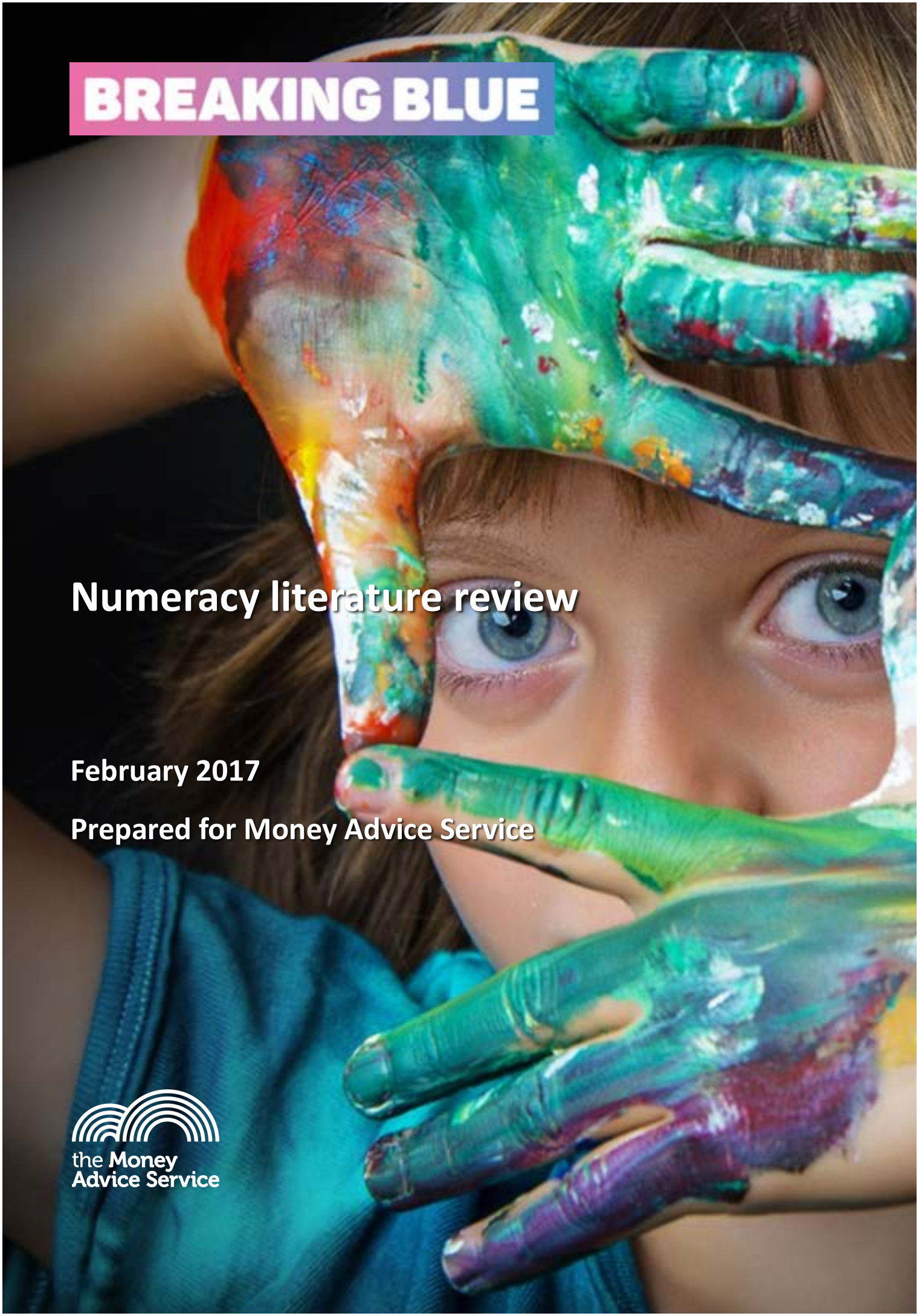

Numeracy literature review

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Contents

Executive summary

Whilst there is a **strong *correlation* between numeracy and/or financial literacy and levels of financial capability**, there is less evidence for a *causal* relationship between the two. Demographic factors such as gender, ethnicity, education and income, as well as attitudinal differences play a significant role in the financial decision-making process, particularly for less numerate individuals.

When it comes to choosing products, there is a **strong correlation between numeracy and/or financial literacy and the ability to make sensible informed choices**, based on various sources of information. Financial confidence, by which is meant an individual's sense of their own ability to manage money, is also a significant factor in financial decision-making, and **lower levels of financial literacy can impact on financial confidence.** This typically occurs amongst younger people and women. However, evidence suggests that over-confidence exists amongst certain demographic groups, typically the older relatively well-off, and this can result in individuals being less likely to seek professional advice and potentially making poorer decisions as a result. **Dedicated financial education programmes can have a positive impact in relation to levels of financial confidence and therefore individuals' ability to manage money**, yet those who feel they lack numeracy skills are typically less likely to want to improve in this area.

There is also a **strong link between numeracy and/or financial literacy and day-to-day financial management,** with those with more advanced numeracy skills being more likely to check bills or bank statements on a regular basis. However, the evidence to support this relationship is usually caveated by other factors. Those who are less likely to keep on top of day-to-day financial management may take less of an interest generally, **while background factors such as income and education can play a role,** again undermining the case for a causal relationship.

Planning ahead is also positively influenced by levels of numeracy and/or financial literacy. In terms of demographics, long-term financial planning is more likely to be undertaken by older, wealthier and more educated individuals, with these groups taking more of an active approach to savings and investments. At an attitudinal level, there is also some evidence that indicates less numerate individuals are more like to consider short-term over long-term financial planning.

There is a good amount of evidence to suggest **that interventions such as financial education programmes can stimulate positive financial behaviour change.** However, the low-numeracy groups such programmes are aimed at tend to be hard to engage, thus undermining the positive impacts that such programmes can have. Questions around whether such programmes should focus on numeracy or financial literacy remain.

More empirical research is required into the attitudes of low-numeracy/financial literacy groups towards both longer-term planning and day-to-day management, and also into the barriers to good money-management.

