

# Financial literacy, financial judgement, and retirement self-efficacy of older trustees of self-managed superannuation funds

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## Abstract

We investigate relationships between retirement self-efficacy, financial literacy and financial judgement across a sample of older trustees of self-managed superannuation funds (SMSFs). Aside from demographic factors, we explore self-rated dementia behaviours, general mental ability, mastery and risk tolerance. An increasing number of older people are controlling significant assets, particularly those who elect to become self-managed superannuation fund trustees. The ageing population, including self-managed superannuation fund trustees, is susceptible to cognitive decline with advancing age. We find that cognitive ability and self-rated behavioural dementia symptoms both relate to financial literacy. Variance in retirement self-efficacy was explained by age, cognitive ability, financial literacy, mastery and self-rated behavioural dementia symptoms. Those reporting dementia symptoms appear more vulnerable to making poor financial judgements. Findings have important implications for financial literacy interventions and the monitoring of on-going cognitive decline.

JEL Classification: **J26, D14, G23, G11, E21, I10**

## Keywords

Ageing, cognitive ability, dementia, financial decision-making, financial literacy, retirement savings

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## 1. Introduction

Central to Australia's retirement savings system, is tax-favoured superannuation. Although a majority of Australian workers become members of superannuation funds through mandatory contributions, as a consequence of the Superannuation Guarantee, choice is an important element of superannuation. This includes choice of fund, choice of investments and choice of savings/contributions levels. For most Australians, superannuation savings are in large funds initiated by employers, unions or financial institutions and overseen by a governance structure that includes professional third-party administrators and fund managers. An increasing number of wealthier individuals are, however, members of self-managed superannuation funds (SMSFs) where all members are trustees and are thereby responsible themselves for governance and investment decisions of the fund. An ability to make, and continue to make, these decisions in the accumulation and pension phases is assumed. We explore this with a focus on the quality of decision-making, and its sensitivity to cognitive decline.

Foulds (1999) reports that SMSFs were originally set up for the self-employed and for employees of small businesses. There were 99,000 funds in 1995 which "probably reflects a growing desire by high net-worth professionals and small business proprietors to take greater control of their own investments" (Insurance and Superannuation Commission, 1995: 8). Even so, they accounted for only 8% of the \$230 billion industry assets. The increasing ability of wealthier individuals to create their own funds meant that by the end of 2013 the number of funds had grown to 522,328 (Australian Prudential Regulatory Authority (APRA), 2015 – accounting for 30% of the \$1.9 trillion industry assets. SMSFs provide the ability for members to choose their assets and ensure appropriate tax planning in exchange for taking direct responsibility for the management of those funds. As personal account balances are higher, they allow economies of scale. Raftery (2014) calculates their costs as approximately half that of industry and retail funds and estimates "that the potential lifetime cost-saving benefits are as much as \$304,000 for the average 35 year old working couple" (Raftery, 2014: 137). The majority (62%) of SMSF members are 55 and older, of which 46% are 64 and older (Australian Taxation Office (ATO), 2012c).

SMSF trustees/members take responsibility for losses: "fund activities are conducted entirely at the risk of the beneficiaries ... self-managed superannuation funds do not have access to compensation mechanisms available to APRA-regulated funds if fraudulent conduct or theft results in financial loss" (Treasury, 2014: 55). Price Waterhouse Coopers (PwC) found that many SMSFs had poor investment strategies, which might "result in retirees not having sufficient funds to support their retirement and increase reliance on the public purse" (PwC, 2014: 56). The public purse is Australia's first retirement savings pillar, the means tested age pension. The age pension safety net remains in place for all, including SMSF trustees. Wood (2013) suggested that this may encourage more risky investments.

SMSF trustees assume total financial control of their funds, which presumes a level of cognitive functioning and financial literacy commensurate with the management of pensions and investments on a corporate scale. The ATO emphasises that the decision to become a SMSF trustee "is a big responsibility" and "can be difficult" (ATO, 2011). In view of the difficulty, PwC (2014) proposed that only sophisticated investors, as defined in the Corporations Act 2001, should be permitted to set up SMSFs. However, in spite of these concerns, the SMSF sector has been judged as "largely successful and well-functioning" by a recent comprehensive review of the superannuation system (Commonwealth of Australia, 2010: 217). The same review also considered age-based restrictions in investment choice, or in the broader control of SMSFs, but ultimately rejected it concluding "this challenges the ethos of SMSFs given the principle that SMSF trustees are ultimately responsible for their retirement outcomes" (Commonwealth of Australia, 2010: 260).

Trustees' responsibilities include: preparing and implementing an investment strategy; ensuring contributions are invested according to the investment strategy and in compliance with superannuation law; when in pension phase, ensuring minimum payments are made; as well as submitting annual returns and organising an annual audit by a suitably qualified auditor (ATO, 2012b). Many of these tasks are undertaken with the assistance of service professionals, notably accountants and financial planners. However, the responsibility rests with the trustees, who must sign a declaration, when appointed as trustee, acknowledging this responsibility, as well as the obligation to keep themselves informed of changes to relevant legislation (ATO, 2012d).

There is no explicit financial education or training requirements when establishing an SMSF or once the fund is operational. Compliance is the primary measure of trustee competence. Key decisions remain with trustees as they progress from accumulation to decumulation, including choice of investments, ensuring that the administration is cost effective, and determining an appropriate withdrawal rate to avoid the fund being depleted too soon. An open question is whether these requirements are cognisant of the medical and psychological evidence relating to cognitive functioning that suggests the quality of financial decisions declines as we age, as people become more susceptible to dementia and Alzheimer's disease (Agarwal et al., 2009; Prince, 2008). Little research is available that investigates the relationship between exogenous and pre-determined variables – such as age, gender, cognitive ability, risk tolerance and education – on endogenous variables such as retirement self-efficacy. Other variables such as financial literacy and judgement have the potential to be both. Whilst financial literacy and judgement may be the result of cognitive ability, education and age, these may in turn determine retirement self-efficacy and the ability to cope with wealth accumulation and management in retirement. In order to progress research, baseline measures are needed which will create a foundation for future longitudinal studies, which can then be used to answer questions about direction and causation.

