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Develop a retirement plan and stick to it: it will improve both your attitude and behavior with money

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Abstract

This study explores the relationship between financial literacy, behavior and attitude, and retirement savings decisions. Members of a South African tertiary institution's retirement fund were surveyed and multistage multivariate regression and mediation analyses showed that developing and conforming to a retirement plan positively influenced financial attitude and behavior. This indicates that interventions should focus on the specific behaviors which drive retirement planning, rather than financial literacy in isolation. Use of formal tools such as consulting with a financial planner also increases the relative risk of successful retirement planning. This presents a tangible and linear approach towards improved financial behavior. © 2020 Academy of Financial Services. All rights reserved.

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1. Introduction

Many investors lack a basic understanding of financial concepts and a sizeable proportion of the population in a number of countries lack financial literacy (Atkinson & Messy, 2012). An awareness of this creates the need to understand the potentially deleterious effects of this lack of financial literacy on an individual's financial wealth. This study focuses on retirement savings as one aspect of financial wealth, with specific focus on the attitude, behavior, and retirement savings decisions that are made by individuals. Thus, this study aims to

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assess more than just financial literacy, but also the impact of several variables on financial attitude and financial behavior.

The social and broader macroeconomic context within South Africa is such that consumers are unable to only rely on the state and/or their employer for financial security in retirement. The National Treasury (2014) has stated that only an estimated six percentage of South Africans will be able to replace their full income at retirement and maintain their lifestyle. The situation South Africa finds itself in is not too dissimilar to other countries. In the United States, a shift from a few decades ago shows Americans needing to rely on 401(k)-type accounts to supplement social security in retirement (Morrissey, 2016). Additionally, this retirement wealth has been unable to grow at the same pace that the aging population has. In Canada, the threat of widening intergenerational inequality exists (McKenna, 2015). Almost half of Canadian families nearing retirement have no accrued employer pension benefits (Shillington, 2016). The cost of health care and Old Age Security, which is paid out of current revenues, is rising at a faster rate than the tax base.

This study is important because it goes beyond the measurement of financial literacy and assesses the connections with retirement savings decisions and behaviors. It does this by assessing not just the impact of financial literacy on thinking and planning for retirement, but also the interconnectedness between financial literacy, financial attitude, planning for retirement and financial behavior. Focusing on South Africa, which is rich in diversity with large inequality and unemployment rates (Statistics South Africa, 2018; Taylor, 2002), also provides a unique perspective on a community not too dissimilar to comparable developing economies across the world.

The research approach includes multivariate regression and mediation analysis on data obtained from surveying members of a South African tertiary institution's retirement fund. Socioeconomic information for each respondent was obtained directly from the retirement fund, allowing for the necessary objective controls when assessing the proposed relationships.

The results show that it is not financial literacy that is positively related to financial behavior. Rather, developing and conforming to a retirement plan, is the predictive variable. Furthermore, a positive financial attitude is shown to be positively associated with financial behavior. However, further mediation analysis showed that being a more successful planner was associated with a better financial attitude and in turn better financial behavior. Furthermore, a formal approach to retirement planning, such as consulting with a financial planner, can assist in being a more successful planner.

These results are helpful as they provide the basis for a tangible plan to improve retirement saving for individuals. Furthermore, educational interventions can be targeted to specific behaviors, rather than financial literacy in isolation.

This study continues by reviewing literature on financial literacy and financial behavior. Thereafter, the research method is presented, which includes descriptive statistics to understand the socioeconomic breakdown of the respondents. The measurement of variables is also discussed. The results continue to present the output from multivariate regression and mediation analyses that critically assess the relationship among the measured variables. Discussion on the outcomes are presented and conclusions and recommendations made which are broadly applicable across the globe.

2. Literature review

Analyses of the level of financial literacy of individuals will be reviewed and potential sources from which retirement savings information is received will be summarized. After that, connections with a consumer's associated financial behavior (i.e., their propensity to save for retirement) will be examined. Studies that have looked at education interventions will also be considered as a possible means to improve financial literacy.