List of tables and figures

Authors

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Introduction

Background

Previous research has found lower numeracy to be linked to lower effectiveness in keeping track of finances and lower confidence managing money, while higher numeracy has been linked to setting financial goals and using best-buy literature when choosing products. The Money Advice Service (MAS) continues to explore the possible considerations for adult basic skills policy for stakeholders in the public, private and charitable sectors and contribute to the financial capability evidence base. This literature review provides a 'deep dive' in order to establish the links between numeracy and financial capability, and inform the development of successful financial capability interventions for working age adults, including the design of appropriate policy.

Objectives

The key objectives of this literature review are:

- to gain a better understanding of the relationship between numeracy and financial capability, and whether there is a causal relationship between the two
- to analyse whether numeracy is more, or less, important than attitudes and motivations when it comes to financial capability
- to understand if there are particular demographic factors that affect numeracy and consequently financial capability; for example, gender, ethnicity, education level
- to analyse the role of financial confidence in financial capability
- to examine what good measures of numeracy and financial capability might be and how interventions can best take these into consideration
- to identify gaps in the current evidence base where new research may be required

Methodology

This literature review was conducted based on our established and successful approach to finding, reviewing, and analysing existing sources. An initial list of sources was provided by MAS, based on articles recommended by individual stakeholders during interviews. We added to this list via keyword searches, utilizing academic databases, industry reports, and both online and offline channels. We then 'snowballed' this list by reviewing those sources they mentioned to see if they were relevant, and repeated this process with any new articles we included. All sources were then read and summarized against the hypotheses provided by MAS, and in light of any additional themes relevant to those hypotheses. Analysis was conducted in order to ascertain and agree upon emerging themes, which then became the basis for the chapters of this report.

It should be noted that all research approaches have some methodological limitations and a literature review is no exception. This study incorporated only recognised, published, secondary research. No un-published material was included. We were, therefore, bound by the information that was available to us: not all of the subjects that were of interest to the review had necessarily been covered by existing, published research. In addition, this literature review was limited to published sources in the English language only, and so excluded any sources written exclusively in other languages and not translated into English.

Any research study conducted within a set time limit is bound to be somewhat selective. Although great effort was taken to assess all potential sources of information, it is impossible to guarantee that every relevant source was reviewed. Overall, the quality of the evidence evaluated was high, but only reliable sources of data were included. This meant those not backed by an established body, or published in an established journal were rejected; as were those published in journals that were not peer reviewed; web-only sources were permitted where they appeared via the websites of respected organisations. The references do not include materials identified via searches but rejected from the study on these grounds.

Numeracy and financial capability

Defining Numeracy

Throughout this report we refer to both 'numeracy' and 'financial literacy'. By numeracy we mean the extent to which an individual is numerate, i.e. their proficiency at undertaking mathematical calculations outside of a financial context. By financial literacy we mean a more general measure including the ability to perform basic financial calculations (usually related to concepts such as compound interest, inflation and time value of money) as well as their responses to broader questions on financial products and planning. Most of the sources we reviewed used the two terms in ways aligned to these definitions; where they did not, we have explained their specific definitions. A few sources used the terms interchangeably, and in this case we have interpreted what is meant on a case-by-case basis.

We recognise in using these two terms that the difference is an important one. An individual may have low numeracy but still have good financial literacy. Therefore, we are careful to point out where it is actually greater financial literacy that may be required, as opposed to greater numeracy (although we accept that higher numeracy certainly aids levels of financial literacy, and that at the most basic level, financial literacy is not possible without numeracy).

Evidence for a causal effect between numeracy and financial capability

There are several studies noted throughout this report that highlight a *strong correlation* between numeracy and/or financial literacy skills and levels of financial capability; those who have stronger skills in these areas typically manage their finances and make product choices in a more effective manner. For example, a study undertaken by the Institute for Fiscal Studies found strong positive correlations between numeracy levels and product choices around retirement planning[1], while Hogarth and Hilgert (2002)[2] find a strong correlation between those who score higher on financial literacy tests and those who follow recommended financial practices such as paying all bills on time and having an emergency fund.

However, there is less evidence that demonstrates a *causal* effect between numeracy and/or financial literacy and levels of financial capability. Indeed, Cole and Fernando (2008)[3] consider various studies that explore this relationship (particularly in relation to financial literacy programmes) and make the case that 'financial literacy may be a secondary, or even tertiary, determinant of individual financial behaviour'. While they acknowledge that improved financial literacy may well have a positive impact, they argue that finding a degree of causality is difficult to achieve in the context of other factors that could influence decision-making. In addition, Hogarth and Hilgert (2003)[4] place doubt on the causality of the relationship between financial literacy and behaviour. They argue that knowledge may increase as wealth increases, or other factors such as family experiences and economic background, may affect both knowledge and behaviour.

Attitudes and motivations for financial behaviour

There are various factors that feed into financial capability and decision-making alongside levels of numeracy and/or financial literacy. As outlined by the Money Advice Service in its analysis of the UK Financial Capability Survey[5], factors including financial confidence and financial engagement are key components of financial wellbeing (or 'enablers and inhibitors' specifically), more-so than financial numeracy skills. The paper concludes 'that it is an individual's confidence in applying their basic numeracy skills that is important'; i.e. assuming an

[1] Banks and Oldfield (2007) *Understanding pensions: Cognitive functions, numerical ability and retirement saving*

[2] Hogarth and Hilgert (2002): *Financial Knowledge, Experience and Learning Preferences: Preliminary Results from a New Survey on Financial Literacy*

[3] Cole and Fernando (2008). *Assessing the importance of financial literacy*

[4] Hogarth and Hilgert (2003): *Household Financial Management: The Connection between Knowledge and Behavior*

[5] Money Advice Service (2015) *Measuring financial capability – identifying the building blocks Understanding what drives or inhibits consumers' financial wellbeing and resilience*

individual has a basic level of numeracy, it is their confidence in managing everyday money matters that has the greatest impact. Confidence is investigated in more detail on page 10.

There is evidence to suggest that less rational factors feed into the decision-making of individuals with lower numeracy and/or financial literacy skills. For example, research indicates that less numerate individuals attach more importance to short-term costs and benefits than those that may occur in the distant future[6]. Furthermore, experiments have shown that those with more advanced financial literacy skills are more effective at making financial judgements over the long-term. For example, Hastings and Mitchell (2011)[7] find a link between financial literacy and impatience when exploring investment decisions, that suggests 'those who choose to defer payment for a greater reward are more likely to possess a basic understanding of simple math and financial concepts necessary to make intertemporal financial decisions'. In addition, and as outlined on page 14, evidence also suggests that these less numerate groups use less information when choosing financial products, and are more likely to use easier-to-determine characteristics to support their decision-making.

