Intelligence xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

Intelligence

Associations of intelligence across the life course with optimism and pessimism in older age

Adele M. Taylor [a], Stuart J. Ritchie [a,b], Ian J. Deary [a,b,*]

[a] Department of Psychology, The University of Edinburgh, 7 George Square, Edinburgh EH8 9JZ, UK
[b] Centre for Cognitive Ageing and Cognitive Epidemiology, University of Edinburgh, 7 George Square, Edinburgh EH8 9JZ, UK

ARTICLE INFO

Article history:
Received 4 November 2016
Received in revised form 1 March 2017
Accepted 1 March 2017
Available online xxxx

Keywords:
Cognitive ability
Dispositional optimism and pessimism

ABSTRACT

Maintaining good cognitive function is important for successful aging, and it has been suggested recently that having and optimistic outlook may also be valuable. However few have studied the relationship between cognitive ability and dispositional optimism and pessimism in older age. It is unclear whether associations found previously between cognitive ability and pessimism in older age, are evident across the life course, and are consistent at different points in older age. In the present study we examined associations between dispositional optimism and pessimism measured in the eighth and ninth decade of life and childhood and older age cognitive ability, and lifetime change in cognitive ability. Participants were two independent narrow-age samples of older individuals with mean ages about 73 ($n = 847$) and 87 ($n = 220$) years from the Lothian Birth Cohorts of 1936 (LBC1936) and 1921 (LBC1921), respectively. Higher cognitive ability in childhood and older-age, and healthier cognitive change across the lifetime were associated with lower pessimism in older age: age-11 IQ (LBC1936: $\beta = -0.17$, $p < 0.001$; LBC1921: $\beta = -0.29$, $p = 0.001$), older-age IQ (LBC1936: $\beta = -0.18$, $p < 0.001$; LBC1921: $\beta = -0.27$, $p < 0.001$), cognitive change (LBC1936: $\beta = -0.06$, $p < 0.04$; LBC1921: $\beta = -0.15$, $p = 0.05$). Cognitive ability was not significantly associated with optimism in bivariate analyses, and after adjustment for covariates had only small associations with optimism and only in the LBC1936. The results are consistent with differential associations between cognitive functions and optimism and pessimism, and indicate that their associations with cognitive ability are similar in the eighth and ninth decades of life.

Optimism and pessimism are trait-like facets of personality which describe a person's general expectations for good or bad things to happen (Scheier & Carver, 1985). It has recently been argued that "personal resources such as optimism… are integral to ageing well" (Cosco, Brayne, & Stephan, 2014, p. 35). The suggested importance of an optimistic outlook for successful ageing reflects the current emphasis on psychosocial factors (Cosco, Prina, Perales, Stephan, & Brayne, 2014a), and is perhaps unsurprising given the range of outcomes to which optimism has been linked, including social resources, quality of life, and many physical health measures (Carver & Scheier, 2014; Carver, Scheier, & Segerstrom, 2010). Preservation of cognitive function has long been a constituent in the conceptualisation of successful aging (Rowe & Kahn, 1987). Researchers and laypersons agree that maintaining cognitive function is key to aging well (Bowling, 2007; Cosco et al., 2014b). Though dispositional optimism and cognitive function are both considered to be important in older age, the relationship between these factors has received relatively limited attention, and it is unclear to what extent they relate to one another. Here, we examine the relations between cognitive ability and optimism and pessimism in older age, using data from two independent, narrow-age samples of individuals in their eighth and ninth decades of life.

Individual differences research on personality provides a plausible mechanism through which cognitive ability might be related to optimism and pessimism in older age. There is evidence that personality traits and psychological outlook are malleable throughout life (Mottus, Johnson, & Deary, 2012; Smith & Baltes, 1997; Mroczek & Spiro, 2003, Roberts, Wood, & Smith, 2005), and that these changes may be due to the effects of significant life-stage experiences, such as career success in mid-life, or death of a spouse in later life (Roberts & Mroczek, 2008). Optimism is closely related to other well-established personality traits, including those known as the 'Big Five' personality traits (extraversion, emotional stability, agreeableness, conscientiousness, and intellect), and mood factors (Glaesmer et al., 2012; Marshall, Wortman, Kusulas, Hervig, & Vickers, 1992; Sharpe, Martin, & Roth, 2011), and levels of optimism have also been reported to change across the life course (Chopik, Kim, & Smith, 2015). Furthermore, optimism might also be modified by significant life stage experiences. Chopik et al. (2015) found that increasing optimism over 4 years in later life was related to better

