An Australian survey of cognitive health beliefs, intentions, and behaviours through the adult life course

Diane E. Hosking, Kerry A. Sargent-Cox, Kaarin J. Anstey *

Centre for Research on Ageing, Health and Wellbeing and the Centre for Excellence in Population Ageing Research, The Australian National University, Canberra, ACT, Australia

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ABSTRACT

Objective. Information is required regarding cognitive health beliefs and behaviours from across the life in order to inform the design of interventions to optimise cognitive health and reduce the risk of cognitive impairment.

Methods. A survey of Australian adults aged 20–89 was administered via Computer Assisted Telephone Interviewing (CATI) software to respondents recruited by random digit dialling (N = 900). Socio-demographic and self-reported health information was collected to investigate associations with cognitive health responses.

Results. Alcohol abuse was nominated by the highest proportion of respondents (34.3%) as detrimental for brain health. Fewer than 5% nominated elevated cholesterol, blood pressure, obesity, poor education, or ageing. The most frequently endorsed protective activity was socialising (70%). Socio-demographic factors predicted responses. Age-group differences were apparent in the proportions nominating alcohol ($X^2 = 24.2$; $p < .001$), drugs ($X^2 = 56.8$; $p < .001$), smoking ($X^2 = 13.1$; $p = .001$), nutrition ($X^2 = 20.4$; $p < .001$), and mental activity ($X^2 = 12.8$; $p = .002$) as relevant to brain health. Activities undertaken for cognitive benefit also differed by age. Across all ages the perceived benefit of activities was not supported by intentions to undertake activities.

Conclusions. Interventions are needed to inform and motivate people across the life-course to undertake behaviours specifically to optimise their cognitive health.

Introduction

Cognitive health can be viewed along a continuum from optimal functioning to mild cognitive impairment to severe dementia (Centers for Disease Control and Prevention, 2007). Cognitive trajectories throughout adulthood are determined by genetic and early-life influences that interact with life course environmental exposures and behavioural choices to enhance brain functioning or to cause neuropathological change (Hertzog et al., 2008). Educational attainment, cognitive and social engagement, dietary factors, drug and alcohol use, physical activity levels, mental health, and cardiovascular risk (Beydoun et al., 2014; Solomon et al., 2014) contribute to the complex balance between the accumulation of brain reserve and the burden of ageing and brain pathology (Anstey, 2014; Stern, 2002).

Over the last decade, governments and Alzheimer's International agencies have implemented public health campaigns targeting these modifiable lifestyle factors that impact upon brain health and cognition (Centers for Disease Control and Prevention, 2007; Laditka et al., 2012;

World Health Organisation, 2012). In Australia, the national 'Mind Your Mind' dementia risk prevention programme was one of the first initiatives to place dementia prevention in the context of maintaining overall health and wellbeing (Connor, 2008). This programme was supported in 2011 by the launch of a smart phone application which aimed to increase awareness of modifiable dementia risk factors, provide information linking lifestyle choices to brain health, and promote behavioural change (Alzheimer's Australia, 2012).

Acknowledging the lifestyle determinants of dementia risk constitutes a vital contribution to reducing the future prevalence of the disease (Farrow, 2010) but a complimentary approach is the promotion of knowledge and behaviour that potentially optimises cognitive health at every life-stage (Anstey, 2014). Cognitive health contributes to a society's mental capital; that is, the extent to which individuals are able to reach their cognitive potential in order to contribute fully to society and experience a high quality of life (Beddington et al., 2008). The context for the promotion and maintenance of cognitive health therefore extends beyond addressing the challenge of population ageing to a broader focus on optimising cognitive functioning across the whole of adulthood (Anstey, 2014).

A number of surveys have been conducted across the United States (Anderson et al., 2009; Laditka et al., 2012) the United Kingdom (McParland et al., 2012; U.K. Health Forum, 2014) and Australia (Low

* Corresponding author at: The Centre for Research on Ageing, Health and Wellbeing, Florey Building 54, Mills Road, Acton, The Australian National University, Canberra, ACT 0200, Australia. Fax: +61 2 6125 1558.
E-mail address: kaarin.anstey@anu.edu.au (K.J. Anstey).

and Anstey, 2007; Smith et al., 2014) to assess the public's knowledge of the modifiable determinants of cognitive health and dementia risk. Generally, these surveys have been undertaken in the context of developing public health strategies to prevent cognitive decline in older age. To date, however, we are aware of no surveys that have assessed current or intended behaviours undertaken by adults of all ages specifically for potential cognitive benefit. Such information is relevant for the design of interventions to optimise cognitive health across the lifespan.