Demographic factors

There are several studies that demonstrate differences in numerical and/or financial literacy skills at a gender level. Across most numeracy and financial literacy studies, men were generally found to perform at a higher level than women. For example, on numeracy skills specifically, the Skills for Life Survey run by BIS shows that women are less likely to be at Entry Level 3 or above (73% of women vs. 79% of men). Most academic sources agreed that lower levels of numeracy and/or financial literacy can potentially lead to women having lower levels of engagement with financial markets generally. Almenberg and Dreber (2012)[8] conclude that gender differences in financial literacy can explain a significant part of the gender gap in stock market participation, while Lusardi and Mitchel (2009)[9] find that women are less likely to plan for retirement. However, while many authors relate this back to lower levels of financial literacy, some argue that other factors are at play. For example, Lusardi (2012) notes that women are more likely to indicate that they do not know the answer to a financial literacy question, which may indicate a lack of confidence in financial knowledge rather than lack of actual knowledge (further details on confidence in relation to gender can be found on page 10).

There is also a consistent gap in levels of numeracy and financial literacy by socio-economic status and education attainment, with various sources substantiating this point. Lusardi and Mitchell (2007)[10] emphasise where the gaps in levels of numeracy and financial literacy typically lie – 'less financially knowledgeable respondents were more likely to be single, relatively uneducated, relatively low income, minority, and either young or old (not middle-aged)'.

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[6] Frederick (2005) *Cognitive Reflection and Decision Making*

[7] Hastings and Mitchell (2011) *How financial literacy and impatience shape retirement wealth and investment behaviors*

[8] Almenberg and Dreber (2011) *Gender, financial literacy and stock market participation.*

[9] Lusardi and Mitchell (2009) *How ordinary consumers make complex economic decisions: Financial literacy and retirement readiness.*

[10] Lusardi and Mitchell (2007) *Financial literacy and retirement preparedness: Evidence and implications for financial education*.

Financial confidence

Financial literacy

While there are few studies that focus on the topic of financial confidence in relation to numeracy specifically, there is some evidence to support the view that lower levels of financial literacy can impact on confidence in managing money. The Australian Commonwealth Bank Foundation cite research[11] that shows levels of confidence in relation to saving money and withstanding financial pressure are higher amongst individuals with higher financial literacy scores. In addition, there is evidence that indicates that lower levels of financial confidence can impact on engaging with financial matters and taking out financial products. For example, many individuals are deterred from entering the stock market because of low levels of financial confidence, underpinned by a lack of knowledge and understanding; studies amongst Dutch[12] and American[13] adults emphasise this point.

On the other hand, studies show that levels of over-confidence in relation to financial literacy can also have potentially negative impacts. Lusardi and Mitchell (2007)[14] cite evidence from Germany, United States, United Kingdom and Australia that demonstrate a mismatch between high levels of confidence in understanding financial issues, and far lower levels of *actual* comprehension. The authors conclude this could have a negative impact in terms of 'seeking out professional advice, thus widening the 'knowledge gap''. Having said that, the same authors find a strong correlation between 'objective and subjective literacy' in a 2009 paper[15]; that is, high levels of financial literacy are associated more strongly with those who report high levels of economic knowledge.

The issue of confidence in a financial context is also investigated as part of a study undertaken by the Financial Consumer Agency of Canada[16], which explores the relationship between knowledge (i.e. understanding of financial matters), skills (the ability to apply financial knowledge in everyday life) and confidence (the self-assurance to make important decisions). The findings showed that financial confidence is in fact a better predictor than financial knowledge when it comes to outcomes associated with day-to-day money and debt management. It also showed that those with high levels of knowledge are likely to experience relatively poor outcomes if they also have low levels of financial confidence, while those who have relatively low levels of knowledge achieve good outcomes in these areas if they have high levels of financial confidence. In line with findings related to financial literacy, the study found that groups with lower levels of financial confidence included women, those living in low-income households and those with lower levels of educational attainment.

There is evidence to suggest that dedicated financial education programmes have a positive impact not only on levels of financial knowledge, but also in relation to confidence. For example, in a financial training programme run with high school students specifically, Huddleston-Casas, Danes and Boyce (1999)[17] found that amongst those who participated in the programme, the proportion who 'almost always' felt confident about making decisions that dealt with money increased from around a fifth before the programme to around half thereafter. In addition, in a Literature Review undertaken by BIS[18] on workplace English and Maths skills, the authors cite evidence from various international programmes that demonstrate work-based literacy and numeracy programmes can improve employee confidence and morale.

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[11] Commonwealth Bank Foundation (2004) *Improving financial literacy in Australia: benefits for the individual and the nation. Key findings*

[12] Almenberg and Dreber (2011) *Gender, financial literacy and stock market participation.*

[13] Lusardi and Mitchell (2011) *The outlook for financial literacy*

[14] Lusardi and Mitchell (2007) *Financial literacy and retirement preparedness: Evidence and implications for financial education.*

[15] Lusardi and Mitchell (2009) *How ordinary consumers make complex economic decisions: Financial literacy and retirement readiness.*

[16] Palameta, Nguyen, Shek-wai Hui, Gyarmati (2016) *The link between financial confidence and financial outcomes among working-aged Canadians*

[17] Huddleston-Casas, Danes and Boyce (1999) *Impact Evaluation of a Financial Literacy Program: Evidence for Needed Educational Policy Change*

[18] BIS Research Paper Number 267 (2016) *Impact of Poor English and Maths Skills on Employers: Literature Review*

However, there are some indications that those who believe their numeracy skills to be lacking are less likely to want to improve in this area, making it potentially difficult to engage those with low numeracy, but who could gain good levels of financial confidence. Bynner and Parsons (2006)[19] undertook an analysis of longitudinal British Cohort Studies and found that ''around three-and-a-half times as many men and women with Entry Level 2 numeracy wanted to improve their numerical skills in comparison with men and women with Level 2 numeracy'.