This study generates baseline data to promote a better understanding of variables influencing retirement self-efficacy, financial literacy and judgement, particularly with respect to trustees of SMSFs. We also examine the role of demographic factors and of psychological attitudes: mastery, self-rated dementia symptoms and financial risk tolerance. Previous research into SMSFs has concentrated on analysing investment and expense performance (Raftery, 2014). Research into financial literacy, on the other hand, has focussed on “ordinary Australians” (Agnew et al., 2013) who are often not engaged with their superannuation, in contrast with the more sophisticated and fully engaged trustees of SMSFs. In summary, the contribution of this paper is the examination of the relationship between cognitive ability and financial literacy, and in turn the relationship between cognitive ability, financial literacy and retirement self-efficacy, for a group of investors who now control the largest asset pool of the Australian superannuation system.

## 2. Literature and hypotheses development

### 2.1. Age and cognitive ability

The availability of financial resources and security is obviously desirable in its own right, and is a consistent predictor of retirement adjustment and satisfaction (Donaldson et al., 2010; Leung and Earl, 2012; Noone et al., 2009; Topa et al., 2009; Wang, 2007). To the extent that financial resources are self-managed, their adequacy is potentially dependent on adequate cognitive performance, which is known to decline with age – sometimes catastrophically. Banks et al. (2010) investigated this relationship with mixed results in terms of retirement “trajectories” across cognitive function. However, Hsu and Willis (2011: 1) reported that “as the financial decision maker’s cognition declines, the management of finances is eventually turned over to his cognitively intact spouse, *often well after difficulties handling money have already emerged*” [our italics].

There is considerable empirical evidence to suggest that one's ability to deal with novel material/problems under time pressure (fluid intelligence), peaks in middle age and then declines, whereas our acquired knowledge and experience (crystallised intelligence) continues to increase with age (Deary, 2001). The decline in fluid intelligence with age is likely attributable to an associated decline in processing speed (Salthouse, 1996). In other studies, older respondents performed better than younger respondents on sophisticated financial literacy questions with basic numeracy peaking in middle age (Bateman et al., 2012). This supports other evidence (Banks and Oldfield, 2007) that, although a decline in numerical ability with age can affect the ability to answer some questions, the acquisition of knowledge continues throughout one's life (Lusardi and Mitchell, 2009). Agarwal et al. (2009) found that older individuals displayed considerably poorer financial judgement than their younger counterparts, with a peak at an average age of 53.

Financial management is one task that requires high cognitive function. As discussed by Hsu and Willis (2011), this task has become more complex as regular streams of retirement income from defined benefit pensions have been replaced by retirement plans that need to be actively managed both before and after retirement. Individuals now have investment choices that were not previously available, while after retirement they must decide what proportion of their assets they can afford to consume. Korniotis and Kumar (2011) demonstrated evidence that older investors, consistent with expectations regarding crystallised intelligence, displayed the benefits of experience, in that they tend to adopt common investment rules of thumb. However, consistent with a hump-shaped relationship between fluid intelligence and age, older investors "exhibit worse stock selection ability and poor diversification skill", (p. 245) with a peak in investment skill at age 42 and a significant skill drop from age 70. Reduced cognitive function predicts both low asset accumulation and less participation in the financial markets (Benjamin et al., 2013). Other studies have found similar patterns with respect to numeracy and the accumulation of wealth (Banks and Oldfield, 2007; Smith et al., 2010), though more muted in Banks et al. (2010). In view of these reported relationships we test the following hypotheses:

H1a: Financial literacy and judgement will increase with age

H1b: Cognitive ability positively influences financial literacy and judgement

## 2.2. Cognitive ability: the case of dementia in older age

Dementia represents a particular problem within the context of financial decision-making in that poor financial decisions may be made prior to a diagnosis, which is often delayed. Dementia is "an umbrella term describing a syndrome associated with more than 100 different diseases ... characterised by the impairment of brain functions, including language, memory, perception, personality and cognitive skills" (Commonwealth of Australia, 2013). Dementia is distinguished from general declines in cognitive and mental functions when severity is "enough to impair a person's daily functioning" (Hsu and Willis, 2011). Persons suffering from dementia require assistance with a range of tasks including self-care, housework and property maintenance (Australian Institute of Health and Welfare, 2007). It is estimated that, worldwide, only 2% of those affected by dementia are under 65 years of age, with the prevalence doubling every 5 years after the age of 65 (Prince, 2008). In the US, Karel et al. (2012) estimated that 10% of adults aged 65 and over suffer from dementia, and this is expected to increase by 1.5 million in the next 10 years. Dementia is the third leading cause of death in Australia (Australian Bureau of Statistics (ABS), 2009).

Declines in financial skills are likely to be a consequence of declines in ability, although it is possible that they become evident before the decline in cognitive ability is diagnosed. Triebel

et al. (2009) identified declines in financial skills in patients with mild cognitive impairment (MCI) in the year before developing Alzheimer's. Chan and Elbel (2012) found low cognitive ability and poor skill with numbers may prevent many from obtaining their medical benefit entitlements. Agarwal et al. (2009) used debt transaction data and reported that elderly at-risk individuals pay more for financial services and pay higher interest rates. Marson et al. (2000) found those classified with mild Alzheimer's disease (AD) scored lower on investment decision-making tasks, and Earnst et al. (2001) reported lower scores on ability to detect mail and telephone fraud. Hsu and Willis (2011) reported various instances where undiagnosed individuals have been subject to fraud.

Given awareness of declining cognitive capacity early in the process, individuals could change their own behaviour accordingly in order to mitigate the effects of such declines on their households. The reality is that a lack of insight into decline appears to be a consequence of a decline in cognitive ability itself. Okonkwo et al. (2008: 257) reported that "patients with mild cognitive impairment do not seem to be fully aware of the functional deficits they experience with regards to financial abilities". In particular, they found that those with cognitive impairment tended to overestimate their capabilities when referring to complex skills that they had previously mastered, while also displaying greater caution when faced with new problems – in this case, investments. Notably, family members or caregivers also misjudged their financial abilities.

