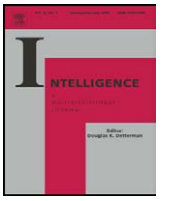
Intelligence 37 (2009) 600–606

Contents lists available at ScienceDirect

Intelligence



Level of cognitive performance as a correlate and predictor of health behaviors that protect against cognitive decline in late life: The path through life study

Kaarin J. Anstey [a,*], Lee-Fay Low [b], Helen Christensen [a], Perminder Sachdev [b]

[a] Centre for Mental Health Research, Australian National University, Australia
[b] Dementia Collaborative Research Centre, University of New South Wales, Australia

ARTICLE INFO

Article history:
Received 23 June 2008
Received in revised form 26 August 2008
Accepted 4 October 2008
Available online 5 November 2008

Keywords:
Physical activity
Smoking
Complementary medicine
Cognitive decline
Epidemiology
Antihypertensives
Cholesterol

ABSTRACT

There is a lack of information on how cognitive ability relates to both health behaviors and change in health behaviors over time. This study examined verbal ability and processing speed as predictors of health behaviors in the PATH Through Life Study that includes cohorts aged in their 20s, 40s and 60s. Higher cognitive scores were associated with higher levels of physical activity, greater likelihood of taking vitamin and mineral supplements, reduced likelihood of current smoking and not abstaining from alcohol. However, lower level of verbal ability and processing speed were associated with higher levels of use of cholesterol lowering medication in the 60s cohort. Physical activity, consumption of vitamins and minerals and taking cholesterol lowering and antihypertensive medication over the four-year follow-up period increased in this cohort. The likelihood of adopting healthier behaviors was greatest for those with the lowest cognitive scores. We conclude that while higher levels of cognitive performance are associated with health promoting behaviors, improvements in health behavior are more likely to be due to non-cognitive, contextual and societal factors.

The association between several modifiable health behaviors and risk of cognitive decline and dementia has been established through recent meta-analyses and systematic reviews. For example, smoking has been associated with increased dementia risk in older adults (Anstey, von Sanden, Salim, & O'Kearney, 2007); physical activity has been associated with reduced cognitive decline (Kramer, Erickson, & Colcombe, 2006); and low levels of alcohol consumption appear to protect against cognitive decline (Peters, Peters, Warner, Beckett, & Bulpitt, 2008).

There are risk factors for cognitive decline and dementia that are modifiable by medication. Examples of these risk factors include hypertension and hypercholesteremia, both of which have been shown to increase the risk of cognitive decline and dementia when they are present in mid-life (Anstey, Lipnicki, & Low, 2008; Qiu, Winblad, & Fratiglioni, 2005). These conditions are usually treated for the prevention of cardiovascular disease. The taking of medications to prevent such conditions is a health behavior that ultimately may contribute to brain health and prevention of later cognitive decline.

There may be health behaviors that are precautionary or aimed at preventing disease, such as taking vitamin and mineral supplements. It is unknown whether any such supplements prevent cognitive decline or dementia (Ancelin, Christen, & Ritchie, 2007) and recent reviews have shown that they do not promote longevity (Bengmark, 2006).

In addition to cognitive impairment and decline being important outcomes in epidemiological research, cognition may also influence the extent to which individuals manage their own risk for cognitive decline. Therefore, the relationship between risk factors and cognition may be more complex than between risk factors and other medical outcomes.

* Corresponding author. Centre for Mental Health Research, Australian National University, Canberra ACT 0200, Australia. Tel.: +61 2 61258410; fax: +61 2 61250733.
E-mail address: kaarin.anstey@anu.edu.au (K.J. Anstey).

0160-2896/$ – see front matter.
doi:10.1016/j.intell.2008.10.001

Instead of a unidirectional direct or indirect effect between exposure and cognitive decline, there may be an interactive cycle involving cognition, self-management of health, and ultimate cognitive outcomes. We have argued previously that the association between cognition and mortality may be in part explained by the tendency for better health behavior and chronic disease management to occur in groups with higher levels of education and better cognitive performance (Anstey, Mack, & von Sanden, 2006). However, there has been little empirical evidence on which to base this view.

One of the few studies to examine cognition as a predictor of health behavior showed that smoking cessation reported in mid-life was associated with higher IQ at age 11 (Taylor et al., 2003). However, we are not aware of any study that has examined cognitive function as a predictor of change in other health behaviors such as taking vitamins or prescription medication for cardiovascular risk factors, or for engaging in physical activity. It is also unknown whether cognitive ability has a greater effect on health behavior at different stages of the life-course.