Demographic differences

Gaps between perceived and actual levels of financial literacy also vary depending on a range of factors. Lusardi and Mitchell (2011)[20] undertake further analysis of self-assessed financial knowledge in relation to actual levels of financial literacy. The results show that those from younger age groups (who are more likely to have lower levels of financial literacy) are more accurate at self-assessing their financial knowledge than older age groups, where actual financial literacy is low but self-assessed financial knowledge is high. In addition, research shows that income and education impacts on levels of financial confidence.

A paper by Schagen and Lines (1996)[21] focussed on a variety of factors of day-to-day money management; groups such as single parents on benefits, families in rented accommodation and students were more likely to rate their confidence in carrying out a variety of day-to-day finance-related tasks lower than the general public.

There is also evidence to suggest that women are less confident in their financial capability than men. For students specifically, Chen and Volpe (2002) conclude that 'college women were found to be less confident, less enthusiastic, and less willing to increase their knowledge of personal finance compared to college men'[22]. Perhaps related to this, there are well-established differences in risk behaviour between men and women, with a United States study showing that men are more than twice as likely to be willing to take financial risks[23].

[19] Bynner and Parsons (2006) *New Light on Literacy and Numeracy; Results of the Literacy and Numeracy Assessment in the Age 34 follow-up of the 1970 British Cohort Study*

[20] Lusardi and Mitchell (2011) *Financial literacy and retirement planning in the United States.*

[21] Schagen and Lines (1996) *Financial Literacy in Adult Life: A Report to the NatWest Group Charitable Trust, Slough, Berkshire*

[22] Sole (2014) Financial Literacy: An Essential Component of Mathematics Literacy and Numeracy

[23] FINRA Investor Education Foundation (2012) *Financial Capability in the United States Report of Findings from the 2012 National Financial Capability Study*

Managing day-to-day

Numeracy

Studies clearly highlight the relationship between numeracy, financial literacy and day-to-day financial management. Activities such as managing a phone contract, paying utility bills and keeping track of finances generally tend to be more challenging for those who exhibit lower levels of numeracy, financial literacy and knowledge of financial matters.

The link between day-to-day financial management and numeracy specifically, is evidenced most directly in the latest Skills for Life Survey run by BIS (Department of Business, Innovation and Skills)[24]. When focussing on the frequency of checking bills or bank statements, it found that those who scored lower in numeracy assessments were less likely to check their bills on a regular basis. For example, only 5% of those who check bills or bank statements more than once a week have numeracy levels of Entry Level 1 or below, compared to a third (33%) at Level 1 and a quarter (24%) at Level 2 or above. The table below outlines the differences between numeracy level and frequency of checking in full.

		FREQUENCY OF CHECKING				CHECKS AT ALL	NEVER CHECKS
	All	Every day or most days	About once a week	About once a month	Several times a year		
	%	%	%	%	%	%	%
Entry Level 1 or below	7	5	5	8	13	6	15
Entry Level 2	17	15	15	19	23	16	24
Entry Level 3	25	25	25	26	28	25	27
Level 1	29	33	30	28	24	30	21
Level 2 or above	22	24	25	19	13	22	13
Unweighted	5824	1216	2161	1929	183	5489	323

Base: SfL2011 All aged 16-65 with numeracy score

Figure 1: Numeracy levels by frequency of checking bills or bank statements[1]

However, this study also highlighted the role that other factors besides numeracy can play in how frequently individuals check their finances, such as a lack of interest generally and dealing with banks on a less frequent basis. For example, the study found that respondents aged between 16 and 19, were just as likely as other age groups to rate their maths skills positively, but were the most likely to avoid checking bills and statements (17%, compared to 6% overall).

Atkinson (2007)[25] finds that 'making ends meet' is more challenging for those with lower literacy and numeracy skills. She unpicks the relationship between day-to-day management and numeracy as part of her secondary analysis of the Baseline Survey of Financial Capability (BSFC), originally undertaken on behalf of the Financial Services Authority (FSA, predecessor to the FCA) in 2005. While the survey did not directly identify those with numeracy difficulties, Atkinson concentrated on three groups of adults who were likely to have literacy and numeracy needs as a proxy:

- Group A: those with no qualification above a GCSE grade D-G or equivalent,
- Group B: those with no formal educational qualifications at all
- Group C: those people who were born in the UK but had difficulty reading English.

[24] BIS Research Paper Number 81 (2012) *The 2011 Skills for Life Survey: A Survey of Literacy, Numeracy and ICT Levels in England*

[25] Atkinson (2007) *Financial capability amongst adults with literacy and numeracy needs*

Using factor analysis on a series of attributes from the BSFC, the study developed a set of skills metrics relating to financial capability. On the skills metric 'making ends meet', those with literacy and numeracy needs were more likely to be rated poorly, with Group A in particular likely to struggle on this measure (28% were of this group were in the lowest performing quintile).

Financial literacy

A similar pattern emerges when exploring the link between managing day-to-day and financial literacy. A study run by the Commonwealth Bank of Australia (CBA) in 2004 was the first of its kind to explore the link between financial literacy and outcomes for individuals in Australia[26]. It found that lower financial literacy scores were closely related to respondents being unable to pay their mobile phone, utility and credit cards bills. Ultimately, this study demonstrated that there are significant economic benefits to individuals with higher levels of financial literacy, in terms of lower unemployment rates and higher incomes.

There is also strong evidence that highlights a link between those who score higher on financial literacy tests and following recommended financial practices. Hogarth and Hilgert (2002)[27] find a strong correlation between those who score higher on financial literacy tests and following recommended financial practices such as paying all bills on time and having an emergency fund. In spite of this, the same authors[28] place doubt on the causality of this relationship (that an increase in financial literacy and knowledge improves behaviour) arguing instead that knowledge may increase as wealth increases, or other factors such as family experiences and economic background, may affect both knowledge and behaviour.

