($B = -0.40$, 95% *CI* -0.57, -0.23). By contrast, we observed no significant associations between depressive symptoms and ADL limitations and future subjective age in the fully-adjusted model.
Conclusion: In conclusion, older subjective age is associated with future depression and functional health, but the reverse pattern is confounded by initial health and social factors. These findings indicate that an individual's age identity may have an important effect on both depressive symptoms and activities of daily living.

1. Introduction

Subjective age or self-perceived age is an important feature of later life, since it is relevant to appraisals of health and physical limitations, satisfaction with aging, cognitive fitness, and wellbeing (Larzelere et al., 2011). Discrepancies between chronological age and subjective age are often wider in older age than earlier in life (Kastenbaum et al., 1972; Kotter-Grühn et al., 2009) and most older adults feel younger than their chronological age (Hughes et al., 2013; Rubin and Berntsen, 2006). Longitudinal population studies have demonstrated that individuals who feel older than their chronological age have reduced longevity (Kotter-Grühn et al., 2009; Markides and Pappas, 1982; Rippon and Steptoe, 2015; Uotinen et al., 2005), poorer psychological wellbeing (Choi and DiNitto, 2014; Mock and Eibach, 2011), and poorer cognitive, functional, and physical health (Demakakos et al., 2007; Stephan et al., 2015a, 2014; Westerhof et al., 2014) compared with people who have a younger subjective age. Greater subjective age has also been associated with increased risk of hospitalisation, higher concentrations of C-reactive protein, and more rapid development of cognitive impairment (Stephan et al., 2017, 2016; 2015b).

There have been few studies of reciprocal relationships between subjective age and emotional and functional health outcomes (Spuling et al., 2013), with the majority of existing research focusing on subjective age as a predictor of future health (Kotter-Grühn et al., 2016; Westerhof et al., 2014). Older adults with younger subjective age identities are more likely to have better subjective wellbeing and life satisfaction, and are less likely to experience elevated depressive symptoms (Barak and Stern, 1986; Barrett, 2003; Choi and DiNitto, 2014; Keyes and Westerhof, 2012; Mock and Eibach, 2011; Westerhof and Barrett, 2005). Previous longitudinal studies have demonstrated that having a younger perception of age was potentially protective of declining functional health (Stephan et al., 2015a). Conversely, some work indicates that psychosocial and biomedical factors such as perceived age discrimination, lower grip strength, and higher waist circumference may explain older subjective age (Stephan et al., 2015c). Others have shown that better mental health is an important correlate or predictor of subjective age (Bergland et al., 2014; Infurna et al., 2010) and it has been argued that having a younger subjective age may help to maintain self-esteem and wellbeing over time (Weiss and Lang, 2012).

The aim of the current study was to investigate the direction of the association between subjective age and depression and impaired

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activities of daily living (ADLs) in a large sample of older adults in England. Investigating the direction of the association would enable us to further establish whether there is a reciprocal relationship. The second aim was to establish the extent to which the associations were explained by existing socio-demographic and health factors as these may affect or explain some of the differences in the findings previously observed. It is plausible that in each case there is a bidirectional relationship. People with impaired ADLs may feel older than their actual age, while simultaneously, feeling older might lead to beliefs that one's activities are limited, and make individuals perceive impairments more vividly. In the case of elevated depressive symptoms, depressed mood could make people feel older, while reciprocally, feeling older might make a person more depressed. This is in line with recent empirical studies which have demonstrated that when individuals perceive aging to be fixed and inevitable this may lead to perceptions of age related losses while when individuals perceive that age-related changes can be modified this leads to a more optimistic outlook of the future (Weiss et al., 2016). Similarly, a recent study of 3427 respondents from the Midlife in the United States (MIDUS) study indicated that individuals who had better functional health or cognitive function made more favourable social comparisons of their cognitive function and overall health and in turn reported younger subjective ages in contrast with those with poorer health (Hughes and Lachman, 2016). Therefore, taken together this suggests that when individuals make more negative health related comparisons or perceive such changes as inevitable due to age, they may be more likely to identify with an older subjective age, whereas if they feel these factors are malleable or have a more positive perception of their health they may feel younger than their actual age.