Methods and material

Approval was obtained for this study from the Australian National University Human Research Ethics Committee and respondents gave informed verbal consent at the commencement of the telephone interview. The Survey of Cognitive Health Beliefs, Behaviours, and Intentions was a telephone survey designed by the authors (KJ, KS-C) based on information from reviews and the wider literature. The survey was piloted on a convenience sample of 30 people prior to data collection in 2013.

Participants

An Australia-wide sample was recruited through the polling company Roy Morgan Research. Eligibility included speaking English and being 20 to 89 years. Loose quotas were set to obtain a geographically diverse sample and approximately even numbers of respondents in each age decade. Of the 11,104 telephone calls accepted, there were 2492 screened out due to ineligibility or full quotas and 7712 who refused to take part, leaving a total sample of 900.

The survey

The survey took approximately 25 min to complete and was administered using Computer Assisted Telephone Interviewing (CATI) software. The cognitive health section of the survey consisted of a total of 24 items and assessed demographic information (9 questions), self-report health and health behaviour information (3 questions), social interaction (2 questions), frequency of worry for brain health or cognitive function (once a week, less than once a week, never), whether brain health and cognitive function were components of general health (yes or no), exposure to dementia via friend or family member with the disease (yes or no) and the factors respondents believed were adverse for brain health (free response).

Respondents were asked whether they participated (yes or no) in the following behaviours specifically for cognitive health benefit: physical activity, continuing education, staying hydrated, playing Sudoku, doing crosswords, eating vegetables, eating fish, limiting sugar intake, socialising, quitting or not smoking, reducing stress, drinking wine at least once a week, and undertaking online memory training activities. For any activity undertaken, respondents reported its frequency, the motivation for starting, and the perceived benefit to cognition. Respondents not undertaking the behaviour were asked "Do you think it would be helpful for cognitive health" and "Are you planning to start — if yes or maybe, at what age?"

Statistical analyses

The seven age groups were collapsed into three categories for analyses: young (20–44 years), middle-aged (45–64 years) and older adults (65 + years). BMI was computed from self-reported height and weight and coded into disease risk categories according to the WHO guidelines. (World Health Organisation, 2000) Self-reported hypertension, high cholesterol, and smoking status were combined into a vascular risk variable coded as 0 for no vascular risk factors or 1 indicating one or more vascular risk factors.

Brain health worry was dichotomised as either 'never' worrying about brain health (coded as 0) or 'sometimes' worrying about brain health (coded as 1). Cognitive health behaviours were dichotomised as either doing the behaviour for cognitive health (coded as 1) or not

doing the behaviour or doing it for reasons other than for cognitive health (coded as 0). Summary scores were constructed for the number of factors nominated as being detrimental for brain health, for the number of activities done to benefit cognition, and for the relative frequency that any activities were undertaken. Chi-square tests evaluated age-group differences in cognitive health knowledge and activities. When cells had an expected count of <5 observations, Fisher's exact tests were used. Confidence intervals (95%) were calculated for age-specific frequency proportions.

Logistic regression models tested whether theoretically relevant demographic, health, or psycho-social variables predicted cognitive health perceptions and behaviours. The predictor variables were age, sex, education, perceived ancestry, vascular factors, self-reported depression frequency (times per week feeling depressed), and exposure to dementia.

In multiple regression models, brain health awareness, brain health worry, or dementia exposure were tested as predictors of the total number, or the total frequency of activities nominated as being undertaken for cognitive benefit. Also, for those who did not undertake activities, the total number of activities perceived as potentially beneficial was tested as a predictor of intention to undertake activities in the future. All models controlled for age, sex, and education level.

Table 1
Sample characteristics (n = 900).

Characteristic	
Mean age (±SD)	54.8 (±18.0)
20–44 years (n = 290)	33.4 (±7.0)
45–64 years (n = 309)	55.4 (±5.6)
65 + years (n = 301)	75.0 (±6.6)
Sex	Percentage
Male	41
Female	59
Education (missing 11.4%)	
Still attending school	0.8
Secondary school certificate	31.9
Trade certificate/apprenticeship	7.3
Other certificate	6.3
Associate or undergraduate diploma	9.3
Bachelor's degree or higher	32.9
Location (missing 1.8%)	
Urban	62.8
Rural	37.2
Perceived ancestry (missing 1.3%)	
Anglo/Australian	69.3
Australian Aboriginal	1.1
German	6.2
Greek/Italian	3.8
Other	18.2
Employment (missing 1.0%)	
Full time	32.4
Part time	17.6
Student	2.7
Looking for work	3.9
Housewife/husband	5.4
Retired	33.1
Medically unfit	4.0
Depression: for the previous week (missing 1.1%)	
Rarely or none of the time(<1 day)	70
Some or a little of the time (2–3 days)	12.7
Occasionally or moderate amount of time (3–4 days)	11.4
Most or all of the time (5–7 days)	4.8
Physical health	
Self-report high blood pressure (missing 2%)	21.2
Self-report high cholesterol (missing 4.2%)	15.6
Self-report current smoking	13.9
Mean BMI (±SD)	27.2 (6.5)
Missing (%)	10.8

Results

Demographic characteristics of the sample are presented in Table 1.