[26] Marcolin and Abraham (2006) *Financial literacy research: current literature and future opportunities*

[27] Hogarth and Hilgert (2002): *Financial Knowledge, Experience and Learning Preferences: Preliminary Results from a New Survey on Financial Literacy*

[28] Hogarth and Hilgert (2003): Household Financial Management: The Connection between Knowledge and Behavior

Choosing products

Numeracy

Evidence suggests that higher levels of numeracy can positively impact on consumer product choice. For example, a study undertaken by the Institute for Fiscal Studies[29] – focussing on levels of basic numeracy amongst a cohort of people approaching retirement in England – found strong positive correlations between numeracy levels and product choices around retirement planning. These correlations persisted when controlled for other factors including education and wealth. In addition, in Atkinson's analysis of the Baseline Survey of Financial Capability (BSFC) (2007)[30] – outlined in detail on page 12 – she finds all three groups likely to exhibit numeracy needs to perform lower than average on financial capability scores relating to choosing products.

Financial literacy

A similar pattern applies to the relationship between product choice and financial literacy. Allianz recently published a study[31] looking at financial decision-making across Europe. The research measured levels of financial literacy (based on five questions) for ten European countries, and analysed this against a series of product choices. The study found that those with higher levels of financial literacy were considerably more likely to recognise the best financial product – 63% of the most financially literate chose the best financial product in at least two out of three cases, compared to 22% among the less knowledgeable respondents. In addition, on debt literacy specifically, Lusardi and Peter (2015) find that those with lower levels of tend to transact in 'high-cost manners, incurring higher fees and using high-cost borrowing'.

Decision-making process

There is evidence to suggest that those with lower levels of numeracy and/or financial literacy are more inclined to base their financial decisions on less rational factors. Atkinson (2007) finds that groups likely to exhibit numeracy needs were 'less likely to have used any information to inform their choice of product, or to have compared key features'. Furthermore, at an international level, Hastings and Tejeda-Ashton (2008) focussed on how workers view investment funds in Mexico, in the context of its privatised social security system. The findings demonstrated that the investment choices amongst those with lower levels of financial literacy were more likely to be based on easier-to-determine characteristics such as brand name, over fees and past returns.

There are also differences in the advice that individuals seek depending on levels of financial literacy. Hastings and Tejeda-Ashton found that those with lower levels of financial literacy are more likely to rely on employers and word-of-mouth in their investment choices. Indeed, women and low-income individuals in particular (groups that typically exhibit lower levels of financial literacy) were more likely to rely on employer advice as part of this decision-making process. Conversely, in a study focussed on Dutch adults, Van Rooij, Lusardi and Alessie (2011)[32] found that, when asked about the most important source of advice making important financial decisions for the household, those who display high levels of advanced literacy are 'much less likely to rely on informal sources of information such as family and friends, and much more likely to read newspapers and magazines, consult financial advisors, and seek information on the Internet'.

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[29] Banks and Oldfield (2007) *Understanding pensions: Cognitive functions, numerical ability and retirement saving*

[30] Atkinson (2007) *Financial capability amongst adults with literacy and numeracy needs*

[31] Allianz (2017) *When will the penny drop? Money, financial literacy and risk in the digital age 2017 report*

[32] Van Rooij, Lusardo and Alessie (2011) *Financial literacy and stock market participation*

Planning ahead

There is a wealth of evidence available focussing on the link between numeracy, financial literacy and long-term financial planning. Most studies point to a strong relationship between high levels of financial knowledge, financial literacy and/or numeracy, and effective financial planning.

Numeracy

The Institute of Fiscal Studies explored the link between numeracy and saving for retirement as part of a 2006 report[33]. The analysis focussed on the 2002 wave of the English Longitudinal Study of Ageing (ELSA) – a representative survey of 11,400 individuals in England aged 50 and over. The study found that numeracy impacts on both attitudes towards and understanding of retirement planning. There was a positive correlation between numeracy and measures of retirement saving and investment portfolios, even when controlled for other cognitive ability and education. In addition, numeracy is correlated with knowledge of pension arrangements, and with perceived financial security, even when controlled for other cognitive ability, education and the level of overall retirement saving.

Lusardi (2011)[34] focusses on how specific aspects of numeracy impact on financial planning. She finds that understanding of interest compounding is low, which she argues is concerning given that calculations about compound interest form a part of most financial decisions. The study finds that those who cannot do a 2% interest rate calculation are much less likely to plan for retirement and accumulate wealth more generally, citing evidence from the United States, Russia, Sweden and the Netherlands.

Financial literacy

There are various international studies that further examine the relationship between financial literacy and retirement planning. For example, Lusardi and Mitchell (2009)[35] focus on the retirement planning of American adults, and find that financial literacy is highly influential in this process. The study established levels of financial literacy by analysing responses to questions on basic financial concepts such as numeracy, compound interest, inflation and risk diversification. Analysing this data (through a multivariate regression) against the question 'how much have you thought about retirement?' the data showed that even with demographic and socio-economic factors held constant, financial literacy is indeed influential in retirement planning. In addition, the analysis found that sophisticated financial knowledge is the most important factor over others in this decision-making process.

Bucher-Koenen, Tabea and Lusardi (2011)[36] explore the link between financial literacy and retirement planning amongst German adults. The study measures financial literacy by asking questions relating to interest, inflation and risk, and analyses the results against self-reported levels of retirement planning. The study finds that those who answer the financial literacy questions correctly are more likely to have planned for retirement and, after running multivariate analysis, shows that financial literacy and retirement planning are positively correlated. Similarly, studies amongst individuals in Russia[37] and Switzerland[38] also find correlations between high levels of financial literacy and retirement planning.

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[33] Institute for Fiscal Studies (2006) *Understanding Pensions: Cognitive Function, Numerical Ability And Retirement Saving*

[34] Lusardi (2011) *Numeracy, Financial Literacy, and Financial Decision-Making*

[35] Lusardi and Mitchell (2009) *How Ordinary Consumers Make Complex Economic Decisions: Financial Literacy and Retirement Readiness*

[36] Bucher-Koenen, Tabea and Lusardi (2011): *Financial Literacy and Retirement Planning in Germany*

[37] Klapper and Panos (2011) *Financial literacy and retirement planning: the Russian case*.

[38] Brown and Graf (2013) *Financial Literacy and Retirement Planning in Switzerland*

There is also evidence that highlights a link between financial literacy and investing in the stock market. Christelis, Jappelli and Padula (2006)[39] focus on the link between portfolio choice and cognitive ability by focussing on three domains of cognitive abilities: numeracy, verbal fluency and memory. Through a series of regressions, the study concludes that all three have an independent effect on the decision to hold stocks (as the multivariate analysis controls for education) and 'support the hypothesis that higher cognitive abilities, through their association with lower risk aversion, lower information costs, or higher perceived Sharpe ratio, raise stock market participation.' In addition, Lusardi (2011)[40] cites various papers that reach a similar conclusion on the link between financial literacy and stock market participation.

