

# The motivation and actions of Australians concerning brain health and dementia risk reduction

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## Abstract

**Issue addressed:** Alzheimer's disease and dementia are recognised as critical public health priorities. This study investigated intentions and behaviours concerning brain health and dementia risk reduction among Australians.

**Methods:** A cross-sectional survey of 1000 persons aged 20–75 years measured knowledge, beliefs, intentions and behaviours concerning brain health and dementia. The demographic, experiential and cognitive factors associated with intentions and actions were examined.

**Results:** Around half of respondents were motivated to improve brain health. Behaviours most often reported were mental activity (19%), physical activity (9.6%) and dietary action (6.5%). Actions were most likely among women (OR 1.59, 95% CI 1.19–2.14), those aged 60 years and over (OR 3.07, 95% CI 2.01–2.58), with university education (OR 1.67, 95% CI 1.08–2.58) or with prior contact with a person with dementia (OR 1.99, 95% CI 1.12–3.56). Both intentions and actions were associated with moderate to high knowledge, and beliefs and confidence that favoured dementia risk reduction.

**Conclusions:** A lower proportion of Australians reported taking action to improve brain health than who expressed intentions in this regard. Strategies are needed to improve knowledge about the range of behaviours that contribute to dementia risk reduction and to increase confidence that this outcome is personally achievable.

**So what?** The burden of disease due to Alzheimer's disease and dementia is growing dramatically. It is essential to promote awareness that dementia is not an inevitable result of ageing and to increase understanding that action can be taken throughout the life course to promote brain health.

**Key words:** Alzheimer's disease, attitudes, dementia, health behaviours, health beliefs.

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## Introduction

The most recent findings of the Global Burden of Disease Project revealed that Alzheimer's disease and other forms of dementia are among the most rapidly increasing contributors to disability and premature mortality worldwide. Between 1990 and 2010 there was almost a 100% rise in the total disability adjusted life years due to these conditions, an increase of 53.3% per 100 000 persons.<sup>1</sup> In Australia in 2011, dementia was reported to be the fourth highest contributor to the burden of disease, and it is projected that the number of persons with dementia will triple by the year 2050.<sup>2</sup> Similar dramatic rises are projected in other high-income countries.<sup>3,4</sup>

Australian health policy concerning dementia has historically focused on access to specialist services, quality of care and information and support for caregivers.<sup>5</sup> Given the recent and anticipated increases

in the burden of disease due to dementia, the World Health Organisation recommends a national public health approach that strengthens early detection and intervention and raises public awareness about the disease, its signs, symptoms and risk factors.<sup>6</sup> Consistent with this shift in orientation, an international network of 109 scientists from 36 countries issued a consensus statement in 2013 recommending that funding and effort be directed towards population-based risk-reduction strategies to tackle dementia.<sup>7</sup>

Underpinning these calls is the growing body of evidence that certain risk factors for Alzheimer's disease and vascular dementia are potentially modifiable. Behaviours associated with a lower risk of dementia include physical activity, lowering dietary fat intake, cutting or reducing smoking, undertaking mentally stimulating activities and social connection and relationships.<sup>8–10</sup> Avoidance of

hazardous drinking is also likely to reduce risk, and low levels of alcohol intake may be a protective factor.<sup>11</sup> Evidence that supports the role of these behaviours in the aetiology of dementia are the findings that several biomedical conditions lead to elevated risk, namely hypertension, hyperlipidaemia, obesity and diabetes.<sup>12,13</sup>

Recognising the role that population-based risk reduction plays in the response to dementia brings this issue onto the agenda of health promotion practitioners, who are well placed to undertake strategies for raising awareness, education, organisational partnership development and capacity building of health and non-health agencies. Alzheimer's Australia has been the national leader in these efforts through its brain health and dementia risk-reduction programs *Mind Your Mind* and *Your Brain Matters*, which commenced in 2005 and 2012 respectively. Health promotion initiatives such as these need to be guided by an examination of prevailing knowledge, beliefs and actions concerning dementia risk reduction, to determine gaps in understanding and population segments that should be priorities for attention.

