



## Correlates of adult functional memory: Findings from a British cohort

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### ABSTRACT

This study used a longitudinal data set of 5874 adults to examine factors that influence adult functional memory. Data were collected at birth, in childhood (at age 11), and adulthood (at ages 23 and 50) to examine the effects of family social class, childhood cognitive ability, childhood behaviour problems, personality traits, psychological distress, and educational and occupational achievement in adulthood on adult functional memory. Structural equation modelling showed that parental social status, childhood cognitive ability, personality traits, psychological distress, education and occupation were all significant and direct predictors of adult functional memory. Whilst traits Openness and Emotional Stability were positively associated with adult functional memory, trait Conscientiousness was modestly but negatively associated with adult functional memory. The strongest predictor of adult functional memory was childhood cognitive ability, followed by trait Openness and educational achievement.

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## 1. Introduction

There is extensive and controversial literature on the facets and measurement of intelligence as well as its psychological and demographic correlates (Cattell, 1987). In this longitudinal study we combined two test scores to obtain a measure of functional memory. We consider this as a component of general intelligence as nearly all models have one or more memory components as second level factors such as Carroll's (1993) General Memory and Learning (2Y) and Broad Retrieval Ability (2R). In the study we examined the extent to which parental social class, childhood intelligence and behaviour problems, malaise, personality traits, education, and occupation influence functional memory at age 50 years.

### 1.1. Personality and intelligence

There is a growing interest in the relationship between personality traits and intelligence (Bartels et al., 2012; Furnham & Moutafi, 2012; O'Connor & Paunonen, 2007; Poropat, 2009; von Stumm, Hell, & Chamorro-Premuzic, 2011). Studies have been done using various measures of both personality and intelligence including self-estimated, crystallised and fluid intelligence. The results tend to show correlations are low ( $.00 < r < .35$ ) and that Neuroticism and Conscientiousness are negatively, and Openness is positively, correlated with intelligence. Correlations with Extraversion and Agreeableness are usually very low and results contradictory (Furnham, 2008). Correlations are usually the highest for Openness (around .30 to point .40) followed by Neuroticism and Conscientiousness (around  $-.10$  to  $-.20$ ) showing that effect sizes are all small. DeYoung (2011) has also noted that Openness seems more strongly related to tests of verbal, compared to nonverbal, intelligence.

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*Neuroticism* has been found to negatively correlate with *g* (Ackerman & Heggestad, 1997; Furnham, Forde, & Cotter, 1998; Zeidner & Matthews, 2000). However, it has been proposed that Neuroticism is actually more systematically related to intelligence test performance than to intelligence per se (Moutafi, Furnham, & Crump, 2003). That is, emotionally unstable people may perform poorly in tests because their anxiety affects their performance in exams as well as on intelligence tests, and therefore they may also be expected to have lower educational qualifications (Moutafi, Furnham, & Tsaousis, 2006).

*Openness-to-experience* has been consistently found to correlate positively with intelligence (Baker & Bichsel, 2006). *Open* individuals, being more intellectually curious and behaviorally flexible, are more motivated to engage in intellectual activities, which leads them, in due course, to expand their general knowledge (Ashton, Lee, Vernon, & Jang, 2000). This trait is also related to educational and occupational success (von Stumm et al., 2011).

*Conscientiousness*. Studies have found a significant *negative* relationship between intelligence and Conscientiousness (Moutafi et al., 2003; Moutafi, Furnham, & Paltiel, 2004; Wood & Englert, 2009). This result was surprising given that many other studies had shown that both Conscientiousness and intelligence were positive and significant predictors of educational and work outcomes. Based on Cattell's (1987) investment theory researchers have tried to explain the results in terms of Intelligence Compensation Theory: that is, less intelligent people have to work harder to achieve the same results as more intelligent people in a similar competitive educational or work environments. However it is also possible that more intelligent people realise the importance of becoming Conscientious to achieve many life goals like good education and a well-paid job.

On the other hand, the less unequivocal findings of the associations between Conscientiousness and intelligence may reflect the multiple facets of Conscientiousness. MacCann, Duckworth, and Roberts (2009) conducted exploratory and confirmatory factor analysis of the items of Conscientiousness using the 117-item Conscientiousness from the IPIP (Goldberg et al., 2006) and uncovered eight facets: Industriousness, Perfectionism, Tidiness, Procrastination Refrainment, Control, Cautiousness, Task Planning, and Perseverance. Whilst some facets such as Task Planning, Industriousness, and Perseverance might be positively associated with work performance and career success, other facets such as Procrastination Refrainment, Perfectionism, and Control might be negatively associated with productivity.

### 1.2. The stability of intelligence

There is considerable evidence of the stability of intelligence over time. There have been a number of different data sets examined all of which show surprisingly high correlations (around  $r = .70$ ) between intelligence measured in childhood, mid and late adulthood (Deary, 2001). It may therefore be expected that childhood intelligence is highly correlated with adult intelligence, even with different and brief measures of intelligence.

### 1.3. Social class and intelligence

There is a large research body that links social class with intelligence. Previous studies have established the link between family socio-economic conditions, early cognitive ability, and later educational and occupational outcomes (Deary et al., 2005; Duncan, Featherman, & Duncan, 1972; Tong, Baghurst, Vimpani, & McMichael, 2007; Schoon, 2010). Many studies have demonstrated that parental social class is a significant predictor of children's educational achievement, occupational status and psychometrically measured IQ.

### 1.4. Behaviour problems and intelligence

Whilst there is some evidence of behavioural problems in gifted children, there is a larger literature on early behavioural problems among the less able which in turn are related to poorer educational and occupational achievement. Childhood behavioural problems may be markers of various personality and ability problems which can have significant effects in later life (Rutter, Tizard, & Whitmore, 1970). This study was able to examine the associations between behaviour problems at age 11, and intelligence measured at the same time as well as 39 years later.

### 1.5. Psychological distress and intelligence

There is evidence showing that low childhood intelligence is a risk factor for adult psychological distress (Feinstein & Bynner, 2004; Gale, Hatch, Batty, & Deary, 2009). Lifetime depression has been found to have significant effect on self-reported memory and cognitive problems (Sachs-Ericsson, Joiner, & Blazer, 2008). In a study using an experimental design, Eysenck (1985) showed evidence of a significant association between anxiety and cognitive-task performance, suggesting that worry and other task-irrelevant cognitive activities engendered by anxiety invariably impair performance because they pre-empt some of the available capacity of working memory (Eysenck, 1977, 1979). This study was able to examine whether psychological distress in measured in early life would affect functional memory in mid adulthood.

### 1.6. Hypotheses

We formulated five hypotheses. Hypothesis 1) childhood cognitive ability is significantly associated with adult functional memory; 2) educational and occupational achievement is significantly associated with adult functional memory; 3) childhood behaviour problems are significantly associated with childhood intelligence, Neuroticism, and functional memory in adulthood; 4) psychological distress is significantly associated with adult functional memory; 5) traits Openness and Emotional Stability are significantly associated with adult functional memory.

## 2. Method

### 2.1. Participants

The National Child Development Study 1958 is a large-scale longitudinal study of the 17,415 individuals who were born in

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