Demographic and attitudinal differences

Most studies point towards a difference in attitudes towards long-term financial planning at a demographic level, with older, wealthier and more educated individuals more likely to take a more active approach to saving and investments[41]. Furthermore, at a deeper, more emotional level, there is some research to indicate that less numerate individuals attach more importance to consumer decisions in the short term over long-term financial planning. Studies have shown that individuals who are less numerate and have lower cognitive ability will be more likely to be influenced by short-term costs and benefits than those occurring in the distant future[42]. In addition, a study of Swedish adults[43] explored levels of exponential growth bias (i.e. underestimating the future value of investments rather than overestimating) in relation to levels of financial literacy by asking survey participants to predict the long-term value of an investment. It found that those with more advanced financial literacy skills were less likely to exhibit exponential growth bias.

[39] Christelis, D., T. Jappelli, and M. Padula (2006) *Cognitive abilities and portfolio choice*

[40] Lusardi (2011) *Numeracy, financial literacy, and financial decision-making*

[41] Schagen and Lines (1996) *Financial Literacy in Adult Life: A Report to the NatWest Group Charitable Trust*

[42] Frederick (2005) *Cognitive Reflection and Decision Making*

[43] Almemberg and Gerdes (2011) *Exponential Growth Bias and Financial Literacy*

Interventions

The role of numeracy in financial education

Yet the merit of incorporating numeracy into wider financial education programmes is not clear-cut. As noted earlier, many other (often less rational) factors feed into financial decision-making, and it has also been difficult to draw a causal effect between financial education programmes and future behaviour[44]. In addition, interest in education programmes is often lower amongst the individuals that would yield the most benefit from them. As noted earlier, Bynner and Parsons (2006)[45] demonstrate that those who have more advanced numeracy skills, are already more likely to want to develop their skills. Meanwhile Meier and Sprenger (2007)[46] find that future-oriented people are the most likely to agree to attend financial education programmes (a group that are more likely to manage their personal finances better), and thus conclude that 'selection into financial education contributes to an overestimation of positive impacts'.

There are also concerns around the format financial education programmes should take, and the extent to which numeracy should play a role. Carpena, Cole, Shapiro and Zia (2011)[47] consider the value of combining numeracy with wider financial education programmes. In a study that focusses on the impacts of a financial education program in India (relating to savings, credit, insurance and budgeting), they find that financial education has a positive impact on changing individuals' awareness of and attitudes towards financial products. However, the authors conclude that financial education has limited effects in increasing financial numeracy but does influence awareness of and attitudes towards financial products and financial planning tools. They therefore suggest that 'measuring financial literacy should not exclusively focus on questions that require high numeracy skills…making individuals and households more aware about the details of financial products, or changing their attitudes towards purchasing and recommending formal financial products and services… may be as important, if not more, than enhancing numeracy skills.'

Effective interventions

Many sources promote the use of numeracy and/or financial education programmes in order to positively influence decisions around choosing products and financial behaviour more generally. There is evidence that such programmes have the desired effect; based on a review of over 100 financial education programmes across the World, Kaiser and Menkhoff (2016)[48] find that financial education has a demonstrably positive impact on financial literacy, as well as a positive impact on behaviour (though to a lesser extent). These programmes are often targeted at groups with low numeracy needs. For example, the Institute of Fiscal Studies report[49] (outlined in further detail on page 17) finds a positive correlation between numeracy and measures of retirement saving and investment portfolios, and therefore recommends targeting relevant information at low numeracy groups (as well as low income and low education groups who are more likely to have numeracy needs).

However, as previously mentioned, those who have the lowest numeracy skills are often hard to engage in such intervention programs. Therefore, there is no conclusive evidence across the existing literature as to which types of interventions are most effective. All types of programs appear to have positive impact on those with fair to good numeracy; but analysing which are most effective for those who need them most proves difficult.

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Current evidence and knowledge gaps - recommendations

Knowledge gaps

It is difficult to ascertain specific everyday barriers to managing money; literature outlines what is struggled with (e.g. paying a phone bill), but not why. Also, whilst 'short-term attitudes' are frequently mention, these are not specifically outlined and are certainly not explored in any detail. Further qualitative work, such as face-to-face interviews or ethnographies would enable empirical evidence to be gathered that could provide understanding in both these areas.

In addition, there is also a distinct lack of information on financial capability and ethnicity, with gender, income and education being the demographic factors most focussed on.

Considerations for adult basic skills policy

It is important to acknowledge that while very poor numeracy makes financial literacy difficult, it is not necessarily the case that relatively poor numeracy is linked to poor financial literacy. Therefore, interventions that aim to help individuals understand the *ideas* behind financial products may be more appropriate than those that teach numeracy alone. This may also help engage those who believe their numeracy skills to be lacking and are therefore put off existing interventions.

It is also clear from the evidence analysed here that financial confidence makes for greater financial capability and better decisions (and vice versa). Therefore, interventions should aim to build financial confidence, especially in understanding financial products.

Conclusions

Numeracy and financial capability

There are various sources that demonstrate a strong correlation between numeracy and/or financial literacy and levels of financial capability – those who exhibit more advanced numeracy and/or financial literacy tend to be more effective financial decision-makers. Yet there is less evidence that shows a causal relationship, with background, general education and wealth all feeding into this complex dynamic. Furthermore, less rational choice factors are also found to play a significant role in the financial decision-making process, particularly for less numerate individuals.

At a demographic level, several studies highlight a gender gap on both numeracy and financial literacy, with men consistently performing more strongly than women in these areas. This impacts on financial decisions; for example, women tend to be less likely to plan for retirement and participate in the stock market. There are also consistent gaps across other demographics, with those from lower incomes, minority backgrounds and lower levels of education found to perform more poorly on numeracy and financial literacy tests.