To date, there has been limited research concerning public perceptions of brain health and dementia risk reduction. A national survey undertaken in Australia in 2005 found that popular beliefs about dementia risk were weakly aligned with the scientific evidence<sup>14</sup> with a low level of understanding about the association between dementia and cardiovascular factors.<sup>15</sup> In the United States, the national Brain Health Poll reported over half of respondents believed it was possible to improve brain health, especially those under the age of 50 years, but only 7% rated this as a highly important health issue.<sup>16</sup> A more recent study in Australia in 2012<sup>17</sup> reported that just over 40% of adults firmly believed that the risk of dementia could be reduced, and that knowledge of risk-reduction behaviours was higher among women and people of English-speaking origin.

The present study aims to gain further evidence to guide the efforts of Australian health agencies in addressing dementia by examining the extent to which dementia risk reduction is a motivator for action, and the prevalence of different actions being taken to improve brain health. The associations between demographic differences in intentions and behaviours with risk-reduction knowledge, beliefs and confidence are investigated in this study.

## Methods

### Study population and sampling

A population survey of Australians aged 20–75 years was undertaken. Sampling was performed using random digit dialling with a sampling frame comprising 70% landline numbers and 30% mobile numbers. Respondents within households were selected by identifying those who had the next birthday. To be eligible for inclusion, participants were required to speak English and not be affected by cognitive impairment. Ethical approval for the study was given by the Monash

University Human Research Ethics Committee (approval no. CF12/2427–2012001309).

### Procedures

The Computer Assisted Telephone Interviews were conducted from August to September 2012 by a social research company with extensive experience in epidemiological research. Up to six calls were made to establish contact with households and a further four to achieve completed interviews. The duration of surveys was 10 minutes.

### Measures

The survey was introduced as a study concerning public health issues affecting Australians today. This included newly developed questions and those previously used in Australia and the United States to measure dementia-related knowledge, beliefs and behaviours. To measure the importance placed on dementia as a health issue, respondents were asked two open-ended questions concerning what they considered to be the first and second most important health issues on which they required information. These questions were taken from the US Brain Health Poll.<sup>16</sup>

Behaviours and intentions were investigated by asking respondents if they had undertaken any actions in the past month to improve their brain health. Those responding affirmatively were asked an open-ended question about all of the actions taken, followed by a question about their future intentions concerning action to improve brain health, with response options of no intention, intending to act in the next 6 months, or intending to act in the next month.

To measure dementia risk-reduction beliefs and knowledge, respondents were asked to rate, on a 5-point Likert scale, their agreement with the statement that it is possible to reduce the risk of a person developing dementia. Those who agreed were asked an open-ended question about what can they do to help reduce the risk of dementia, with up to five responses elicited. These questions had been used in previous national Alzheimer's Australia studies.<sup>18</sup> Respondents were then asked to rate, on a 4-point rating scale, their confidence that taking action will reduce their personal risk of dementia.

Respondents were asked if they had ever had personal contact with someone with dementia. Additional demographic information collected included gender, age, educational attainment, household income and language spoken at home.

### Statistical analysis

Prior to analysis the sample was weighted to the age and gender distribution of the Australian population. Descriptive analysis was undertaken to examine the prevalence of intentions and actions related to brain health, and multivariable logistic regression (using the forced entry method) was performed to identify factors associated with these dependent variables. In order to examine the demographic factors associated with intentions and actions, the

models included: gender; age group (20–39 years, 40–59 years, 60–75 years); educational attainment (up to year 10, high school or technical college, university); annual household income (<\$40 000, \$40 000–\$99 000, \$100 000 and over) and language spoken at home (English, other). Additional models added variables for: personal contact with someone with dementia; rating dementia as an important health issue; a strong belief that the risk of dementia can be reduced; knowledge of risk-reduction methods; and a high level of confidence that risk reduction can be achieved personally. Knowledge of dementia risk reduction was classified as moderate-to-high if respondents identified three or more of the following actions: mental activities; social contact; physical activity; a healthy diet; reducing smoking; and moderating alcohol intake. Analyses were carried out using SPSS V20.0.0.