Physical health behaviours and outcomes

Self-reported fish, fruit and alcohol consumption and physical activity levels accorded closely with Australian healthy living guidelines (National Health and Medical Research Council, 2013). Across all age groups, the mode for fish consumption frequency was 1–2 times a week, for vegetables, it was 5 + servings every day, and 'never' was the most frequent response to whether >4 standard drinks were consumed in a row. The response mode for physical activity level was 30 min 5–7 times a week.

Greater than 50% of respondents had a BMI of >25 which categorised them as overweight (World Health Organisation, 2000) and approximately a quarter of those aged 20–44 reported one or more other vascular risk factors (smoking, high-cholesterol, high blood pressure) with this proportion rising to nearly 41% in mid-life, and 50% for those 65 or older.

Perceptions of brain health and cognitive health

In total, 30 adverse factors for brain health were nominated by respondents (M = 2.09; SD = 1.54). Brain health was affirmed as a component of general health by 97% of the sample but those exposed to dementia via a friend or family member were less likely to perceive brain health as part of general health; OR = 0.14 (95% CI = 0.02–0.76).Younger and middle aged respondents worried more about brain health than those in the oldest age group. Table 2 presents the factors nominated as adverse for brain health and differences between age groups in these proportions.

Alcohol abuse (34.3%), lack of mental stimulation (22.6%), and smoking (19.4%) were nominated by the highest proportions of the sample as bad for brain health followed by poor nutrition (18.2%) and lack of physical activity (16.7%). Fewer than 5% of the total sample identified high cholesterol, obesity, lack of education, poor mental health, genetics, high blood pressure, brain trauma, environmental toxins, or ageing.

The chi-square differences between age groups were highly significant for alcohol and drug abuse/consumption, smoking, poor nutrition and lack of mental stimulation. Confidence intervals (95%) indicated that these differences were due to the perceptions of the 20–44 age group with higher proportions nominating these factors compared to those 65 +. In addition to the youngest age group, a higher proportion of those 45–64 compared to those in older age also believed that alcohol abuse had adverse effects on brain health. Unlike the other lifestyle factors, lack of mental stimulation was nominated by the highest proportion of those in mid-life compared to the younger and older age-groups. Other chi-square p-values were <.05 but these items were nominated by small proportions of respondents. Consequently, confidence intervals were wide and proportions were not reliably different between age groups.

Activities undertaken to improve cognitive health

The average number of activities done specifically to benefit cognitive health was 6 (SD = 2.57) from a possible 12 with no significant differences between age-groups. The average participation rate across all activities was 48% with middle-age respondents recording the highest

Table 2
Age group comparisons of brain health perceptions (N = 900).