Financial confidence

Lower levels of financial literacy can impact on confidence on making financial decisions, such as managing money and taking out financial products. However, there is also a detriment to being over-confident in relation to financial literacy, with such individuals less likely to seek professional advice and potentially making poorer decisions as a result. Furthermore, one Canadian-based study highlighted that confidence is a better predictor of financial outcomes (related to day-to-day money and debt management) than financial knowledge specifically. Dedicated financial programmes can have a positive impact in relation to levels of financial confidence, yet those who have lower levels of confidence in their numeracy skills are typically less likely to want to improve in this area.

There are large gaps between perceived and actual levels of financial literacy depending on demographic and social background. For example, amongst older age groups, levels of confidence are higher than warranted, while younger age groups are more accurate at self-assessing their financial knowledge. Women are also less likely to be confident in their financial capability, and perhaps related to this, they are less likely to be willing to take financial risks more generally.

Managing day-to-day

There is a strong link between numeracy skills and day-to-day financial management. The latest Skills for Life Survey run by BIS shows that those with more advanced numeracy skills are more likely to check bills or bank statements on a regular basis. Similarly, several studies highlight the relationship between managing day-to-day and high levels of financial literacy. A study from Australia, for example, demonstrated that lower financial literacy scores are closely related to payment of mobile phone, utility and credit card bills.

However, the evidence to support this relationship is usually caveated by other factors. Those who are less likely to keep on top of day-to-day financial management may take less of an interest generally, while background factors such as income and education can play a role, again undermining the case for a causal relationship.

Choosing products

Various studies highlight the relationship between numeracy and/or financial literacy and product choice. For example, the Institute for Fiscal Studies found strong correlations between numeracy and product choices around retirement planning, even when controlled for factors such as education and wealth. There is also evidence that shows those with lower levels of numeracy and/or financial literacy make financial choices using less information, and base these decisions on less rational factors. On the other hand, those with more advanced numeracy and/or financial literacy tend to use sources such as financial advisors, and make better informed decisions more generally.

Planning ahead

Several studies demonstrate a strong link between numeracy and/or financial literacy and planning ahead, particularly in relation to retirement planning. Evidence from the UK and internationally demonstrates a positive correlation in this area, which persists when controlled for a range of demographic factors. In addition, a similar pattern emerges when focussing on the link between financial literacy and investment in the stock market. Generally, long-term financial planning is more likely to be undertaken by older, wealthier and more educated individuals, with these groups taking more of an active approach to savings and investments. At an attitudinal level, there is also some evidence that indicates less numerate individuals are more like to consider short-term over long-term financial planning.

Interventions

There are several studies that demonstrate the positive impact of financial education programmes in terms of advancing financial literacy and encouraging behaviour change. Many of these interventions are targeted at groups that exhibit low levels of numeracy and/or financial literacy. However, such groups tend to be less likely to take part in financial education initiatives, thus undermining the positive impacts that such programmes can have. There is also some debate around the extent to which numeracy should play a role in financial education programmes – one study suggests that educating consumers on purchasing decisions and making them more aware about financial products and services could potentially have more of a positive impact than focussing on numeracy skills specifically.

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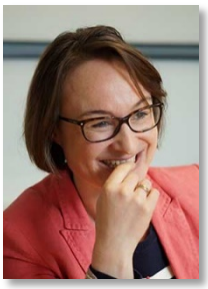

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Awards for Marketing Effectiveness
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MRS Evidence Matters
MRS Awards 2014
Finalist
Financial Services Research

Appendices

1.1 Appendix 1: Details of studies referred to

Allianz (2017) ***When will the penny drop? Money, financial literacy and risk in the digital age***
Allianz surveyed 1000 people in each of 10 western European countries (Austria, Belgium, France, Germany, Italy, the Netherlands, Portugal, Spain, Switzerland and the United Kingdom). The process was conducted online, with a sample provided by the survey research company SSI (Survey Sampling International – www.surveysampling.com). The samples were representative of the population of each country with respect to age, sex and geography.

Almenberg and Dreber (2011) ***Gender, financial literacy and stock market participation***
Almenberg and Dreber use data from the 2010 consumer survey commissioned by the Swedish Financial Supervisory Authority. The data was collected through a telephone survey of an independent random sample of approximately 1,300 Swedish residents that are representative of the adult population.

Almemberg and Gerdes (2011) ***Exponential Growth Bias and Financial Literacy***
Almenberg and Gerdes use data from the 2010 consumer survey commissioned by the Swedish Financial Supervisory Authority, as above.

Atkinson (2007) ***Financial capability amongst adults with literacy and numeracy needs***
Atkinson's study is based on interviews from the Baseline Survey of Financial Capability commissioned by the Financial Services Authority (FSA), now the Financial Conduct Authority (FCA). Interviews were conducted face-to-face by the British Market Research Bureau (now known as Kantar) between June and September 2005. Interviews were conducted with 5,328 people across the UK, using a random location sample.

Banks and Oldfield (2007) ***Understanding pensions***
Banks and Oldfield used the 2002 wave of the English Longitudinal Study of Ageing (ELSA), which is a survey of 11,392 individuals that provides a representative sample of the English population aged 50 and over on 29 February 2002.

BIS Research Paper Number 81 (2012) ***The 2011 Skills for Life Survey***
The Skills for Life 2011 Survey administered 25-minute-long, computerised assessments in literacy, numeracy and ICT topics to respondents during their interviews. Additional information was collected from respondents during the face-to-face interviews to help understand the demographic, social and motivational factors related to basic skills. In all, 7,230 interviews were conducted between May 2010 and February 2011.

Brimble and Blue (2013) ***Tailored Financial Literacy Education: An Indigenous Perspective***
Brimble and Blue's study took a literacy program successfully run in a number of non-indigenous settings and tailored it in terms of the content, delivery and logistics for this purpose in Australia and Canada. Data was collected from participants and facilitators to examine the outcomes of the program and the efficacy of the tailored approach.

Brown and Graf (2013) ***Financial Literacy and Retirement Planning in Switzerland***
Brown and Graf used a representative survey covering 1,500 households to document the level of financial literacy in Switzerland and to examine how financial literacy is related to retirement planning.

Bucher-Koenen, Tabea and Lusardi (2011) ***Financial Literacy and Retirement Planning in Germany***
This study was based on data from a representative German household panel. It was first conducted in 2001 by the Mannheim Research Institute for the Economics of Aging (MEA). Consecutive waves of the survey were in the field in 2003/2004 and every year since 2005. In 2009, 2,222 households were in the panel. The data was collected during the early summer of 2009.