On the other hand, family members and caregivers can, themselves, represent a source of risk. Bagshaw et al. (2013) investigated financial abuse of the elderly in Australia, from the perspective of service providers, older persons and family members. Over 80% of the service providers surveyed saw those family members "with a strong sense of entitlement" as a risk factor, especially in cases of diminished capacity, such as dementia. Although the majority of the older persons in the survey were not concerned at the prospect of financial abuse, two thirds of their children expressed some level of concern.

The problem appears to be complicated by other psychosocial problems such that patients displaying more depressive symptoms tended to underestimate their capabilities – in contrast to those suffering cognitive decline. Overall, however, we expect people to have some awareness of advancing dementia. We therefore propose the following hypotheses:

H2a: The presence of self-rated dementia symptoms will negatively relate to measures of cognitive ability

H2b: The presence of self-rated dementia symptoms will negatively relate to financial literacy and judgement

### ***2.3. The role of mastery and retirement self-efficacy***

Mastery can be defined as the degree to which people feel that they have a sense of personal control over the salient areas of their lives (Skaff et al., 1996), while self-efficacy refers to people's confidence in their ability to perform a particular task successfully (Bandura and Adams, 1977). It is possible that mastery and self-efficacy mediate the relationship between cognitive functioning and financial decision-making. One possibility is that those with perceived changes in cognitive functioning, and with lower levels of mastery and self-efficacy, will lose confidence, which may then be evidenced by greater risk aversion, or a "do nothing" approach. Conversely, mastery and self-efficacy may serve to bolster the confidence of those suffering from cognitive decline, despite poor decision-making capabilities. This would magnify the disadvantage created by cognitive decline, because the person may no longer take appropriate advice.

While we are aware of no studies to date that have linked mastery and self-efficacy to financial literacy, decision-making and cognitive functioning, other research provides evidence that these are predictors of retirement adjustment. Donaldson et al. (2010) reported that mastery was a significant predictor of retirement adjustment. Although retirement self-efficacy research is limited, to date, various studies indicate that retirement self-efficacy influences future retirement transition by lowering pre-retirement anxiety (Fretz et al., 1989), and influencing motivation to attempt retirement transition (Taylor and Shore, 1995), in ways similar to how self-efficacy influences other tasks. We are therefore interested in potential links to financial decision-making.

In normal ageing, declines are seen in information processing and perceptual speed (Field et al., 1988), episodic memory (Verhaeghen and Salthouse, 1997) and performance on complex attentional control tasks, such as driving (McDowd and Craik, 1988). In addition, there is evidence to suggest that “otherwise healthy senior clients may experience substantial declines in cognitive function over time, even without clinical dementia” (Kasten and Kasten, 2011: 60). Comijs et al. (2002), in a 6-year longitudinal study with more than 2000 participants, concluded that memory complaints were associated with physical health problems, depression and anxiety, low feelings of mastery, and low perceived self-efficacy. These associations were significantly stronger in people with initial feelings of high mastery and perceived self-efficacy. This provides early evidence that those experiencing a perceived decline in memory may experience reduced confidence in decision-making – although it was not clear from the study whether an actual decline in cognitive functioning existed.

Retirement self-efficacy is associated with increased retirement satisfaction, but we also investigate whether it may mitigate, or perhaps mask, the impact of cognitive decline. We are, in particular, searching for early warning indicators of an impending decline and factors that may aggravate the possibility of poor decision-making. While the threat of cognitive decline may influence various outcomes, the imagined threat may be just as real and be reflected in behaviour. We explore three related hypotheses:

H3a: The presence of self-rated dementia symptoms will negatively relate to retirement self-efficacy

H3b. Retirement self-efficacy will positively relate to cognitive ability and financial literacy

H3c: Retirement self-efficacy will positively relate to mastery levels

#### **2.4. Risk tolerance, financial literacy and retirement self-efficacy**

Lucarelli and Brighetti (2010) identified the central role of risk tolerance in both the classical economics approach to financial decision-making (including Modern Portfolio theory) and the behavioural economics approach (e.g. Prospect theory). Clark (2008) noted the discretion trustees retain in financial decision-making, highlighting the “supposition that trustees have considerable expertise, whereas the reality is a world characterised, at best, by trustee competence and, at worst, by amateurish confusion” (Clark, 2008: 10). While these comments were made about professional institutional trustees, there is reason to believe that the confusion is aggravated in the case of SMSF trustees, who frequently have less time to devote to the management of their funds and fewer resources to access specialist advice. In their exercise of this discretion, Clark (2008) identified anecdotal evidence of a predisposition to lower risk tolerance among trustees. This may be partly compensated for by the possibility that trustees (of both institutional funds and SMSFs), as a more intelligent or at least better educated group, may exhibit greater risk tolerance given the relationship between risk tolerance and overall intelligence. Benjamin et al. (2013), in experiments with Chilean high-school students, reported that higher cognitive ability

was predictive of higher levels of risk tolerance in small stakes gambles. Besides relationships between risk and intelligence, there also appear to be interactions with other factors. Dulebohn (2002) provided evidence supporting an expectation of a positive (negative) relationship between risk tolerance (aversion) and self-efficacy. Finally, it was expected that a positive relationship between risk tolerance and financial literacy would be observed, given prior evidence by Beal and Delpachitra (2003). Some risk aversion is clearly desirable in a trustee, but it is possible that the interaction with age and cognitive decline may lead to a failure to act, as suggested above. This suggests two hypotheses:

H4a: The presence of self-rated dementia symptoms will be associated with lower levels of risk tolerance

H4b: A positive relationship will exist between risk tolerance and retirement self-efficacy, and between risk tolerance and financial literacy.

## 2.5. Gender, financial literacy and retirement self-efficacy

Research supports the view that males outperform females on tests of mathematical or numerical ability. However, it is accepted that this is not the case with tests of cognitive ability which indicate no gender differences (Neisser et al., 1996), although Frederick (2005) reported significant gender differences in cognitive reflection tests. Females have generally been found to be more likely to access advice than males (for example Collins, 2012; Hackethal et al., 2011; Monticone, 2011). Chang (2005) found single females were more likely to consult friends/relatives with no significant differences for other advice sources.