Declining physical function can serve as an indicator of current health status and frailty (Clegg et al., 2013). There is substantial evidence that cognitive function, depression, social isolation, co-morbidities or disease burden, poor self-rated health, smoking, and low levels of physical activity are associated with declining functional health at older ages (Stuck et al., 1999). Some of the key predictors of depressive symptoms at older ages include female sex, functional limitations, cognitive impairments, poor self-rated health, chronic health conditions, and lack of social networks, along with prior depressive symptoms (Cole and Dendukuri, 2003; Djernes, 2006). In part, subjective perceptions of age may reflect socio-demographic factors such as wealth and education, along with limitations in social activity, social isolation or lifestyle factors (Barrett, 2003; Infurna et al., 2010; Westerhof and Barrett, 2005), all of which are potentially related to health outcomes. Further, it has been argued that subjective perceptions of age, along with our own attitudes to age and aging, are not static and will be influenced by developmental changes along with cultural factors, socio-economic resources, and experiences amongst others across the life-course (Diehl et al., 2014).

In our study we sought to test the following hypotheses: (1) Having an older subjective age at baseline will be associated with increased depressive symptoms and greater ADL limitations four years later; (2) older adults who report increased depressive symptoms or ADL limitations at baseline will have an older subjective age four years later; (3) the predicted bidirectional associations between subjective age, depressive symptoms, and limited ADLs will remain after socio-demographic and health factors are taken into account. All analyses adjusted for the baseline level of the outcome variable. We also took into account demographic factors such as socioeconomic status and education, measures of cognitive function, social engagement, health behaviours, and physical health.

2. Methods

2.1. Participants

This study involved analysis of people who took part in the fourth (2008–09) and sixth (2012–13) waves of the English Longitudinal Study of Ageing (ELSA). ELSA is a national cohort study which began in 2002 to study aging and health in adults aged 50 years and over living in England and the sample is broadly representative of the English population (Steptoe et al., 2013a). The sample is reassessed every two years and every four years for a health examination, and is periodically refreshed to ensure a representation of younger participants. Data are collected each wave using computer-assisted personal interviews (CAPI), and self-completion questionnaires. The fourth wave of ELSA involved 9886 core participants.

2.2. Measures

Subjective age. ELSA participants were asked 'How old do you feel you are?' as part of the main home interview at Waves 4 and 6. Wave 4 was chosen as the baseline for this analysis because this is the first wave in which the subjective age measure was included in the main CAPI interview; it was next repeated in Wave 6. In line with previous research we calculated a proportional discrepancy score by subtracting subjective age from chronological age and dividing the difference score by chronological age (Rubin and Berntsen, 2006; Weiss and Lang, 2012). A positive value indicates a younger subjective age while a negative value indicates an older subjective age (i.e., an individual who scored 0.10 feels 10% younger than their actual age and a participant who scored −0.10 feels 10% older than their actual age). Eleven individuals who said they felt that they were younger than ten years old were excluded from analyses because of uncertainty about whether they had understood the question. Including these eleven participants in the analyses produced similar results to those reported in the current study.

Depressive symptoms. Depressive symptoms were measured using the eight-item Centre for Epidemiological Studies Depression Scale (CES-D) (Steffick, 2000). We did not include responses to the item on loneliness in order to avoid overlap with the loneliness scale (Cacioppo et al., 2010). Total scores ranged from zero to seven, with higher scores indicating increased depressive symptoms.

Activities of daily living (ADLs). Respondents answered whether they had difficulty with any of six ADLs: dressing, walking across a room, bathing or showering, eating, getting in or out of bed, and using the toilet. Scores ranged from zero to six with higher scores indicating greater difficulties.

Covariates. We obtained data on age, sex, marital status (married/non-married), education, wealth, and current employment status during the home interview. The highest educational qualification attained determined an individual's education level, which we divided into three groups: low (no educational qualifications), intermediate (O Levels, Certificate of Secondary Education or equivalent), and high (A Levels or equivalent through to higher degrees). Total non-pension wealth, defined as the sum of financial worth, physical worth (such as business wealth, land or jewellery), and housing wealth after deducting debts, was categorised into quintiles for the purposes of analysis. This information is regarded as a robust indicator of socioeconomic resources in ELSA (Demakakos et al., 2016). Current employment status indicated whether or not a respondent was currently employed (full-time, part-time, or self-employed), retired, or in another situation (for example, unemployed or looking after the home or family).

Cognitive function was measured in terms of memory, combining scores for immediate recall (number of ten aurally presented words recalled) and delayed recall (recall of these same words after the performance of intervening tasks).

Two measures, social isolation and loneliness, assessed social engagement. We created an index of social isolation by giving a point if the respondent was not married or living with a partner, had less than monthly contact (including face-to-face, telephone or written/e-mail contact) with each of children, other family members, and friends, and if they did not participate in organisations, such as social clubs or resident groups, religious groups, or committees, as previously described