Brain health perception	n (% of sample)	20–44 years n = 290 % of age group (95%CI)	45–64 years n = 309 % of age group (95%CI)	65 + years n = 301 % of age group (95%CI)	X^2 difference between ages
Brain health − a component of general health (agree)	871 (96.8)	98.3 (96.7, 99.8)	97.7 (96.0, 99.3)	94.4 (91.7, 97.0)	3.2, p = .18
Missing (%)	1.7	0.7	1.3	3.0	
Worry about brain health/cognitive function (never worry)	368 (40.9)	38.6 (29.5, 47.6)	36.9 (28.1, 45.8)	47.2 (39.4, 55.9)	**8.1, p = .017**
Missing (%)	0.4	n/a	0.3	1.0	
Factors nominated as bad for brain health					
Alcohol abuse/consumption	309 (34.3)	43.8 (35.1, 52.4)	35.0 (26.0, 43.9)	24.6 (14.7, 34.4)	**24.2, p < .001**
Drug abuse/consumption	109 (12.1)	23.8 (13.7, 33.8)	8.4 (−2.2, 19.0)	4.7 (−6.3, 15.7)	**56.8, p < .001**
Smoking	174 (19.4)	26.2 (16.3, 36.0)	17.5 (7.3, 27.6)	15.0 (4.5, 25.4)	**13.1, p = .001**
Medications	11 (1.2)	1.0 (−10.2, 12.2)	1.9 (−9.0, 12.8)	0.7 (−0.8, 12.2)	1.9, p = .38
Poor nutrition	164 (18.2)	24.1 (14.0, 34.1)	20.4 (10.4, 30.3)	10.3 (−0.4, 21.0)	**20.4, p < .001**
Dehydration	8 (0.9)	2.1 (−9.3, 13.5)	0.6 (−10.1, 11.3)	–	**6.7, p = .015**
High cholesterol	10 (1.1)	1.0 (−10.2,12.2)	1.9 (−9.0, 12.8)	0.3 (−10.4, 11.0)	3.4, p = .16
Being overweight	37 (4.1)	3.8 (−7.4,15.0)	4.9 (−6.0, 15.8)	3.7 (−7.4, 14.8)	0.6, p = .71
Lack of physical activity	154 (16.7)	15.5(4.9, 26.0)	20.4 (10.4, 30.3)	14.0 (3.5, 24.4)	4.9, p = .08
Lethargy/laziness	86 (9.6)	5.5 (−5.6, 16.6)	10.7 (0.1, 21.2)	12.3 (1.7, 22.8)	**8.5, p = .014**
Lack of mental stimulation	203 (22.6)	19.0 (8.6, 29.3)	29.4 (20.0, 38.7)	18.9 (8.7, 29.0)	**12.8, p = .002**
Lack of education	30 (3.3)	4.1 (−7.1, 15.3)	3.6 (−7.4, 14.6)	2.3 (−8.8, 13.4)	1.5, p = .46
Poor lifestyle (unspecified)	17 (1.9)	2.8 (−8.6, 14.2)	1.6 (−9.3, 12.5)	1.3 (−9.8,12.4)	1.8, p = .43
Poor health/well-being (unspecified)	21 (3.4)	4.8 (−6.3, 15.9)	3.6 (−7.4, 14.6)	2.0 (−7.7, 10.3)	3.5, p = .16
Poor mental/psychological health	14 (1.6)	1.4 (−10.1, 12.9)	2.3 (−8.8, 13.4)	1.0 (−10.2, 12.2)	1.5, p = .46
Depression	52 (5.8)	6.6 (−4.5, 17.7)	5.5 (−5.3, 16.3)	5.3 (−5.6, 16.2)	0.4, p = .78
Being negative/judgemental	14 (1.6)	2.4 (−8.9, 13.7)	1.0 (−10.2, 12.2)	1.3 (−9.8, 12.4)	2.1, p = .36
Anxiety/rumination	141 (15.7)	19.0 (8.6, 29.3)	15.2 (4.9, 25.4)	13.0 (2.4, 23.5)	4.1, p = .13
Work stress	8 (0.9)	0.7 (−10.8, 12.2)	1.9 (−9.0, 12.8)	–	**6.2, p = .028**
Sleep disorders/fatigue	39 (4.3)	6.6 (−4.5, 17.7)	4.9 (−6.0, 15.8)	1.7 (−9.6, 13.0)	**8.8, p = .012**
Poor relationships	22 (2.4)	2.8 (−8.6, 14.2)	2.9 (−8.0, 13.8)	1.7 (−9.6, 13.0)	1.1, p = .58
Loneliness/lack of social interaction	81 (9.0)	5.5 (−5.6, 16.6)	9.7 (−0.8, 20.2)	11.6 (0.9, 22.2)	**7.0, p = .030**
Genetics/family history	39 (4.3)	4.5 (−6.7, 15.7)	6.1 (−4.6, 16.8)	2.3 (−8.8, 13.4)	5.3, p = .06
Dementia	18 (2.0)	1.7 (−9.6, 13.0)	2.3 (−8.8, 13.4)	2.0 (−9.2, 13.2)	0.2, p = .95
Ageing	32 (3.6)	2.4 (−8.9, 13.7)	4.2 (−6.7, 15.1)	4.0 (−7.0, 15.0)	1.6, p = .44
High blood pressure/disorders	14 (1.7)	1.0 (−10.2, 12.2)	3.6 (−7.4, 14.6)	0.3 (−10.4, 11.0)	**9.6, p = .008**
Stroke	10 (1.1)	0.7 (−10.8, 12.2)	1.6 (−7.4, 14.6)	1.0 (−10.2, 12.2)	1.1, p = .62
Disease (unspecified)	7 (0.8)	0.7 (−10.8, 12.2)	1.6 (−9.3, 12.5)	–	4.9, p = .06
Brain injury/trauma	34 (3.8)	6.6 (−4.5, 17.7)	3.2 (−7.7, 14.4)	1.7 (−9.6, 13.0)	**10.0, p = .006**
Environmental toxins	15 (1.7)	3.1 (−8.2, 14.4)	1.6 (−9.3, 12.5)	0.3 (−10.4, 11.0)	**6.9, p = .023**
Other	65 (7.2)	8.6 (−2.3, 19.5)	7.8 (−2.9, 18.5)	5.3 (−5.6, 16.2)	2.6, p = .28
Can't say	6 (0.7)	1.0 (−10.2,12.2)	0.3 (−10.4, 11.0)	0.7 (−10.8, 12.2)	1.1, p = .45