2.1. Financial literacy

Financial literacy includes financial knowledge, awareness, and skills and capability, with the last of those being inclusive of financial planning (Xu & Zia, 2012). Lusardi and Mitchell (2011) measured how workers made their savings decisions, how they collected information to make such decisions and whether these workers possessed the financial literacy needed to make such decisions. Lusardi and Mitchell (2011) found financial illiteracy to be most common among older Americans and that minorities, women, and consumers without a college or high school degree were most susceptible to having low financial knowledge. This was supported by Xu and Zia (2012) who found women to have lower levels of financial literacy in almost all the countries they investigated.

Using a ten-question financial literacy experiment, Agnew and Szykman (2005) found that individuals tended to gain financial experience as they age, which increased their financial literacy. The researchers found that married consumers performed better than those who were single. However, individuals with children had lower levels of financial literacy than those without children. The variable with the most significant effect on the test scores was salary levels, which were found to decrease test scores as salary levels decreased. The worst performers were those without a college degree. Furthermore, investigating financial literacy across a number of countries, Xu and Zia (2012) found higher-income countries to perform better on financial literacy tests than lower-income countries, and that levels of financial literacy followed an inverted-U shape when plotted against age. Agnew and Szykman (2005) noted that consumers with the lowest results on a financial exam were the same types of consumers who were not saving enough for retirement. This literature presents a potential correlation between financial literacy and retirement savings decisions. Furthermore, certain socioeconomic characteristics such as age, gender, marital status, and salary appear to influence financial literacy. However, further insight from meta-analyses and studies using methods to arrive at causal estimates is required.

Showing that planning and financial literacy are interconnected, Lusardi and Mitchell (2011) found that those individuals who displayed financial literacy were more inclined to plan and, furthermore, to succeed in that plan. This demonstrates a possible association between financial literacy and planning for retirement, which might result in successful retirement savings outcomes. Furthermore, Olsen and Whitman (2007) found that poor savings can be ascribed to a lack of suitable retirement goals.

2.2. Source of information

The source from which a consumer receives financial information could play an integral part in their overall financial welfare (Olsen & Whitman, 2007). In the United States, men, older and better-educated consumers, non-Hispanic Whites, and those earning $70 000 or more a year were found to be significantly more likely to use formal advisors. Those earning less than $20 000 a year were more likely to rely on an informal advisor (Olsen & Whitman, 2007).

Research has shown that people with low basic literacy capabilities rely on informal sources of information, such as friends and family. Conversely, the proportion of households that rely on *inter alia* newspapers, books, financial magazines and financial information on the internet increases considerably as they move from a low level to a higher level of basic literacy. Professional financial advisors are also more likely to be trusted by those households displaying higher financial literacy (Van Rooij et al., 2011).

Moving from basic to advanced financial literacy, the result is similar but more pronounced. Those individuals who display high levels of advanced financial literacy are less likely to rely on informal sources of information and are more likely to consult financial advisors and seek information in newspapers and on the internet (Van Rooij et al., 2011). These findings propose a possible link between the tools that individuals use as a source of retirement saving information and their level of financial literacy.

Next, studies investigating the effect of financial education interventions will be reviewed, in so much as its potential impact on financial literacy and financial behavior.

2.3. Influencing financial behavior

Miller et al. (2015) conducted a meta-analysis on 188 papers and articles that presented impact results of interventions designed to improve financial literacy and/or financial behavior. Key findings were that financial literacy and capability interventions can have a positive impact in certain areas such as increasing savings and promoting certain financial skills, such as record keeping (Miller et al., 2015). In South Africa specifically, financial messages delivered through a popular soap opera improved certain financial behaviors such as borrowing from a formal financial institution rather than retailers which come with higher costs (Berg & Zia, 2013).

A study that focused on the effect of financial education on debt outcomes in early adulthood was performed by Brown et al (2016). The interventions themselves were related to various changes to state-level high-school curricula which varied between financial literacy, economics, and mathematics course offerings. The results showed significant positive effects of financial literacy exposure on increased debt knowledge of youth—in that it increases the occurrence of credit reports thus inferring an understanding of the importance of building a credit record (Brown et al, 2016). Furthermore, for those who had a credit report, math and financial literacy reduced average debt balances and the likelihood of carrying debt. The net effect of both math and financial literacy education was an increase in average creditworthiness. This positive impact of mathematics education is confirmed by Goodman (2009) and Cole et al. (2013) who show that students exposed to more math training have higher average incomes and savings.