Approximately 53% of SMSF members are male (ATO, 2012a) but a higher proportion may make the primary financial decisions regarding the SMSF. While studies on numerical ability abound, research comparing financial literacy across gender has only recently expanded (Banks and Oldfield, 2007; Bateman et al., 2012; Lindberg et al., 2010). Evidence suggests that females are significantly more likely to rate themselves as having little or no knowledge of superannuation matters than are males, who tend to rate themselves as having an average or good amount of superannuation knowledge (Clark-Murphy and Gerrans, 2001). In addition, females tend to demonstrate lower levels of financial literacy than males throughout the literature (Bateman et al., 2012; Lusardi and Mitchell, 2009). Risk-taking behaviour appears to vary according to gender such that women are less risk tolerant than men in the allocation of funds to pension assets (Bajtelsmit et al., 1999) and in investing financial assets (Quinliven, 1997). However, this male–female difference in risk tolerance is no longer evident with increased financial education (Dwyer, Gilkeson and List, 2002) or when financial decisions are put in context (Schubert et al., 1999). The final hypothesis investigated is:

H5: Women will report lower retirement self-efficacy and mastery than men, no difference in financial literacy and lower levels of risk tolerance.

## 3. Research methodology

### 3.1. Participants

Participants responded to an advertisement placed in the National Seniors Australia (NSA) e-newsletter. National Seniors Australia is a non-profit organisation providing free information about issues relevant to the over 50s community. Of the 131 respondents, 26 withdrew from the online survey before completion (thus withdrawing their consent) and two respondents attempted the survey twice.

Thus, there were 103 respondents who completed the survey. A key part of the survey was completion of the Wonderlic Personnel Quicktest (WPT-Q, discussed below) which required the respondent to leave the online survey instrument and complete the WPT-Q on a different website. In total 81 people completed both the online survey and WPT-Q assessments. All estimations in the next section utilise the complete sample of 81 surveys, though validation of survey components utilises the larger sample of 103 surveys. Further discussion of the sample is presented in the Results section below.

### 3.2. Questionnaire measures

The online survey comprised both qualitative and quantitative questions. The initial survey took between 15–30 minutes to complete, with participants able to pause and return to the survey at any time. At the end of the first survey, respondents were directed to the link to the WPT-Q, which took 8 minutes to complete. Respondents could elect to have a description of their cognitive ability (below average, average, above average) and their financial ability (below average, average, above average) sent to them at the completion of the study.

Apart from the demographic information collected, the other independent variables collected in the survey were measures of cognitive ability, self-reported dementia symptoms, mastery and risk tolerance. The dependent variables measured included retirement self-efficacy, financial literacy and financial judgement.

#### 3.2.1. Dependent variables

**3.2.1.1. Retirement self-efficacy.** Retirement self-efficacy, or belief in one's capabilities relating to retirement, was measured using the Retirement Self-Efficacy Scale (RSE) (Neuhs, 1991). The 27-item scale is divided into five subscales: Health, Financial, Activities, Government and Pension Regulations, and Retirement Itself. Sample items include "maintaining your health" and "remaining active at home", with respondents asked to rate their level of confidence in performing each of the items when they are retired, on a 5-point scale of (1) *very little* to (5) *quite a lot*. Possible scores range from 27 to 135, with higher scores indicating greater confidence in their capabilities when retired. Some items in the scale were altered slightly to make them more appropriate for an Australian audience. In the current study, scores ranged from 63–130, with a mean of 116.69, and very good internal consistency (Cronbach's  $\alpha=0.94$ ).

**3.2.1.2. Financial literacy and judgement.** Fifteen financial questions were developed for the purpose of this study. Two questions were included, asking participants to self-assess. Of these, one was a self-check question ("Of the previous five questions, how many do you think you answered correctly?"), and one asked participants to rate their overall ability to make good-quality decisions with their superannuation. The other questions were developed to evaluate the key financial decisions mentioned earlier.

Five items had quantifiable answers based on interpreting summary information for a sample self-managed superannuation fund, and comprised the financial literacy measure for this study. Sample items included "How much did the member withdraw on average each month" and "If the member started to withdraw \$50,000 per year roughly how many years should the account last the member if he/she continued withdrawing \$50,000 per year". The questions increased in difficulty and examined participants' ability to understand and interpret a simplified set of superannuation fund accounts, as a necessary prerequisite for making appropriate financial judgements. The participant's combined score on these five items is referred to as the financial literacy score. Items were scored as either 0 = incorrect or 1 = correct and ranged between 0 and 5.

Eight questions related to financial judgement. Two of these were opinions about the costs associated with the management of a sample SMSF, and others were questions about two different investment scenarios relating to the circumstances of a given SMSF. The first was a 'good' investment with a subsidised and government-guaranteed return 5% above inflation, which would make it an extremely attractive investment, whereas the second offered high returns but with significant, although implicit, risks. Respondents were then asked to rate how likely they would be to perform five actions, such as "immediately take up the maximum allowed" and "ask your financial advisor to see what you should do", in each investment scenario. See the Appendix 1 for details of all the items.

### 3.2.2. Independent variables

**3.2.2.1. Demographic information.** Respondents were asked to indicate their age, gender, level of education, languages spoken, work/retirement status, the number of members in their SMSF, SMSF phase, as well as the value of their SMSF and its asset allocation.

**3.2.2.2. Cognitive ability/intelligence.** Intelligence was measured via the Wonderlic Cognitive Ability Pretest, formerly the Wonderlic Personnel Quicktest (WPT-Q; Wonderlic, 1999), an 8-minute timed test of cognitive ability. The measure is used to determine how well a person can understand instructions, learn, adapt, and solve problems. The WPT-Q has high internal consistency (Cronbach's  $\alpha=0.81$ ).

