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Intelligence in youth and mental health at age 50

Christina Wraw [a,*], Ian J. Deary [a], Geoff Der [b], Catharine R. Gale [a,c]

[a] Center for Cognitive Ageing and Cognitive Epidemiology, Department of Psychology, University of Edinburgh, 7 George Square, Edinburgh, Scotland EH8 9JZ, United Kingdom
[b] MRC/CSO Social & Public Health Sciences Unit, 200 Renfield Street, University of Glasgow, Glasgow G2 3QB, United Kingdom
[c] MRC Life Course Epidemiology Unit, University of Southampton, Southampton General Hospital, Southampton SO16 6YD, United Kingdom

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ABSTRACT

Background: Few cognitive epidemiology studies on mental health have focused on the links between pre-morbid intelligence and self-reports of common mental disorders, such as depression, sleep difficulties, and mental health status. The current study examines these associations in 50-year-old adults.
Methods: The study uses data from the 5793 participants in the National Longitudinal Survey of Youth 1979 cohort (NLSY-79) who responded to questions on mental health at age 50 and had IQ measured with the Armed Forces Qualification Test (AFQT) when they were aged between 15 and 23 years in 1980. Mental health outcomes were: life-time diagnosis of depression; the mental component score of the 12-item short-form Health Survey (SF-12); the 7-item Center for Epidemiological Studies Depression Scale (CES-D); and a summary measure of sleep difficulty.
Results & conclusion: Higher intelligence in youth is associated with a reduced risk of self-reported mental health problems at age 50, with age-at-first-interview and sex adjusted Bs as follows: CES-depression ($B = -0.16$, C.I. -0.19 to -0.12, $p < 0.001$), sleep difficulties ($B = -0.11$, C.I. -0.13 to -0.08, $p < 0.001$), and SF-12 mental health status (OR = 0.78, C.I. 0.72 to 0.85, $p < 0.001$; $r = -0.03$ $p = 0.075$). Conversely, intelligence in youth is linked with an increased risk of receiving a diagnosis of depression by the age of 50 (OR 1.11, C.I. 1.01 to 1.22, $p = 0.024$; $r = 0.03$, $p = 0.109$). No sex differences were observed in the associations. Adjusting for adult SES accounted for most of the association between IQ and the mental health outcomes, except for having reported a diagnosis of depression, in which case adjusting for adult SES led to an increase in the size of the positive association (OR = 1.32, C.I. 1.16 to 1.51, $p < 0.001$).

1. Introduction

Approximately 25% of American adults are affected by mental health problems, with anxiety disorders and depression being the most common problems (American Psychiatric Association, 2015). In 2012, both anxiety and depression were in the top 5 leading causes of disability globally (Mathers, Fat, & Boerma, 2008; Whiteford et al., 2013). In view of this, it is of public health interest to discover the factors that increase the risk of developing these disorders across the life course.

There is evidence in the literature of a link between intelligence test scores in youth and the risk of mental health difficulties in adulthood. For example, a lower IQ in childhood is associated with increased risk of schizophrenia (David, Malmberg, Brandt, Allebeck, & Lewis, 1997; Osler, Lawlor, & Nordentoft, 2007; Gunnell, Harrison, Rasmussen, Fouskakis, & Tynelius, 2002; Zammit et al., 2004; Dickson, Laurens, Cullen, & Hodgins, 2012), post-traumatic stress disorder (PTSD) (Koenen, Moffitt, Poulton, Martin, & Caspi, 2007; Kremen et al., 2007; Gale, Deary et al., 2008; Gale, Batty, Tynelius, Deary, & Rasmussen, 2010) and depression (Zammit et al., 2004; Gale, Deary et al., 2008). Previous research has found that a SD increase of intelligence in youth tends to be associated with a 13% to 43% reduced risk of the above-mentioned mental health difficulties in adulthood (Gale, Deary et al., 2008; Gale et al., 2010; Koenen et al., 2007; Osler et al., 2007). When these studies adjusted for indicators of socio-economic status (i.e. parental occupation or education, or own education or income) the effect sizes in many cases were somewhat reduced; however, the majority of effects remained significant.