Less promising findings by Brown et al. (2016) showed that economic education resulted in increased debt balances, specifically debt for the purpose of supporting consumption. This suggests that while economics training might clarify borrowing and credit markets, it does not improve the ability to make appropriate financial decisions. These results suggest that financial education programs might have a significant impact on the financial decision-making of youth. However, the content of these programs should be carefully constructed. There appears to be different roles for different types of quantitative education in influencing young adults' debt experiences. Brown et al. (2016) do acknowledge a shortcoming in the research in that they were unable to disassociate effects by demographics. This provides impetus for the research that this paper is attempting which controls for the socioeconomic breakdown of respondents.

A further natural experiment looked at the effect of a mandatory eight-hour Personal Financial Management Course (PFMC) on newly enlisted soldiers in the U.S. Army (Skimmyhorn, 2016). The PFMC covered principles (e.g., the time value of money), rules of thumb (e.g., how to obtain a copy of your credit report), and the financial decisions young workers are most likely to face (e.g., buying a car). Attendance at the course succeeded in increasing average monthly contributions and retirement savings rates, the effect of which lasted at least two years. Furthermore, the probability of having adverse legal actions or delinquencies in the first year after the course was reduced. However, this effect did not hold in the second year. These results are somewhat contrary to Brown et al. (2016). Potential explanations could be that Brown et al. (2016) focused on the decision's youth make shortly after leaving high school. Skimmyhorn (2016) present several reasons explaining the success of the PFMC. For one, the course is well-timed for individuals who are becoming increasingly responsible for their own financial wealth. Second, the course has a focused curriculum which covers only the most relevant topics for its cohort of students. Finally, the course offers tailored advice (e.g., use credit when purchasing assets not consumables) rather than broad principles (e.g., how to prepare a net-present-value calculation), which helps maintain the students' attention and interest.

Another notable financial education intervention is the supplemented high-school curriculum in Brazil. Using a randomized control trial, Bruhn et al. (2016) studied the impact of this comprehensive financial education program in six states, 868 schools, and approximately 20,000 high school students in Brazil. The program used new textbooks with interactive classroom exercises, practical homework (e.g., creating a household budget with parents), and relevant role-playing exercises. Teachers were supported with training, instructor handbooks, and internet-based learning tools. The program increased the financial knowledge of the students that led to an increase in saving for purchases, a greater likelihood of financial planning, and greater participation of students in household financial decisions. Positive effects were also noted on students' intertemporal preferences and attitudes. Furthermore, there was evidence of "trickle-up" whereby the parents of these students also showed improved financial knowledge, saving, and spending behavior (Bruhn et al, 2016). These results suggest that financial education might be a valuable complement to the typical high-school curriculum. However, such education requires greater intensity than that which is seen in characteristic once-off financial education training.

A final meta-analysis of the relationship of financial literacy and education on financial behavior was performed by Fernandes et al. (2014) across 201 prior studies. The results showed that interventions to improve financial literacy explained only 0.1% of the variance in the financial behaviors studies. Additionally, financial education deteriorated over time. Also, the effects of financial literacy reduce when controlling for certain psychological traits that were omitted in the prior studies investigated. This emphasizes the need for further research in the field of financial literacy to control for these psychological traits. This will be considered in this article.

Building the case on the importance of psychological traits, Miller et al. (2015) propose that omitted variables related to such psychological traits (such as impulse control, self-efficacy and delayed gratification) contribute to the variance in the results for financial education interventions. Miller et al. (2015) posit that the variance is because people with certain psychometric profiles are more likely to engage in activities that might improve their financial literacy and, in turn, their financial outcomes. However, these behaviors (specifically self-control) are not the typical focus of financial education interventions.

3. Method

The findings from the literature review inform the following three research questions for this study:

1. Does an individual's level of financial literacy influence him/her thinking about retirement?
2. Does an individual's level of financial literacy influence him/her planning for retirement?
3. Does an individual's level of financial literacy and/or financial attitude and/or the type of planner he/she is influence his/her financial behavior?