## Results

### Respondent characteristics

There were 1000 interviews completed with a cooperation rate among eligible persons of 58%. Table 1 shows the unweighted and weighted characteristics of respondents. Before weighting, the mean age of respondents was 47.6 years (s.d. 18.44). There was a higher proportion of women than men (57.1% v. 42.9%), with over 40% of respondents having a university level education. The distribution of household incomes shows that most (40.9%) were in the middle category, with ~30% in the lowest (\$40 000) and highest (\$100 000 or more) categories respectively. Less than 15% of respondents reported speaking a language other than English at

**Table 1. Characteristics of survey respondents (n = 1000)**  
Numbers do not add to 1000 for some variables due to missing data

Characteristics	Unweighted	Weighted
Mean age (s.d.)	47.6 (18.44)	46.2 (18.27)
Age groups		
20–39 years	299 (29.9%)	382 (38.2%)
40–59 years	401 (40.1%)	354 (35.4%)
60+ years	298 (29.8%)	263 (26.3%)
Gender		
Men	429 (42.9%)	491 (49.1%)
Women	571 (57.1%)	509 (50.9%)
Education level		
Completed up to year 10	214 (21.4%)	202 (20.2%)
Completed year 12/TAFE	370 (37.0%)	364 (36.4%)
Completed university	402 (40.2%)	413 (41.3%)
Income groups		
Not stated	173 (17.3%)	167 (16.7%)
<\$39 999	245 (24.5%)	265 (26.5%)
\$40 000–\$99 999	334 (33.4%)	319 (31.9%)
\$100 000+	248 (24.8%)	248 (24.8%)
Language		
English	850 (85.0%)	839 (83.9%)
Other	146 (14.6%)	156 (15.6%)
Contact with dementia		
Yes	730 (73.0%)	713 (71.3%)
No	270 (27.0%)	287 (28.7%)

home, and approximately three-quarters had prior contact with a person experiencing dementia.

### Intentions to address brain health

A little over half of respondents reported they intended taking action to improve their brain health, with 32.3% indicating an intention to act in the next month and 20% in the next 6 months. Table 2 shows that the demographic sub-groups most often reporting an intention to take action in the next month were women (36.1%), people aged 60 years and over (41.8%), those with a university level education (38.0%), people in the lowest household income category (38.5%) and those who spoke English at home (33.4%).

The likelihood of reporting any intention (in the next month or 6 months) to act to improve brain health was examined in relation to the demographic characteristics, past exposure to dementia and dementia-related knowledge and beliefs of respondents. Women were more likely than men to express this intention (odds ratio (OR) 1.61, 95% confidence interval (CI) 1.20–2.16) and university-educated respondents were more likely than those with the lowest level of education (OR 1.73, 95% CI 1.11–2.70). People who were in the middle (OR 0.49, 95% CI 0.33–0.72) and highest (OR 0.33, 95% CI 0.21–0.52) categories of household income had lower odds than those in the bottom income category of expressing intentions to improve brain health. An intention to take action was more likely to be expressed by respondents who strongly believed that the risk of dementia can be reduced (OR 1.65, 95% CI 1.21–2.25), with moderate to high knowledge about risk-reduction behaviours (1.80, 95% CI 1.21–2.69) and with a high level of confidence that they can achieve personal risk reduction (OR 1.83, 95% CI 1.29–2.59).

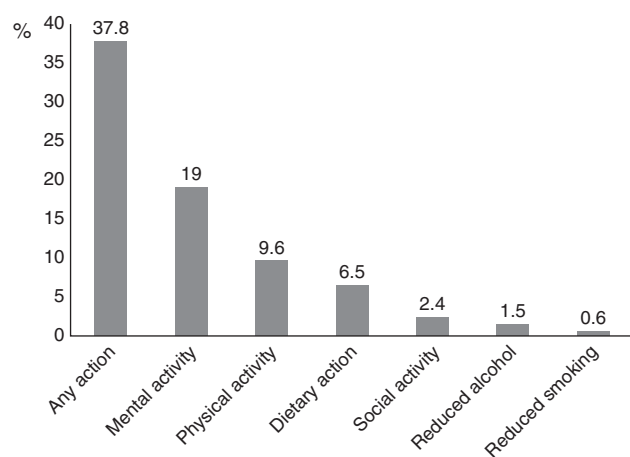
### Actions to improve brain health

Figure 1 shows that 37.8% of respondents reported taking some action in the past month to improve their brain health, most frequently through mental activity (19.0%), while 9.6% reported undertaking physical activity and 6.5% took dietary action to improve their brain health. Participating in social activity, reducing alcohol intake and reducing smoking were mentioned by small proportions of respondents.