The bold values indicates significant at < .05.

participation at 50%.Worrying about brain health or being exposed to a friend or relative with dementia were not significant predictors of the number of activities performed. The overall frequency score for younger respondents (M = 26.31, SD = 11.92; 95% CI = 24.91–27.71) was lower thanthat for middle-aged (M = 29.40, SD = 12.47, 95% CI = 28.00–30.81) and older respondents (M = 29.53, SD = 12.75, 95% CI = 28.11–31.04).

Figure 1 presents the proportions of participants who undertook the specified activities to benefit their cognitive health. The most frequently endorsed activities were socialising (70%), eating fish (64.9%), eating vegetables (62.8%) physical activity (61.4%) and quitting smoking (58.2%). Higher proportions of younger compared to older respondents continued education, drank more water, and had done online activities in the past. Compared to older respondents, stress reduction and playing Sudoku were done by more younger and middle-aged people, but those in middle-age and older-age did more crosswords, drank wine and reported reducing sugar intake compared to those who were 20–44. Greater proportions of older respondents than either middle-aged or younger respondents reported giving up smoking.

Between 80% and 98% of respondents believed that the activities undertaken had provided cognitive benefits, with the exception being wine drinking which was perceived as beneficial by only 50.7%. The majority of respondents nominated 'nothing specific' or 'other reason' as the preferred response options for the reason they started activities to improve their cognitive health rather than awareness of ageing, having a health scare or being influenced by the media (Table S1).

The majority of those who did not undertake a specific activity nonetheless perceived such activities as potentially beneficial to cognitive health, although chi-square tests demonstrated age group-differences for continuing education (X^2 = 34.50, p < 0.001), stress reduction (X^2 = 29.13, p < 0.001), limiting sugar intake (X = 8.69, p = 0.013),

and playing Sudoku (X^2 = 8.39, p = 0.015) and crosswords (X^2 = 6.90, p = 0.032) (Fig. S1).

Figure 2 demonstrates that for all activities the proportion of respondents who believed behaviours potentially benefited cognitive health was higher than the proportion who intended to start doing the activity in the future.

Predictors of cognitive health beliefs and behaviours

Socio-demographic and health variables influenced respondents' perceptions regarding cognitive health and its maintenance (see Table 3).

Those with a bachelor's degree or higher nominated a broad range of factors as being bad for brain health including genetic, lifestyle, health, and psychological variables. Dementia exposure predicted knowledge of the following as dementia risk factors: smoking, alcohol abuse, genetics, and physical activity. Women were more likely than men to be aware of poor health and loneliness as adverse effects on brain health, with women also more likely to undertake activities to benefit their cognition. Feeling depressed more than 1-day a week was associated with less socialising or playing Sudoku for cognitive benefit and stress reduction was likely to be perceived as beneficial.

Perceived ancestry was specifically associated with beliefs and behaviours regarding the relevance of substance abuse and dietary factors to cognitive health. Non-Anglo ancestry was associated with nominating alcohol, drugs, and smoking as adverse whereas Anglo-ancestry was associated with eating fish and vegetables, and quitting smoking.