Bynner and Parsons (2006) ***New Light on Literacy and Numeracy***

This study drew on data from the 1958 and 1970 British birth cohort studies, which have followed up individuals throughout their lives, with new data about the cohort members collected at regular intervals. The National Child Development Study (NCDS) has followed up all 17,000 individuals born in a single week in 1958. The 1970 British Cohort Study (BCS70), which is the subject of this report, has followed up all 16,500 individuals born in a single week in 1970. The two main parts of the survey comprised the Core Interview, which was completed by 9,665 cohort members, and the Parent and Child Interview, which was completed by 2,846 cohort members including information on 5,207 of their children. These samples were fully representative of the original cohort.

Christelis, Jappelli, and Padula (2006) ***Cognitive abilities and portfolio choice***

This study uses the Survey of Health, Ageing and Retirement in Europe (SHARE). The survey has detailed data on wealth and portfolio composition of individuals aged 50+ in 11 European countries and three indicators of cognitive abilities: mathematical, verbal fluency, and recall skills.

Commonwealth Bank Foundation (2004) Improving financial literacy in Australia

A national telephone survey was conducted with 5000 Australians aged 16 – 65 years, between August 18 and September 9, 2004, using Computer Assisted Telephone Interviewing (CATI).

FINRA Investor Education Foundation (2012) ***Financial Capability in the United States Report of Findings from the 2012 National Financial Capability Study***

This study uses data from the 2012 and 2009 NFCS State-by-State Surveys, each of which were nationwide online surveys of over 25,000 American adults.

Hastings and Mitchell (2011) ***How financial literacy and impatience shape retirement wealth and investment behaviours***

This paper uses experimental evidence derived from the 2009 Chilean Encuesta de Protección Social (EPS or Social Protection Survey) to evaluate how financial literacy and impatience predict saving and investment decisions. The EPS is a nationally representative panel of respondents followed every two years, fielded by the University of Chile's Microdata Center in cooperation with the University of Pennsylvania.

Hogarth and Hilgert (2002) ***Financial Knowledge, Experience and Learning Preferences: Preliminary Results from a New Survey on Financial Literacy***

The Federal Reserve commissioned additional questions regarding a household's financial knowledge, experience, behaviours, learning experiences, and learning preferences in the monthly Surveys of Consumers. These surveys measure changes in consumer attitudes and expectations with regard to consumer finance decisions. Each monthly telephone survey of 500 households includes a set of core questions covering consumer attitudes and expectations along with socioeconomic and demographic characteristics. The questionnaire was administered in November and December 2001; the data contains information from 1000 respondents.

Hogarth and Hilgert (2003) ***Household Financial Management***

Study based on same data as above.

Huddleston-Casas, Danes and Boyce (1999) Impact Evaluation of a Financial Literacy Program

This study was based on 738 surveys to teachers in the US using the financial education part of the curriculum; then 188 student and teacher surveys.

Institute for Fiscal Studies (2006) Understanding Pensions

This study used the 2002 wave of the English Longitudinal Study of Ageing (ELSA) which is a survey of 11,400 individuals that provides a representative sample of the English population aged 50 and over on February 29 2002.

Klapper and Panos (2011) ***Financial literacy and retirement planning: the Russian case***
This study analyses results of a detailed survey of financial literacy administered to a nationally representative sample of 1,400 Russian individuals. The survey includes questions on financial literacy, retirement planning, and the use of various financial products as well as detailed demographic and socioeconomic information.
Lusardi and Mitchell (2007) Financial literacy and retirement preparedness
This study uses data from the 2004 US Health and Retirement Study to evaluate whether Baby Boomers are relatively well informed about financial matters. Specifically, it focuses on some 1,700 Early Boomers age 51-56 in 2004.

Lusardi and Mitchell (2009) ***How ordinary consumers make complex economic decisions***
This study was based on the Health and Retirement Study (HRS), a nationally representative longitudinal dataset of Americans over the age of 50. For the 2004 HRS wave, Lusardi and Mitchell designed and administered a special module on financial literacy and retirement planning.
Money Advice Service (2015) Measuring financial capability
This study is based on the 2015 Adult Financial Capability Survey for the UK. This was a major piece of research involving over 3,500 interviews with a representative sample of the UK population, supplemented by additional interviews in the devolved nations and amongst younger consumers aged 18-24.

Palameta, Nguyen, Shek-wai Hui, Gyarmati (2016) ***The link between financial confidence and financial outcomes among working-aged Canadians***
This study used data from the 2014 Canadian Financial Capability Survey (CFCS)

Schagen and Lines (1996) ***Financial Literacy in Adult Life: A Report to the NatWest Group Charitable Trust, Slough, Berkshire***
For this study, MORI carried out a face-to-face survey of 772 people who fell into five 'at risk' groups.

Van Rooij, Lusardo and Alessie (2011) ***Financial literacy and stock market participation***
This study used data from the 2005 DNB Household Survey (DHS). DHS is an annual household survey covering information about demographic and economic characteristics and focusing on wealth and saving data. The panel is run by CentERdata, a survey research institute at Tilburg University that specializes in internet surveys. The data set is representative of the Dutch population, and it contains over 2,000 households. In addition to using data from the main core of the DHS, the study also used data from two modules (added to the survey in 2005 and 2006) which were designed by the authors.

Appendix 2: Questions used to measure numeracy and financial literacy in Allianz (2017)

Lusardi and Mitchell questions to test financial literacy

- Compound interest

Suppose you had £100 in a savings account and the interest rate was 2% per year. After five years, how much do you think you would have in the account if you left the money to grow?
More than £102
Exactly £102
Less than £102
Don‘t know
Refuse to answer

- Inflation

Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After one year, how much would you be able to buy with the money in this account?
More than today
Exactly the same
Less than today
Don‘t know
Refuse to answer

- Diversification

Do you think the following statement is true or false? “Buying a single company stock usually provides a safer return than a stock mutual fund.”
True
False
Don’t know
Refuse to answer

Lusardi and Tufano questions to test risk literacy

- If the chance of getting a disease is 10 percent, how many people out of 1,000 would be expected to get the disease?
-
- If 5 people all have the winning number in the lottery and the prize is 2 million dollars, how much will each of them get?