Table 3 shows that the demographic sub-groups most likely to report taking action in the past month to improve their brain health were women (OR 1.59, 95% CI 1.19–2.14), people in the 40–59 years (OR 1.46, 95% CI 1.03–2.08) and 60 years and over age groups (OR 3.07, 95% CI 2.01–4.68) and those with a university-level education (OR 1.67, 95% CI 1.08–2.58). In addition, other factors associated with a higher likelihood of taking action were having previous contact with a person with dementia (OR 2.09, 95% CI 1.46–3.00), identifying dementia as a health issue of personal concern (OR 1.99, 95% CI 1.12–3.56), reporting a strong belief that dementia risk can be reduced (OR 1.88, 95% CI 1.38–2.55), demonstrating moderate to high knowledge of risk-reduction behaviours (OR 2.25, 95% CI 1.54–3.28) and showing a high level of confidence that personal risk reduction can be achieved (OR 1.83, 95% CI 1.31–2.56).

**Table 2. Intentions to take steps to improve brain health, by demographic characteristics, personal exposure, knowledge and beliefs**  
The odds ratio (OR) is adjusted for gender, age, educational attainment, income and language spoken; CI, confidence interval

Independent variable	Characteristics	Intention to act			Any intention	
		None	Next 6 months	Next 1 month	OR	95% CI
All		42.3	20.0	32.3		
Gender	Men	47.0	18.7	28.5		
	Women	37.6	21.2	36.1	1.61	1.20–2.16
Age	20–39 years	46.2	23.0	26.9		
	40–59 years	44.6	17.8	31.1	1.08	0.77–1.52
	60+ years	33.5	18.6	41.8	1.45	0.94–2.22
Education	≤year 10	40.4	18.2	34.0		
	High school/ TAFE	46.2	23.4	25.8	1.09	0.71–1.67
	University	38.7	18.2	38.0	1.73	1.11–2.70
Income	<\$40 000	28.3	22.3	38.5		
	\$40 000–\$99 000	45.5	22.4	29.6	0.49	0.33–0.72
	\$100 000+	53.2	12.9	29.4	0.33	0.21–0.52
Language	English	42.0	19.3	33.4		
	Other	42.3	23.7	26.9	0.83	0.54–1.27
Contact with dementia	No	46.9	22.9	25.0		
	Yes	40.3	18.8	35.3	1.28	0.92–1.80
Dementia concern	No	43.6	19.4	31.7		
	Yes	25.0	27.8	40.3	1.91	0.98–3.72
Prevention belief	No	45.8	21.1	27.7		
	Yes	36.0	18.3	40.3	1.65	1.21–2.25
Prevention knowledge	Low	44.5	19.7	30.4		
	Mod–high	31.0	21.1	41.5	1.80	1.21–2.69
Prevention confidence	No	45.1	18.5	30.6		
	Yes	34.3	23.9	37.3	1.83	1.29–2.59



**Fig. 1.** Percentage of participants who reported taking action to improve brain health ( $n = 1000$ ).

Examination of the sub-groups who reported each action to improve brain health showed that moderate to high knowledge of dementia risk-reduction behaviours was associated with a higher likelihood of reporting mental activity, physical activity and dietary action (Table 3). The odds of reporting mental activity were higher for respondents who had a strong belief that dementia risk can be reduced, a high level of confidence to achieve this outcome and by women and those aged 60 years and over. Physical activity was also reported more often by women and those aged 60 years and over

and by those with prior contact with someone with dementia, while the odds of dietary action were higher among people with a strong risk-reduction belief.

## Discussion

The growing evidence concerning the relationship between dementia and lifestyle behaviours has informed recent calls for the adoption of a public health approach, incorporating population-based risk-reduction strategies, to tackle this major contributor to the burden of disease. The present study is one of the first to investigate the general public's motivation and actions towards brain health and dementia risk reduction in a country where the prevalence of Alzheimer's disease and other forms of dementia is rising dramatically. The findings reveal differences in readiness to take action on this issue between different population segments, and indicate a role for continued efforts to increase knowledge about vascular health behaviours and understanding of the benefits of these for risk reduction.