Having one or more vascular risk factors was not associated with worry about brain health. Those with higher vascular risk were less likely to nominate a sedentary lifestyle as detrimental for brain health or to quit smoking for cognitive benefit.
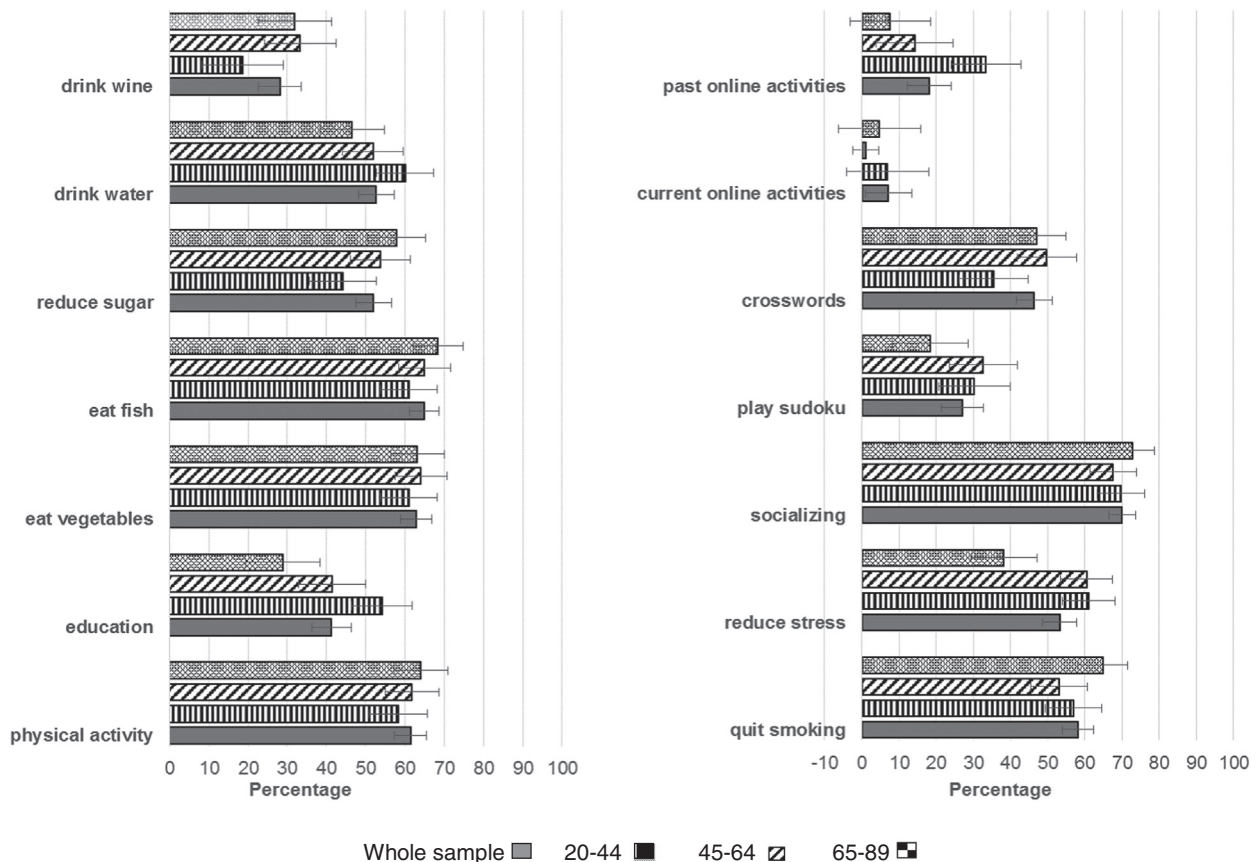