Much of this previous work was based on records of hospital admissions for mental illnesses. However, around 40% of adults in the U.S with a mental illness may not receive treatment (American Psychiatric Association, 2015). Therefore, it is important to test if this relationship between intelligence and mental disorders holds for the common, less severe cases of mental illness.

Some work in the cognitive epidemiology of mental health has focused on sub-clinical mental health problems based on self-reported measures. In two British cohorts, the 1958 National Child Development Survey and the 1970 British Cohort Study, IQ in childhood was inversely associated with risk of psychological distress in individuals in their early 30's. In these two cohorts, Childhood IQ and scores on a the Malaise

* Corresponding author.
E-mail address: s1457166@sms.ed.ac.uk (C. Wraw).

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depression scale correlated −0.11 and −0.18, respectively (Gale, Hatch, Batty & Deary, 2008). The current study aims to expand these findings by testing for links between intelligence in youth and self-reports of mental health in an American cohort of adults around the age of 50.

It is important to focus on middle-aged adults, because much of the previous work has looked at mental health problems in younger adults under the age of 40. Moreover, it is not uncommon for someone aged 45–54 to have a mental health problem (Kessler et al., 2009); for example, approximately 14% of British men and 23% of women in this age group had a common mental disorder in 2007, with similar rates for those aged 16–44 (McManus, Meltzer, Brugha, Bebbington, & Jenkins, 2009).

There is some evidence that the relationship between intelligence in youth and mental health outcomes in adulthood might be different for men and women (Hatch et al., 2007). As the current study is based on a cohort that is made up of both men and women, a sex-by-IQ interaction will be included in the analysis to test for differences in the association between intelligence and mental health outcomes in men and women.

The present study follows up on previous analyses of the NLSY-79 cohort at the age of 40 years (Der, Batty, & Deary, 2009). In that study, higher IQ in youth was significantly linked with self-reports of better overall mental health and lower levels of depression at age 40. There were also fewer self-reports of sleeping difficulties and lifetime cases of depression by the age of 40 in people with higher IQ at entry to the study. A standard deviation higher score in IQ was associated with a 23% to 12% reduced risk of having sleeping difficulties and depression, respectively, at age 40; it was also associated with approximately a fifth of a standard deviation lower depression score as well as a marginally better global mental health status score.

There are a number of ways in which the study by Der, Batty and Deary (2009) could be improved. For example, it would be useful to test how intelligence relates to both mental health status at age 50 as well as the lifetime prevalence of depression diagnosis up to age 50. In addition to this, both childhood (parental) and adult SES are associated with mental health inequalities (Wilkinson & Marmot, 2003) and intelligence (Lubinski, 2009; McLoyd, 1998) but only childhood SES was adjusted for in the models reported by Der, Batty and Deary (2009).

It is important to adjust for adulthood SES, in addition to childhood SES, as this could help to highlight a possible mediation pathway along which pre-morbid intelligence affects mental health outcomes. With regard to lower socio-economic status, it is important to mention that poverty and mental illness very likely interact dynamically, in a cycle: i.e., poverty could increase the risk of a mental illness, as explained by the social causation theory (Lund, 2012; Saraceno, Levav, & Kohn, 2005; Stansfeld, Clark, Rodgers, Caldwell, & Power, 2011). Mental illness might, in turn, increase the risk of poverty, as explained by the social drift theory (Dembling, Rovnyak, Mackey, & Blank, 2002; Rodgers & Mann, 1993; Lund, 2012; Saraceno et al., 2005; Stansfeld et al., 2011; Kessler, 2004). Whereas SES is often represented by a compound index, as it is in the present study, it is also potentially informative to examine individually the impact of its components – namely, education, income, and occupational status – as possible mediators of the relationship between childhood intelligence and later health. We also note the value of having a measure of intelligence that was taken in youth, because this increases the likelihood that the measure is truly pre-morbid; it helps to avoid the possibility that poor mental health in youth confounds the association between lower IQ and poor mental health later in adulthood.