* Corresponding author at: Centre for Cognitive Ageing and Cognitive Epidemiology, Department of Psychology, University of Edinburgh, 7 George Square, Edinburgh EH8 9JZ, UK.
E-mail address: i.deary@ed.ac.uk (I.J. Deary).

http://dx.doi.org/10.1016/j.intell.2017.03.002

Please cite this article as: Taylor, A.M., et al., Associations of intelligence across the life course with optimism and pessimism in older age, *Intelligence* (2017), http://dx.doi.org/10.1016/j.intell.2017.03.002

self-rated health and fewer chronic illnesses measured over the same period. Similarly to physical health in older age, cognitive decline is prevalent in aging populations and is a cause for great concern (Deary et al., 2009). Differences in cognitive ability could thus be considered highly salient to how older age is experienced, and may be related to individual differences in optimism and pessimism in later life.

We are aware of only two studies which have examined associations between cognitive ability and optimism and pessimism. In a study of 57 high school students aged 15, higher intelligence measured using a figure analogy task was associated with greater optimism (standardized beta coefficient = 0.22; Nurmi & Pulliainen, 1991). In a sample of over 7000 adults at a mean age of 68 years, Palgi (2013) found that higher cognitive ability was associated with lower pessimism (unstandardized beta coefficient = −0.10), but was not significantly associated with optimism. These studies indicate that differences in cognitive ability are related to how optimistic or pessimistic a person rates themselves to be when measured concurrently, and suggest that this relationship could be present in childhood and in older age. It is unclear, however, if the relationship is present across the life course.

It is possible that cognitive ability measured in childhood is associated with later life optimism and pessimism. Cognitive ability is highly stable across the life course (Gow et al., 2011), and the influence of childhood cognitive ability on important later life physical and mental health outcomes is well established (Deary, Whiteman, Starr, Whalley & Fox, 2004; Deary, Weiss, & Batty, 2010). Furthermore, associations between adulthood optimism and pessimism and predictor variables measured decades earlier in childhood have been demonstrated. Childhood SES (Heinonen et al., 2006), exposure to adversity in childhood (Korkeila et al., 2004), and educational achievement (Ek, Remes, & Sovio, 2004), have all been associated with optimism and pessimism in adults. To our knowledge, no study has examined the association between cognitive ability measured in childhood and later-life optimism and pessimism. This is important, because childhood cognitive ability is associated with these aforementioned childhood correlates of adult optimism and pessimism. Using results from a rarely-available, direct measure of cognitive ability from childhood, and from the same test taken over 60 years later, here we were able to examine this question in two separate older-age samples; that is, we were able to assess whether associations between older-age cognitive ability and optimism and pessimism were independent of childhood cognitive ability. This highly unusual dataset also allowed us to measure lifetime cognitive change and test whether amount of change in cognitive ability across the life course is related to optimism and pessimism in later life.

The aim of the present study was to examine the cross-sectional relationship between cognitive ability and optimism and pessimism in the 8th and 9th decades of life. Participants' completion of cognitive ability tests at age 11 and at age 70 or 87 years allowed us to test the hypotheses that childhood cognitive ability, older age cognitive ability, and lifetime change in cognitive ability would be associated with optimism and pessimism in older age. We also tested these associations after adjustment for potentially confounding variables.

1. Methods

Ethical permission for the Lothian Birth Cohort 1936 (LBC1936) study protocol was obtained from the Multi-Centre Research Ethics Committee for Scotland (Wave 1: MREC/01/0/56), the Lothian Research Ethics Committee (Wave 1: LREC/2003/2/29), and the Scotland A Research Ethics Committee (Wave 2: 07/MRE00/58). Ethics permission for the Lothian Birth Cohort 1921 (LBC1921) was obtained from the Lothian Research Ethics Committee (Wave 1: LREC/1998/4/183; Wave 3: LREC1702/98/4/183). The research was carried out in compliance with the Helsinki Declaration. Written, informed consent was given by all participants.