Whole sample ▦   20-44 ■   45-64 ▨   65-89 ⬓

Figure 1. Activities undertaken specifically for cognitive health by age.
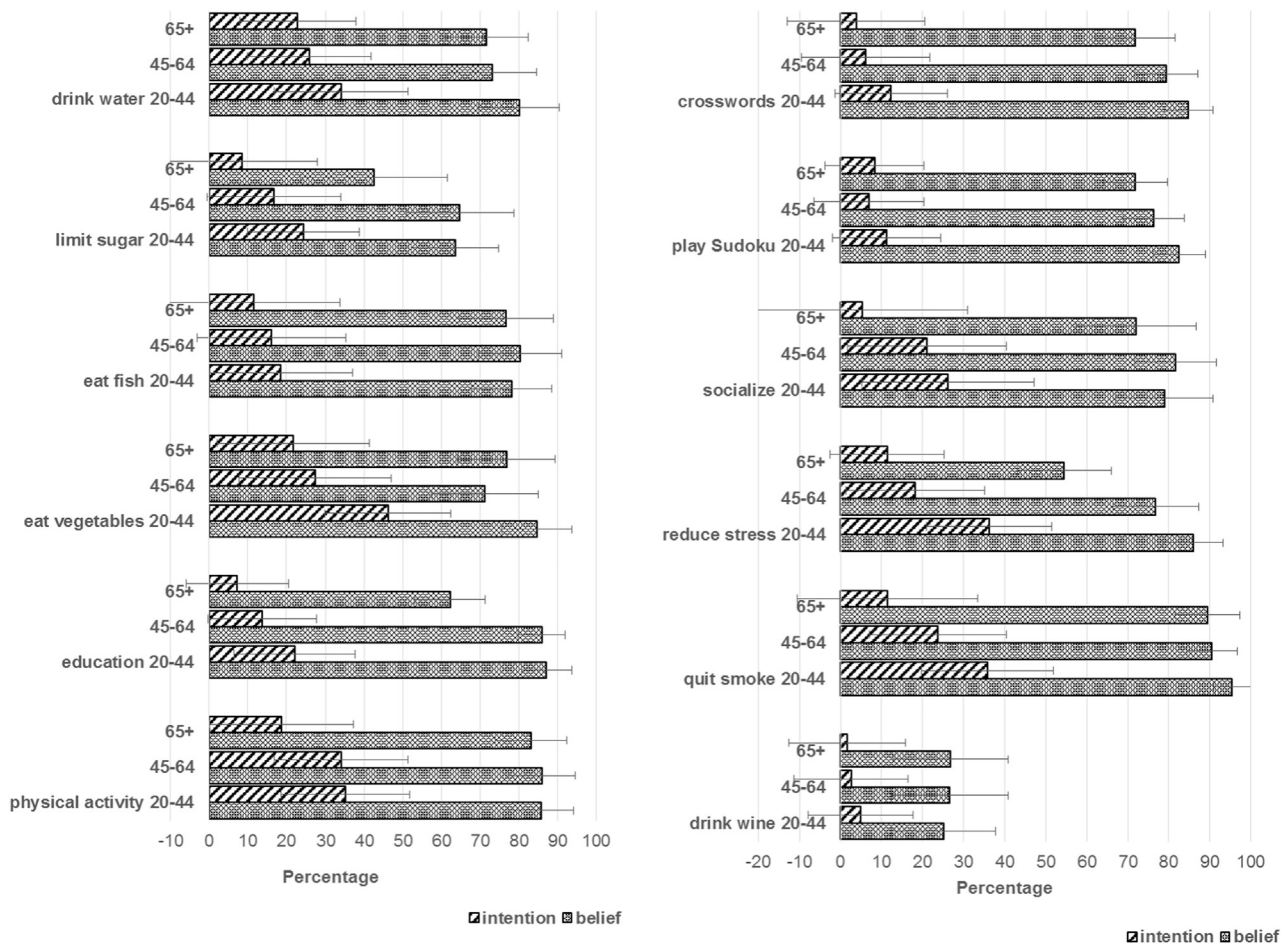
Figure 2. Comparison between belief and intention for activities not undertaken by age.

Discussion

Findings from the survey provide useful information to inform public health initiatives and interventions to promote cognitive health across adulthood. Previously demonstrated knowledge of potential links between cognitive health and lifestyle factors (socialising, nutrition and physical activity) (Farrow, 2008) appears to have been translated into behaviour to some extent. However, awareness was lacking of the established associations between vascular health and brain health; very few respondents in any age group nominated cholesterol, blood pressure, obesity or stroke as adverse for brain health. These findings have been reiterated by results from two other recent surveys: one conducted in the UK (U.K. Health Forum, 2014) and one in Australia (Smith et al., 2014) that specifically addressed dementia risk factor knowledge. In common with the Survey of Cognitive Health both these surveys also found relatively low proportions of those sampled who were aware of the links between brain health and vascular health. Taken together, it is clear that within the dual contexts of brain health promotion and dementia prevention, there is an urgent need for interventions to improve vascular health across all age groups, and promote knowledge of vascular risk indicators and their relevance for future cognitive health.

A novel and unexpected finding was that younger and middle-aged respondents worried more about their brain health than did those in older-age. This information suggests that those in middle adulthood would be amenable to interventions focused on promoting optimal cognitive health which then acts to buffer against cognitive ageing and decline in later life (Anstey, 2014). Significantly greater percentage of younger compared to older respondents also nominated alcohol, drug

abuse, and smoking as adverse for brain health. A possible explanation is that some of those from the youngest age group were exposed to drug and alcohol education campaigns that had targeted adolescents and young people during the 1990s and early 2000s in Australia (Australian Government, 2006).

A number of health models (Ajzen, 1991; Ajzen and Fishbein, 1980; Becker, 1974; Rogers, 1983; Schwarzer and Fuchs, 1996) acknowledge the role of intention as a precursor of change, even though it may be a poor predictor of outcomes (Sutton, 2005). The low levels of intention in contrast to the high levels of perceived benefit for cognitively relevant behaviours suggest that bringing about behaviour change to optimise cognitive health will be challenging. On the individual level, future cognitive health, like cardiovascular health or cancer prevention cannot be guaranteed by the lifestyle modifications that are demonstrated as effective in population level analyses (Rose, 1981). Interventions may be of benefit, therefore, that promote cognitive health within a broader health framework and provide motivation by potentially enhancing capabilities or teaching new skills to achieve tangible outcomes.