**3.2.2.3. Self-rated dementia symptoms.** Dementia symptoms were measured using the self-report version of the Healthy Aging Brain Care Monitor (HABC-SR; Monahan et al., 2012). The scale comprised 30 items describing aspects of daily life that can be affected by dementia symptoms and is divided into four subscales: cognitive; behavioural and psychological; functional; and stress/quality of Life. HABC scores (HABC\_Total) range from 0–36, with higher scores indicating more dementia symptoms on the four subscales. There are six items in the cognitive subscale (HABC\_Cog), such as "remembering appointments" and "handling complicated financial affairs such as balancing a cheque book, income taxes and paying bills". There are 11 items in the behavioural and psychological subscale (HABC\_Behav) such as "less interest or pleasure in doing things, hobbies or activities" and "wandering, pacing or doing things repeatedly". There are nine items in the functional subscale (HABC\_Func), including "taking medication in the right dose at the right time" and "learning to use a tool, appliance or gadget". There are four items in the quality of life/stress subscale (HABC\_Stress), including "your financial future" and "your physical health". Respondents were asked to rate the frequency with which they had experienced problems with each item over the past two weeks. Responses were scored as 0–3 points per item, depending on whether they had been rated as (0) *not at all* to (3) *almost daily* on the 4-point scale. Consistent with past research (Monahan et al., 2012, Cronbach's  $\alpha=0.92$ ) overall internal consistency was high (Cronbach's  $\alpha=0.88$ ). Internal consistency for the subscales is of moderate size for the cognitive subscale and the behavioural and psychological subscale (Cronbach's  $\alpha=0.68$  and  $\alpha=0.66$ , respectively) and high for the functional and quality of life/stress subscales (Cronbach's  $\alpha=0.89$  and  $\alpha=0.80$ , respectively). Given that all respondents are active users of the internet and manage their own SMSFs, we expected very low scores on the self-reported dementia tests.

**3.2.2.4. Mastery.** Mastery was measured using the 7-item scale (Mastery) developed by Pearlin and Schooler (1978). Sample items include "I have little control over the things that happen to me" and "I can do just about anything I really set my mind to". Respondents rated their agreement with these statements on a 4-point scale, ranging from (1) *strongly disagree* to (4) *strongly agree*.

Possible scores range from 7 to 28, with a higher score indicating a higher level of mastery, and some items were reverse scored. In the present study, scores ranged from 12–28 and Cronbach's alpha (Cronbach's  $\alpha=0.76$ ) was lower than in previous studies (Donaldson et al., 2010, Cronbach's  $\alpha=0.88$ ) but still within acceptable levels.

**3.2.2.5. Financial risk tolerance.** Participants' tolerance for financial risk, specifically risk involved in investing for retirement, was measured using a 5-item scale (Risk Tolerance) developed by Jacobs-Lawson (2003) and expanded upon by Jacobs-Lawson and Hershey (2005). Respondents were asked to rate their agreement with the five statements on a 7-point scale from (1) *strongly disagree* to (7) *strongly agree*. In the current study, scores ranged from 5–31, with a mean of 15.24 and a Cronbach's  $\alpha=0.73$ , which is lower than that found by Jacobs-Lawson and Hershey (2005, Cronbach's  $\alpha=0.83$ ).

## 4. Research findings

The sample of SMSF participants was comparable to other SMSF trustees in Australia in terms of asset size, number of fund members and risk profile of funds. SMSF trustees oversee the management of a significant amount of funds, collectively and individually, with mean (median) assets of \$963,000 (\$539,000) (ATO, 2012a: 12). These asset values are comparable to the present sample with mean (median) assets of \$887,379 (\$800,000). SMSFs can have up to four members, though two member funds are most common (69%) followed by single member funds (22%), similar to funds in the sample (68% and 29% respectively). The risk profile of the funds in the sample, as indicated by the average allocation to equity investments, is comparable to the SMSF population. The sample is marginally less aggressive in the accumulation phase (35% vs. 40% equity), and more aggressive in the pension phase (55% vs. 45% equity).

The 24 females in our sample ranged in age from 55 to 74 years, with a mean of 63.4 years and the 57 males in our sample ranged in age from 51 to 83, with a mean of 65.8 years. A one-way analysis of variance (ANOVA) was conducted on age by gender; there was no significant difference in mean age of males and females. Compared to results reported by Monahan et al. (2012), but as expected, participants in our sample tended to show far fewer dementia symptoms. The mean total HABC score for participants in the current study was 3.49,  $SD = 5.6$ , whereas the mean total HABC score for Monahan et al.'s normal participants was 10.6,  $SD = 11.9$ , and for the participants with dementia, 27.5,  $SD = 18$ . Similarly, the mean behavioural and psychological HABC subscale score for participants in the current study was 1.11,  $SD = 1.6$ , whereas the mean behavioural and psychological HABC subscale score for Monahan et al.'s normal participants was 4.8,  $SD = 6.6$ , and for the participants with dementia, 9.3,  $SD = 6.8$ . In general, this was a high functioning group when compared to the general population. This is not surprising, given that participants were necessarily computer literate, are considerably wealthier than the average population and still regard themselves as capable of managing their SMSFs. Correlational analyses of all variables can be found in Table 1.

Two three-step hierarchical regression analyses examined the variables influencing financial literacy and retirement self-efficacy. Demographics were entered in step 1, cognitive ability, risk tolerance, and mastery entered in step 2, and the self-rated dementia symptoms were included as separate variables (i.e. cognitive, functional, behavioural and stress) in step 3. In addition, financial literacy was added in step 2 to determine its relationship in the retirement self-efficacy regression. Estimated standardised coefficients are presented in Table 2.

Hypothesis 2a suggested a relationship between the presence of self-reported dementia symptoms and cognitive skills. No significant relationships were found between the two measures



indicating that, although there may be variability in cognitive skills, these were not matched by self-reported symptoms of dementia. It may be that people are generally not particularly good at self-rating dementia symptoms, as is the case with self-rating of other personal characteristics. It was hypothesised (2b) that financial literacy would be negatively related to self-rated dementia scores, and this was the case, but only for the behavioural items of the HABC. These items consisted of self-reported behaviours with a psychological basis including having “less interest or pleasure in doing things, hobbies or activities” and “wandering, pacing or doing things repeatedly”. Those displaying lower levels of financial literacy are also those recognising behaviours reflecting dementia symptoms.

In terms of the relative importance of the significant variables explaining financial literacy, the size of superannuation assets and cognitive abilities (Wonderlic) are estimated to be of equal importance. A one unit (standard deviation) change in each is associated with a 0.25 change in standardised financial literacy. The significant negative self-rated dementia score (behavioural component) was of smaller magnitude, approximately 25% less at  $-0.18$ .