1.1. Participants

Participants were from the LBC1936 and LBC1921 studies. Comprehensive recruitment and assessment procedures for both studies have previously been reported (Deary et al., 2004; Deary et al., 2007). In brief, the LBC studies were designed as follow-ups to the Scottish Mental Surveys of 1947 (SMS1947) and 1932 (SMS1932; Scottish Council for Research in Education (SCRE), 1933, 1949), to study a wide range of determinants of individual differences in non-pathological cognitive ageing (Deary, Gow, Pattie, & Starr, 2012). At about age 11, as part of the Scottish Mental Surveys, most participants had completed a test of general intelligence, a version of the Moray House Test (MHT) No.12. Around six (LBC1936) and seven (LBC1921) decades later, participants sat the same test again when they were recruited to the Lothian Birth Cohort studies.

1.1.1. LBC1936

The LBC1936 consists of 1091 individuals (548 males, 543 females), mostly from Edinburgh and the surrounding Lothian area, who were contacted for follow-up testing between 2004 and 2007 (Wave 1), at an average age of 69.5 years ($SD = 0.8$). Data for the current study mostly comes from Wave 2 of follow-up testing, undertaken between 2007 and 2010 (mean age = 72.5 years, $SD = 0.7$; $n = 866$). Between follow-ups the main reasons for attrition were: death ($n = 39$), permanent withdrawal ($n = 151$), and no longer being eligible or loss of contact ($n = 35$).

1.1.2. LBC1921

The LBC1921 consists of 550 individuals (234 males, 316 females), mostly from Edinburgh and the surrounding Lothian area, who were contacted for follow-up testing between 1999 and 2001 (Wave 1), at an average age of 79.1 years ($SD = 0.6$). Data for the current study mostly comes from Wave 3 of follow-up testing, between 2007 and 2008 (mean age = 86.6 years, $SD = 0.4$; $n = 235$). Between follow-ups the main reasons for attrition were: death (after Wave 1: $n = 88$; after Wave 2: $n = 55$), permanent withdrawal (after Wave 1: $n = 60$; after Wave 2: $n = 7$), and other reasons (after Wave 1: $n = 81$ and 2: $n = 24$; Deary, Pattie, & Starr, 2013).

Analyses in the current paper are based on participants who had complete Life Orientation Test-Revised data (LOT-R; Scheier, Carver, & Bridges, 1994) from the first wave of testing at which the LOT-R was administered to each sample (for the LBC1921 this was the only wave at which it was administered). Those with missing or incomplete LOT-R data were excluded (LBC1936: $n = 12$, LBC1921: $n = 4$). Remaining participants with an Mini Mental State Examination score of <24 were also excluded; this is a commonly-used cut-off indicating possible dementia (LBC1936: $n = 7$, LBC1921: $n = 11$). The samples remaining for analysis were $n = 847$ for LBC1936, and $n = 220$ for LBC1921.

1.2. Measures

Participants from both samples were tested at the same clinical research facility, and the measures used and their administration was the same for each.

1.2.1. Childhood cognitive ability

Cognitive ability in childhood was assessed using a version of the Moray House Test (MHT) No. 12, which most participants completed as part of the SMS1932 or SMS1947 (SCRE, 1933, 1949). The MHT is a group-administered psychometric intelligence test that includes verbal reasoning, arithmetic, spatial and other items. It has a time limit of 45 min, and a maximum score of 76. The MHT was validated at age 11 years against the Terman-Merrill revision of the Binet Scales, with which it correlated about $r = 0.80$ (Scottish Council for Research in Education, SCRE, 1949, p. 123). MHT scores for both the LBC1921 and LBC1936 were corrected for age in days at time of testing by saving

Please cite this article as: Taylor, A.M., et al., Associations of intelligence across the life course with optimism and pessimism in older age, *Intelligence* (2017), http://dx.doi.org/10.1016/j.intell.2017.03.002