It was encouraging that over half of respondents reported that they intended to take action to improve their brain health, although less than one-third indicated a strong intention to do so (i.e. in the next month). Several groups stood out as having a higher likelihood of intention, particularly women and the university educated. These patterns are consistent with evidence that women and the higher educated have higher levels of health literacy and devote greater attention to personal wellness.<sup>19–21</sup> In addition, a markedly higher

**Table 3. Actions taken to improve brain health, by demographic characteristics, personal exposure, knowledge and beliefs**  
The odds ratio (OR) is adjusted for gender, age, educational attainment, income and language spoken; CI, confidence interval

Independent variable	Characteristics	Any action			Mental activity			Physical activity			Dietary action		
		%	OR	95.0% CI	%	OR	95.0% CI	%	OR	95.0% CI	%	OR	95.0% CI
Gender	Men	33.1			13.8			8.1			6.9		
	Women	42.8	1.59	1.19–2.14	24.0	2.07	1.43–2.99	11.0	1.68	1.03–2.75	6.1	0.79	0.45–1.39
Age	20–39 years	29.2			12.3			9.7			7.6		
	40–59 years	36.7	1.46	1.03–2.08	16.7	1.32	0.84–2.08	5.1	0.55	0.28–1.08	4.2	0.36	0.17–0.76
Education	60+ years	53.1	3.07	2.01–4.68	31.9	3.08	1.86–5.11	15.6	2.48	1.31–4.71	8.0	0.78	0.37–1.64
	≤year 10	37.1			21.7			10.8			4.9		
	High school/TAFE	35.4	1.18	0.77–1.80	16.0	1.05	0.63–1.75	8.2	0.77	0.39–1.55	5.8	1.30	0.54–3.12
Income	University	41.7	1.67	1.08–2.58	21.1	1.55	0.93–2.60	10.2	1.20	0.61–2.34	7.5	2.14	0.90–5.10
	< \$40 000	43.2			23.8			14.0			8.3		
Language	\$40 000–\$99 000	34.1	0.77	0.52–1.12	17.9	0.83	0.52–1.31	5.6	0.50	0.27–0.96	4.4	0.45	0.21–0.96
	\$100 000+	33.9	0.81	0.52–1.26	15.7	0.77	0.45–1.33	9.2	1.06	0.53–2.11	7.6	0.67	0.30–1.46
Contact with dementia	English	40.0			21.1			9.4			6.9		
	Other	28.9	0.78	0.50–1.21	8.3	0.37	0.19–0.72	11.5	1.79	0.95–3.39	5.1	0.49	0.20–1.21
Dementia concern	No	25.3			11.5			6.6			4.9		
	Yes	43.2	2.09	1.46–3.00	22.1	1.55	0.98–2.43	10.8	1.91	1.01–3.61	7.3	1.89	0.90–3.97
Prevention belief	No	36.5			17.9			9.2			6.3		
	Yes	58.3	1.99	1.12–3.56	34.7	1.55	0.84–2.87	15.5	1.48	0.68–3.23	9.7	2.33	0.91–5.97
Prevention knowledge	No	33.2			15.5			9.0			5.2		
	Yes	46.6	1.88	1.38–2.55	25.3	2.31	1.59–3.35	10.6	1.22	0.75–2.00	8.7	2.16	1.23–3.79
Prevention confidence	Low	34.6			17.2			8.3			4.9		
	Mod-high	55.0	2.25	1.54–3.28	28.2	1.74	1.13–2.67	15.9	2.10	1.20–3.69	14.1	3.82	2.11–6.93
	No	34.3			17.4			8.4			5.5		
	Yes	47.9	1.83	1.31–2.56	23.1	1.77	1.19–2.64	13.4	1.38	0.82–2.32	9.3	1.49	0.82–2.70

proportion of people aged 60 years and over reported strong intentions to take action than the proportion of middle and younger aged adults. In the case of older people, a higher level of risk perception may influence their motivation, with studies in several countries showing that fear and concern about Alzheimer's disease and dementia is significantly greater in this age group compared with middle-aged and younger adults.<sup>22,23</sup> Having fewer time pressures and competing demands may also contribute to the higher level of readiness to address brain health among older people. The findings indicate that men, middle- and younger-aged adults and those with lower educational levels are priority groups for public health education about dementia risk reduction.