In hypothesis 3a it was proposed that retirement self-efficacy would be related to the presence of self-rated symptoms of dementia. Again it was found that only behavioural items with a psychological basis (HABC\_Behav) were associated with retirement self-efficacy. Evidence of pacing behaviours and withdrawal from hobbies and interests coincides with a reduction in retirement self-efficacy. Hypotheses 3b proposed a relationship between retirement self-efficacy, financial literacy and cognitive ability. Cognitive ability and financial literacy were both significantly related to retirement self-efficacy. This suggests that those people with a greater sense of control over their lives also possess higher levels of general mental ability and financial literacy.

Again in terms of the relative magnitude of the significant variables, a one unit (standard deviation) change in the self-rated dementia symptoms (HABC\_Behav) is equal to a one unit decrease in age or financial literacy, but smaller (approximately 25 percent) than the impact of a one standard deviation change in Mastery. A parallel can be drawn between our equivalence in magnitude (but offsetting sign) for age and the self-rated dementia symptoms to the findings of Boyle et al. (2012). Boyle et al. (2012) estimated that a one-standard deviation increase in cognitive decline was equivalent in decision-making performance to that of an individual seven years older. In our sample, given the sample standard deviation of age was 6.8, years we thus find a comparable result, though this time in terms of retirement-self efficacy. It should be noted that the causality of these relationships are not yet clear in this data set. It may be that higher levels of ability and financial literacy help people to feel more in control generally; “*my finances are okay, I’m okay*”, but the opposite might also be true.

Hypothesis 3c proposed a relationship between mastery and retirement self-efficacy and this was supported. More generalised levels of mastery are associated with the more specific measure of retirement self-efficacy.

Hypothesis 4a proposed a relationship between the presence of self-rated dementia symptoms and risk tolerance. No such relationship was found. According to hypothesis 4b, risk tolerance would positively relate to retirement self-efficacy and financial literacy. Results in Table 1 indicate no significant relationship between risk tolerance and either self-efficacy and financial literacy. Table 2 similarly reports no significant relationship between risk tolerance and financial literacy within the regression estimation. However, in the retirement self-efficacy estimation, a negative relationship was found contrary to expectations.

To test hypothesis 5, an ANOVA was conducted on cognitive ability (measured using Wonderlic), HABC, RSE, Financial Literacy, Mastery and Risk by Gender. There were no significant differences between males and females on any variable, except for mastery. Males appear to be higher in mastery than females,  $F(1,79) = 4.204$ ,  $p = 0.044$ , supporting the earlier findings of Donaldson

**Table 2.** Hierarchical multiple regression predicting Financial Literacy and Retirement Self-Efficacy Score.

This table presents estimates from a hierarchical regression with financial literacy and judgement in the first column of results and retirement self-efficacy in column 2. Each component of the Healthy Aging Brain Care (HABC) Monitor is entered separately in step three. Explanatory variables are standardised, with the exception of gender. Three blocks are entered with incremental r-squared values noted. Significance levels (\*\*\*) $p < 0.01$ , (\*\*) $p < 0.05$ , (\*) $p < 0.10$  are based on robust standard errors using the Huber-White sandwich estimator.

	Financial Literacy	Retirement Self-Efficacy (RSE)
Step 1		
Age	-0.0205	0.1922**
Male	0.3224	0.1333
Gender not reported	-0.1579	-0.3848
Education	0.1484	-0.1075
Value Super Assets	0.2778***	0.2456***
Step 2		
Age	0.0973	0.2759***
Male	0.3809	0.1245
Gender not reported	0.1016	-0.1751
Education	0.0643	-0.1209
Value of Super Assets	0.2451**	0.1499**
Wonderlic	0.2629**	0.2228**
Risk Tolerance	-0.1548	-0.1543**
Mastery	0.1172	0.4222***
Financial Literacy	N/A	0.2412***
Step 3		
Age	0.0912	0.0904
Male	0.3671	0.2774***
Gender not reported	0.1114	0.1379
Education	0.0624	0.1379
Value of Super Assets	0.2507**	0.2852***
Wonderlic	0.2562**	0.2774***
		0.1379
		0.0086
		-0.3148
		-0.1776
		-0.1204
		-0.1139
		-0.1424
		0.1489*
		0.1615**
		0.2199**
		0.2245**
		0.2774***
		0.1279
		-0.1776
		-0.1204
		0.1485*
		0.1615**
		0.2199**
		0.2245**

(Continued)



et al. (2010) who reported a small correlation between gender and mastery, such that males showed higher mastery than females ( $r = 0.10$ ,  $n = 570$ ,  $p < 0.05$ ).

A comparison of mean scores for the likelihood of consulting others for advice when confronted with investment scenario one (i.e. the deposit that offered better returns than existing term deposits), revealed that females were significantly more likely to seek advice from a friend or family member than were males (t-test 3.266,  $p < 0.01$ ,  $n = 81$ ). Females were also more likely to consult a financial professional (t-test 2.035,  $p < 0.045$ ,  $n = 81$ ). There were no significant gender differences in the likelihood of advice-seeking in investment scenario two (the risky investment opportunity) from family and friends (t-test 1.6220,  $p = 0.109$ ,  $n = 81$ ) or financial professional (t-test 0.3282,  $p = 0.746$ ,  $n = 81$ ).

#### 4.1. Post-hoc analyses

A closer examination of the group that reported more than one symptom of cognitive decline ( $n = 16$ ) was conducted, to determine differences in financial judgement. In this case, positive relationships were recorded between the self-reported HABC cognitive measures and all three judgement questions. Respondents who were more likely to regard the SMSF administration charges as “very inexpensive” ( $p < 0.01$ ) were considerably more likely to respond “definitely would” to both the good guaranteed investment and the poor risky investment ( $p < 0.05$  and  $p < 0.001$  respectively). These responses are consistent with the possibility that these individuals are less able to evaluate charges and investment risks consistent with Agarwal et al. (2009). Their more enthusiastic response to the good investment than the average was, however, surprising. The expectation was that higher risk aversion would prevail and that members with cognitive dementia symptoms would be less likely to take action. What attracted them is not clear, but it is possible that they are more likely to respond credulously to “special offers”, and we have tentatively interpreted their responses as displaying poor judgement in being overly enthusiastic. Given the sub-sample size, this tentative finding could be investigated with a wider set of judgement questions in due course.