The present study also tests for associations between intelligence in youth and sleep difficulties at age 50. Although sleep difficulties are not often included in studies on mental health, they were included in the present study primarily because sleep difficulties often co-occur with psychiatric disorders such as anxiety or depression (Bixler, Vgontzas, Lin, Vela-Bueno, & Kales, 2002; Szelenberger & Soldatos, 2005; Ford & Kamerow, 1989; Kales, Caldwell, Soldatos, Bixler, & Kales, 1983). Der et al. (2009) found that a SD increment in intelligence in youth was associated with a 23% reduction in the likelihood of reporting sleep difficulties at age 40. The current study will test this association at the age of 50 years.

The present study is particularly interested in testing how intelligence in youth is associated with different self-reported mental health outcomes (mental health status, sleep difficulties, and levels of depression) at age 50, and with self-reports of a lifetime diagnosis of depression by the age of 50. The current study also tests the role played by childhood and adult SES, and the latter's three components (education, income, and occupation status), in the above-mentioned relationships. It is hypothesized that higher IQ in youth will be associated with better mental health across all outcomes. It is hypothesized that adult SES will have a greater attenuating effect on the relationship between intelligence and mental health outcomes than childhood SES because adult SES is thought to mediate some of the association between intelligence in youth and mental health outcomes in adulthood. Finally, the present study will also test for sex-based differences in intelligence-mental health associations.

2. Methods

2.1. Participants

This study was based on data from the National Longitudinal Survey of Youth 1979 (NLSY-79). The initial sample was representative of non-institutionalized young people who lived in the United States. It was a random household sample and consisted of 12,686 individuals aged 14–21 years on 31st of December 1978. There were 6283 males (50%) and 6403 females (50%); 16% were Hispanic/Latino, 25% were Black, and 59% were non-Black & non-Hispanic; ethnic minorities were intentionally over-represented in order to obtain a large-enough sample size of these groups.

The NLSY-79 survey collected information on a variety of topics such as health, education, achievement tests, employment, and attitudes. The initial interview for NLSY-79 took place in 1979 and respondents were re-interviewed annually until 1994 and biennially thereafter. The most recent data available derive from the 2012 wave. It had a 73.3% retention rate from the initial sample to the 2012 wave, which consisted of 7301 individuals (48% males). The respondents were between 47 and 56 years of age (Bureau of Labor Statistics, 2015).

The 50+ health module was used in the present study. The data in this module were collected over three waves in 2008, 2010, and 2012. Respondents completed this module when they were approximately 50 years old (range 49–55). In total, 6893 (46%) of the initial NLSY-79 sample completed the 50+ health module (48% males). The three following measures appeared in both the 40+ health module and the 50+ health module: the 7-item Center for Epidemiological Studies Depression Scale (CES-D), the 12-item Short-Form Health Survey—mental health status (SF-12), and a question about sleep difficulty. The other question included in this study, which asked about a lifetime diagnosis of depression, was novel to the 50+ health module (NLSY-79).

2.2. Measures

The data were downloaded from the National Longitudinal Study (NLS) Web Investigator site on 15/11/2014 (NLSY-79).

2.2.1. Intelligence

The measure of intelligence used in the NLSY-79 was the Armed Forces Qualification Test (AFQT), 1989 re-normed version. The participants in the NLSY-79 completed the AFQT in 1980 when they were aged between 15 and 23 years. This score is derived from four of the 10 subtests in the Armed Services Vocational Aptitude Battery (ASVAB). The subtests assessed the following: arithmetic reasoning