The survey outcomes need to be interpreted in the context of some limitations. There was a clear discrepancy between self-reported health information, including overall high vascular risk and respondents' apparent close adherence to recommended dietary and physical activity guidelines. It is possible that responses to these questions in particular were prone to social approval bias which is probable for self-reported frequencies of fruit and vegetable consumption (Miller et al., 2008) and levels of physical activity (Tully et al., 2014). Other limitations include the restriction of the sample to those with a landline and that Indigenous Australians, migrants, and those with very low education were under-represented.

Table 3
Predictors of beliefs, actions, and intentions regarding cognitive health behaviours.

Predictor	Odds ratio	95% CI
Sex (0 = female, 1 = male)		
Loneliness: adverse effect brain health	0.36	0.19–0.67
Poor health: adverse effect brain health	0.28	0.10–0.77
Eating vegetables: cognitive benefit	0.66	0.48–0.91
Eating fish: cognitive benefit	0.60	0.43–0.83
Drinking water: cognitive benefit	0.61	0.44–0.83
Socialising: cognitive benefit	0.60	0.43–0.84
Sudoku: cognitive benefit	0.48	0.34–0.69
Crosswords: cognitive benefit	0.47	0.34–0.64
Drinking water: potentially beneficial	0.38	0.19–0.78
Reducing sugar: potentially beneficial	0.34	0.18–0.63
Might start drinking more water: cognitive benefit	1.92	1.08–3.42
Might start reducing sugar: cognitive benefit	2.51	1.24–5.06
Vascular risk (0 = no factors, 1 = ≥1 risk factor)		
High cholesterol: adverse effect brain health	11.50	1.88–70.43
Sedentary lifestyle: adverse effect brain health	0.58	0.37–0.91
Quit smoking: cognitive benefit	0.42	0.30–0.59
Sudoku: potentially beneficial	0.61	0.37–0.99
Might start drinking more water: cognitive benefit	0.49	0.27–0.91
Education (0 = < bachelor degree, 1 = bachelor degree or higher)		
Poor nutrition: adverse effect brain health	1.94	1.33–2.84
Obesity: adverse effect brain health	3.12	1.44–6.79
Sedentary lifestyle: adverse effect brain health	1.74	1.17–2.61
Lack of mental activity: adverse effect brain health	1.46	1.02–2.09
Loneliness: adverse effect brain health	1.87	1.08–3.24
Genetics: adverse effect brain health	3.45	1.67–7.14
Continuing education: cognitive benefit	1.79	1.30–2.45
Eating vegetables: cognitive benefit	0.70	0.50–0.98
Quit smoking cognitive benefit	0.68	0.49–0.94
Drinking water: cognitive benefit	0.55	0.40–0.77
Reducing sugar: cognitive benefit	0.66	0.48–0.90
Continuing education: potentially beneficial	2.11	1.06–4.22
Might start playing Sudoku: cognitive benefit	2.36	1.11–5.00
Perceived ancestry (0 = Anglo/Australian, 1 = Other)		
Alcohol abuse: adverse effect brain health	1.75	1.15–2.66
Drug abuse: adverse effect brain health	1.92	1.03–3.56
Smoking: adverse effect brain health	1.97	1.16–3.34
Lack of mental activity: adverse effect brain health	1.86	1.13–3.05
Eating vegetables: cognitive benefit	0.59	0.38–0.91
Sudoku: cognitive benefit	1.59	1.0–2.51
Eating fish: cognitive benefit	0.63	0.41–0.98
Quit smoking: cognitive benefit	0.65	0.43–0.99
Might start playing Sudoku: cognitive benefit	3.56	1.84–5.00
Depression (0 = no depression, 1 = depression ≥1 weekly)		
Sudoku: cognitive benefit	0.63	0.42–0.93
Socialising: cognitive benefit	0.68	0.47–0.99
Might start: physical activity cognitive benefit	0.47	0.25–0.89
Might start drinking wine: cognitive benefit	0.34	0.13–0.90
AD/dementia exposure (0 = no exposure, 1 = exposure)		
Smoking: adverse effect brain health	1.57	1.03–2.40
Genetics: adverse effect brain health	5.76	1.72–19.25
Physical activity: potentially beneficial	2.61	1.08–6.33
Stress reduction: potentially beneficial	2.08	1.09–3.94

Study strengths included a geographically diverse sample with all age groups equally represented and the assessment of socio-demographic and health correlates. Another strength was the inclusion of an open-ended question on the determinants of brain health resulting in up to 30 factors being nominated by respondents.

Conclusion

This survey of Australian adults assessed cognitive health beliefs, behaviours, and intentions across adulthood. Results indicated that interventions are needed to ensure that a broader spectrum of the population is informed regarding adverse factors for brain health and to focus upon bridging the gap between knowledge and intentions in order to optimise cognitive health across the lifespan.

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