As a whole, the group displaying more than one symptom of cognitive decline was better educated and scored well on the Wonderlic and the financial literacy questions, which is consistent with the more routine or applied skills being retained for longer than more complex decisions involving judgement, which makes dementia difficult to diagnose in the early stages. The participants did, however, report lower values on Mastery ( $t = -2.9$ ,  $p = 0.02$ ), which, together with the fact that they reported symptoms of cognitive decline, means that they may be conscious of their apparently declining abilities. This may be related to their volunteering for the study, so no conclusions can be drawn at this stage about the prevalence of cognitive decline in the community of SMSF investors. The fact is, however, that nine of the 16 respondents identifying dementia-related symptoms made what were regarded as poor financial judgements – as against eight poor judgements from the remaining participants in the sample. Although the making of poor judgements might itself be evidence of declining powers, none of the other responses of the latter group were unusual or indicated cognitive or other difficulties.

## 5. Discussion

The current study has investigated the members and trustees of SMSFs, a category of superannuation funds who account for the largest proportion the superannuation assets in Australia. Notwithstanding their importance, they remain a relatively under-researched group. The responsibility these trustees take on in the management of retirement assets is significant. The main aim was to explore the relationship between financial literacy and cognitive functioning, the potential mediating roles of retirement self-efficacy, mastery, risk tolerance and presence of dementia symptoms. We were also

interested in variables promoting retirement self-efficacy, as it is of value in its own right, and the role of gender differences. A number of important relationships were identified.

Those people reporting higher levels of financial literacy also perform well on a measure of general mental ability, and rate themselves lower on self-rated behavioural dementia symptoms. After controlling for gender, age, level of education, value of superannuation assets and intelligence, self-reported dementia symptoms on the behavioural subscale are good negative indicators of financial literacy. Engagement in activities and being able to perform everyday tasks may be markers of on-going interest and participation in matters requiring financial literacy.

A number of factors contribute to feelings of being in control during retirement – having higher levels of cognitive ability, better financial literacy, a sense of generalised mastery and the absence of behavioural self-rated dementia symptoms all contribute. What is yet to be explored is if the self-reported measures of dementia-related symptoms are associated with significant and genuine cognitive decline, as the Wonderlic score is measured only once and there is no evidence of a relationship between it and the HABC subscales.

A number of important questions result from our research. Firstly, if financial literacy and general mental ability are related, how feasible is it to expect increases in financial literacy from interventions? Are there limits to the extent that scores on measures of financial literacy can be improved? What are the implications for SMSF trustees if that is the case – should there be minimum requirements of financial literacy? It is not clear why the self-rated cognitive dementia symptoms and the cognitive ability measures are unrelated. It may be that while people are able to recognise behavioural declines, cognitive declines may escape them. This emphasises the importance of external testing, rather than over-relying on self-report measures.

Further research is needed to determine the direction of relationships between retirement self-efficacy and possible predictors. As alluded to earlier, does having a sharp mind and a good handle on finances contribute to retirement self-efficacy, or is the converse true? Longitudinal data, and in particular cross-lagged panel analysis, will help to answer this question.

There was some evidence of gender differences on the psychosocial variables in the current study. Consistent with prior research, males report higher levels of mastery than females. Women also seemed more likely to consult with family and friends in making financial decisions than were men. This gender difference is consistent with Grable and Joo (2001) and Chang (2005). In contrast Monticone (2011) found no significant difference by gender in preference for formal advice from professionals and informal advice such as that of family and colleagues.

Given that cognitive ability is associated with more years of education, it is perhaps not surprising that it was also associated with higher financial literacy. Evidence from previous studies suggests that financial literacy is a form of crystallised intelligence that increases with age (Bateman et al., 2012; Korniotis and Kumar, 2011; Lusardi and Mitchell, 2009) as opposed to numeracy, which peaks in middle age and then declines (Banks and Oldfield, 2007). Future studies into finances and aging should use applied measures of financial literacy as we have done here, rather than numeracy, which was prominent in the Wonderlic questions, to gain an accurate picture of financial ability.

Perceived behavioural functioning was associated with lower levels of retirement self-efficacy. This provides some limited support to suggest that perceived withdrawal from activities or a reluctance to take on or learn new tasks may influence retirement self-efficacy more generally. What is not clear is the direction of causation – whether withdrawal from activities promotes lower self-efficacy or whether lower levels of self-efficacy result in withdrawal from activities. We see evidence that perceived behavioural limitations (e.g. interests in hobbies, outside interests) have a more generalised effect on retirement self-efficacy.

We do know that those people reporting higher levels of cognitive ability (as measured by Wonderlic) also report higher levels of retirement self-efficacy, and this independent measure of cognitive ability may be the better indicator rather than self-ratings of cognitive decline. Interventions designed to increase mastery may have a positive effect on the ability to cope with life during retirement. Some preliminary evidence exists to suggest that this is already the case (Zacher et al., 2011).

There were some limitations in our study that could be addressed in future research. Our sample was quite small consisting of 81 respondents who report high levels of capacity and low levels of reported dementia symptoms. It is acknowledged that because our analysis relied upon discrete variables, counts and indicator variables, results may differ with broader samples with lower levels of capacity and higher levels of reported dementia symptoms. However, it is also likely that many of the relationships reported would be more acute in an affected sample. In particular, it is expected that a less capable sample would score more poorly on measures of financial judgment. Similarly, as people accumulate more examples of their own behavioural decline (as evidenced by the HABC – Behavioural score), mastery would be more affected.

As expected, owing to the recruitment criteria, the sample is marginally older than the average SMSF population. In the broader SMSF population 24.4% (36.4% sample) of members are younger than 50, whereas less than 3% of the current sample are younger than 55. A larger proportion of the sample (68.4% vs. 35.7%) is in pension phase (i.e. making payments/withdrawals from accumulated savings) rather than accumulation phase (i.e. building accumulated savings). There were also fewer women in our sample, when compared to the ATO data. Our results, therefore, help to explain the experiences of older adults in SMSFs rather than all SMSF members.