Use of prescription medication differs from health behaviors that occur as part of lifestyle such as physical activity and smoking. This adaptive behavior depends on the individual having been prescribed medication by their physician, and hence is the outcome of a series of events whereby the individual must either seek medical attention or experience a medical event, obtain a diagnosis and then follow this up by taking prescribed medication. Since higher levels of education and cognitive ability are associated with better health, and are also expected to be associated with higher levels of help seeking and diagnosis, it is difficult to predict which direction the net effect of cognition on medication use (for high cholesterol and blood pressure) will take.

The present study investigates how cognitive function in adulthood is associated with health behaviors that may influence chronic disease and cognitive development and decline in late life. The health behaviors studied include physical activity, smoking and alcohol consumption, taking cholesterol lowering and antihypertensive medication, and taking vitamin or mineral supplements. The study aims to a) determine the extent to which cognitive function is associated with health behaviors that have been shown to protect against cognitive decline or that modify risk factors for dementia; b) determine whether cognitive function is associated with the uptake of positive health behaviors or cessation of negative health behaviors over a four year follow-up period.

Analyses were conducted using a measure of verbal intelligence because it was hypothesised that higher levels of verbal intelligence would be associated with greater general knowledge about healthy life-styles, and in turn, more beneficial health behaviors. To determine whether this was an effect restricted to knowledge, or whether it was associated more broadly with fluid type abilities, we also evaluated a measure of processing speed as a correlate and predictor of health behaviors. The main variables that could potentially confound any association between cognitive function and health behavior include education and physical health, both of which may influence both verbal intelligence and health behaviors. These factors were therefore controlled for statistically in all analyses.

1. Method

1.1. Study design and participants

The sample came from the PATH Through Life Project, a large community survey concerned with the health and well being of people aged 20 to 24 (20s), 40 to 44 (40s), and 60 to 64 (60s) years who live in Canberra or the neighbouring town of Queanbeyan, Australia (Jorm, Anstey, Christensen, & Rodgers, 2004). Each cohort is to be followed up every 4 years over a total period of 20 years. Results presented here concern the first and second wave interviews with 20- to 24-year-olds being conducted in 1999–2000 and 2003–2004, 40- to 44-year-olds, which were conducted in 2000–01 and 2004–05, and with 60- to 64-year-olds, conducted in 2001–02 and 2005–06 respectively. Participants had to be in their respective age group on the 1st January 1999 (for 20-to 24-year olds) 2000 (for 40- to 44-year-olds), or 2001 (for 60- to 64-year-olds). The sampling frames were the electoral rolls for Canberra and Queanbeyan, Australia. Registration on the electoral roll is compulsory for Australian citizens. At Wave 2, of the 20–24 year old cohort, 1061 had moved, 2190 could not be found, 1701 refused or had poor English, and 2404 were interviewed (58.6% of those found and in age range). In the 40–44 year old cohort, 280 had moved, 612 could not be found, 1389 refused or had poor English, and 2530 were interviewed (64.6% of those found and in age range). For the 60- to 64-year-olds, there was a change to the law allowing the Australian Electoral Commission to release more specific age group information. Letters were sent to 4832 persons, 34 were out of the required age range, 182 had moved, 28 were dead, 209 could not be found, 1827 refused or their English was too poor to allow an interview, and 2551 were interviewed (58.3% of those found and in age range). At Wave 2, 2139 of the 20s, 2354 of the 40s, and 2222 of the 60s were reinterviewed.

1.2. Measures

1.2.1. Education

Highest level of education was measured using six questions assessing (i) the amount of primary (elementary) and secondary schooling, (ii) the highest level of post-secondary/tertiary education attained, (iii) the number of years taken to complete post-secondary/tertiary education, (iv) present courses of study, (v) time taken on present courses of study, and (vi) whether present study is being completed on a full- or part-time basis. Responses to these items were combined into a single variable corresponding to the highest level of education attained, ranging from 4 to 18 years.

1.2.2. Spot-the-Word task

Lexical decision performance was measured using the Spot-the-Word Test Version A (STW), which asks participants to choose the real words from 60 pairs of words and nonsense words (Baddeley, Emslie, & Nimmo-Smith, 1992).

1.2.3. Symbol–Digit Modalities Test

The Symbol–Digits Modalities Test (SDMT, (Smith, 1982) was administered as a measure of mental speed that is highly