It was notable that respondents from the lowest income households were more likely to express intentions to take action to improve brain health than those in the middle and higher income groups, and the reasons for this are unclear. This group may comprise a higher proportion of aged and disability pensioners who would be in contact with health services more frequently and therefore be more aware of dementia.

The proportion of people who reported taking action to improve brain health was lower than those who expressed intentions in this regard; although the demographic profile of those intending and reporting to take action was similar. Additionally, those with prior contact with a person with dementia were more likely to report taking action, which suggests that this exposure increased their knowledge and concern about the condition. Mental activities, such as puzzles, reading and other hobbies, were almost twice as common as physical activity, the next most frequently reported action and mentioned markedly more often than dietary change, social activity, moderation in alcohol intake and reduced smoking. This is consistent with findings in Australia and several other countries that mental activity is most strongly linked to dementia risk reduction.<sup>15,16,24</sup> Several respondents may have been undertaking other health behaviours, like regular physical activity and eating a healthy diet, but did not see a connection between these and brain health improvement. These findings highlight a lack of public understanding about the role that vascular health behaviours play in the promotion of brain health. It is especially important that middle-aged adults recognise this because studies show that action to reduce blood pressure and improve diet at this stage of life can significantly reduce dementia risk.<sup>25,26</sup>

Knowledge about the lifestyle actions that can reduce dementia risk, together with a strong belief that risk can be reduced and confidence that this outcome is personally achievable were found to be associated with both motivation and actions to improve brain health. It was notable that moderate to high knowledge was the variable most consistently associated with action, in respect to all risk-reduction behaviours investigated (mental activity, physical activity and dietary action). This finding is contrary to previous studies in Australia<sup>27</sup> and Canada,<sup>28</sup> where knowledge of behaviours for

reducing the risk of vascular dementia had only a weak relationship with health behaviours. An explanation for this may be that these other studies explored the relationship between knowledge and general health behaviours, rather than those performed deliberately to improve brain health. The present findings are consistent with small studies in the United States that reported positive associations between the belief that dementia is preventable and taking actions to achieve this.<sup>24</sup> Given that the current study is cross-sectional in nature, it should be acknowledged that risk-reduction beliefs and confidence may be a result, rather than a cause, of action, and represent a rationalisation of the benefits of adopted lifestyle practices. However, protection motivation theory supports the causal influence that beliefs that an action will reduce a health threat, and confidence to perform that action, have upon intentions and behaviours.<sup>9</sup>

The data presented were collected from a national sample which, after weighting, reflected the gender, age, household income and language characteristics of the Australian population at the time of the survey. A limitation to the generalisability of the findings is that there was an overrepresentation of people with a university-level education (40.2% vs. 25.4% in Australia).<sup>30</sup> While several survey questions were drawn from instruments used in previous studies, the reliability and validity of these questions have not been reported. The questions used were, however, straightforward and those examining knowledge and behaviours were open-ended and offered no prompts which might have aided correct guessing. The questions concerning brain health behaviours investigated whether any action had been taken but did not provide information about the frequency or duration of these actions. In addition, information was not collected about the health status of respondents, which may be a factor that influences knowledge and beliefs about dementia and the ability to perform different health behaviours.

This study found that brain health improvement is a motivator towards healthy lifestyles for just over half of the Australian population – especially for women, older adults and those with a tertiary level of education. However, a lower proportion of people reported taking action, and it was found that this was most often taken by those with accurate knowledge of risk-reduction behaviours, a strong belief that risk reduction is possible and high levels of confidence that risk reduction is personally achievable. There is an important role for brain health and dementia risk-reduction campaigns – such as *Your Brain Matters* in Australia and the *Healthy Brain Initiative* in the United States – to increase the public's understanding that dementia is not an inevitable part of ageing and that vascular health behaviours may reduce risk. Because many key brain health messages are consistent with those of other chronic diseases, there is also scope for greater recognition of dementia within the prevention strategies delivered by a range of government and non-government agencies.



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