If, as suspected and demonstrated in post-hoc analysis, cognitive functioning is a determinant of financial judgement, this is a matter of considerable concern for members of SMSFs. This is not alleviated by the fact that over half of those making poor financial judgements in this survey also reported cognitive dementia symptoms. Further evidence is needed to explore the mechanisms needed to prompt a voluntary cognitive assessment and to take action to reduce the consequential financial risks, particularly for members of self-managed funds. Results from cognitive assessment may afford the opportunity to involve others in the management of their portfolios (e.g. seek superannuation advice from a financial planner, or pass over control of their SMSF). Early advice may assist members of funds to make the best possible decisions before significant cognitive decline robs them of the opportunity. Apart from these individual consequences, we found no obvious source of any systematic bias in the behaviour of older investors.

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## Note

1. Estimations with age-squared (untabulated) were similarly non-significant. The non-significance is consistent with our older sample and with the empirical literature which has estimated relatively early peaks between ages 42 and 53, as discussed in Section 2.1.

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## Appendix I

### Financial literacy

Questions 1 to 5 comprised the financial literacy measure used in the regression reported in Table 2. Questions 11, 12, 14 and 15 are reported in the chi-square analysis. Questions 8, 10 and 13 were those utilised to in the post-hoc analysis.

The following information provides summary information for a superannuation account *which is currently in the pension phase*. The member in this fund is withdrawing a monthly allocated pension. The underlying investments in the fund's portfolio consist of equal amounts in term deposits and shares, which are primarily invested through managed funds.

<b>In the year 1/7/2011 to 30/6/2012</b>	
Balance on 1 July 2011	\$330,500
Withdrawals over the year	-\$48,000
Investment earnings	\$12,500
Costs (Administration, Advice and other charges)	-\$2000
Balance at 30/6/2012	\$293,000
Average return on investment (after charges)	3.4%

The next five questions refer to the information in the table above.

1. How much did the member withdraw, on average, in each month in 2011/2012?
  - \$3305
  - \$4000
  - \$12,500
  - \$48,000
  - Do not know
  
2. Which of the following is closest to how much the member was charged for costs (administration, advice and other charges) over the past year?
  - More than 3% of their beginning balance
  - More than 2% but less than 3% of their beginning balance
  - More than 1% but less than 2% of their beginning balance
  - Less than 1% of their beginning balance
  - Do not know
  
3. Given that the member (in the table above) will continue to withdraw the same amount each year, pay the same costs, and make the same return on their investments, which of the following best describes what will happen?
  - The percentage/proportion paid in costs will remain unchanged
  - The percentage/proportion paid in costs will steadily increase
  - The percentage/proportion paid in costs will steadily decrease

- It isn't possible to know from the information provided what will happen to the percentage/proportion paid in costs
  - Do not know
4. Consider again the account in the table above. It has a balance of \$293,000 at the end of the year. Let's say it can now earn a guaranteed interest rate of 5% per annum. If the member started to withdraw \$50,000 per year, roughly how many years should the account last the member if he/she continued withdrawing \$50,000 per year? (You can ignore inflation in your answer.)
- Less than 4 years
  - More than 4 but less than 6 years
  - Between 6 and 10 years
  - More than 10 years
  - Do not know
5. Again consider the member of the superannuation fund mentioned above. Remember that the pension is in draw down phase. He/she has received a small inheritance, and is now considering whether to reduce the amount withdrawn from the account each year. Which of the following is true of the regulations governing the minimum amount that can be withdrawn each year?
- These regulations are recommendations to help work out how much to withdraw
  - The withdrawals are monitored by the Australian Tax Office (ATO), which will tell you to take more if you do not comply
  - The regulations are enforced by the ATO and penalties apply for non-compliance
  - The regulations prevent you from changing the amounts you are withdrawing
  - I do not know exactly

### Self-assessment

6. Of the previous five questions above how many do you think you answered correctly?
- None
  - One
  - Two
  - Three
  - Four
  - Five
7. Overall, how would you rate your overall ability to make good quality decisions with your own superannuation fund(s)? Please answer on a scale of 1 to 10 where 1 is "Poor" and 10 is "Excellent".
- 1 Poor Understanding
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7

- 8
- 9
- 10 Excellent Understanding

### Financial judgement

8. Considering the size of the account, how do you assess the costs that were paid?
- Very inexpensive
  - Inexpensive
  - Neither inexpensive or expensive
  - Expensive
  - Very expensive
9. What would be the highest amount you would consider a reasonable amount to pay for the management of an account with this asset balance and investment mix?
- \$1000
  - \$2000
  - \$3000
  - \$4000
  - \$5000
  - \$6000
  - \$7000
  - \$8000
  - \$9000
  - \$10,000 or more

### Good (guaranteed investment scenario)

One of the large Australian banks has sent you a brochure telling you that those aged 55 and above are being offered a chance to invest up to \$50,000 in a special deposit. The deposit is offering a guaranteed rate of return of 5% above inflation, subsidised by the Commonwealth Government. There have been a number of articles in the press confirming that the investment is available. Assuming your investment strategy permitted such an investment, how likely would it be that you would do the following?

Item	Definitely would not (1)	Probably would not (2)	Not sure (3)	Probably would (4)	Definitely would (5)
10. Immediately take up the maximum allowed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Ask your financial advisor (planner, accountant) what you should do.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Ask a family member or close friend what you should do.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*Poor (risky investment scenario)*

If instead of the investment opportunity given above, you were given an offer to invest up to \$50,000 in a new infrastructure investment account. This account is not guaranteed by the Commonwealth Government, but it is projected to provide a return of 6% p.a. more than the inflation rate in the next ten years. Assuming your investment strategy permitted such an investment, how likely would it be that you would do the following?

Item	Definitely would not (1)	Probably would not (2)	Not sure (3)	Probably would (4)	Definitely would (5)
13. Immediately take up the maximum allowed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Ask your financial advisor (planner, accountant) what you should do.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Ask a family member or close friend what you should do.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>