Thus, the results will present findings on the connection between financial literacy, financial behavior, financial attitude and retirement savings decisions. Of which the latter encapsulates thinking and planning for retirement.

Staff at The University of Cape Town (UCT) who were members of the UCT Retirement Fund (UCTRF) were targeted for a survey. The UCTRF was established on January 1, 1995 and is a Defined Contribution Provident Fund. All permanent and fixed-term contract employees of UCT, inclusive of academic and support or administrative staff, who have not yet reached the normal retirement age, automatically become members of the UCTRF upon their appointment.

The UCTRF is relevant to the South African landscape in that it is a large fund (both in terms of number of members and accumulated funds) and that it combines academics and administrative staff that are from very different walks of life. Thus, while the results may not be generalizable to the rest of South Africa in a statistical sense, as a single case study, it provides relevant information that is theoretically or logically generalizable.

Participants were asked questions to determine their level of financial literacy, financial behavior, financial attitude, and whether they thought about and planned for their retirement. Most of the questions used were drawn from previous studies (notably Atkinson & Messy, 2012; Lusardi & Mitchell, 2011, 2017; and Van Rooij, Lusardi, & Alessie, 2011). These questions have been used in a number of studies worldwide, including: Australia (Agnew, Bateman, & Thorp, 2013), Switzerland (Brown & Graf, 2013), France (Arrondel, Debbich, & Savignac, 2013), Russia (Klapper & Panos, 2011), Romania (Beckmann, 2013), and Japan (Sekita, 2011).

Certain socioeconomic characteristics were also garnered from the survey questions. Appendixes A– C show the various questions. Furthermore, the UCTRF agreed to provide certain sociodemographic information for each participant such as age, gender, race, cost of employment (COE) and highest qualification (all as at July 31, 2014). The inclusion of these characteristics addresses some of the variances noted by Brown et al. (2016) and Miller et al. (2015) in the literature reviewed.

3.1. Research strategy

The survey was cognitively tested by 11 people (five males and six females of differing ages) to evaluate the wording and design of the survey (Willimack, Lyberg, Martin, Japec, & Whitridge, 2004). The suggestions from this testing were analyzed and, where appropriate, changes were made to update and improve the original survey questions. The cognitive testing was done in stages; not all 11 testers tested the survey at the same time. This was done to enable each subsequent tester to test any changes suggested by the previous testers. The changes made and the reasoning for each amendment were as follows:

- Changing certain Americanisms to South African terminology (e.g., replacing "firm" with "company" and "stock" with "share").
- Some of the ordered response options were re-ordered from "disagree to agree" to "agree to disagree," as most testers seemed to anticipate that construction.
- References in financial knowledge questions to "savings accounts" and "shares" were changed to include "savings accounts/cash" and "shares/equity" to avoid incorrect responses owing to differing terminology.
- References to "moderate" risk companies were changed to "medium" risk companies for more universal/easier language use.

The UCTRF had 3 602 members as at May 31, 2014 to whom surveys were sent. Of these 3,602 members, 3,333 had access to email. The survey was emailed to these members on Tuesday, August 26, 2014 and remained open until the end of that week. The remaining 269 members had hard copies of the survey (with self-addressed return envelopes) posted to them. A total of 764 responses were received (of which 23 were in hard-copy format). This equated to a total response rate of just over 21%.

The responses were sent to the UCTRF by the respondents. The UCTRF used the staff number provided by each respondent to identify and provide relevant information such as but not limited to: age (as of July 31, 2014), race, gender, cost of employment (COE), and

highest qualification level. However, the UCTRF was unable to give information for 11 of the members owing to incorrect staff numbers as provided by these respondents. Consequently, these 11 members were excluded from any further analysis, resulting in a final sample of 753 members. Nevertheless, the sample remained large enough to apply the central limit theorem and to assume a normal distribution for statistical testing to be performed. Also, 43 respondents did not provide data as to their highest qualification. In the testing, controls were implemented for these nonresponses, and as such, the affected respondents remained in the sample.

To avoid an overstatement (or understatement) of results arising from a nonrepresentative sample (as was found by Lusardi & Mitchell, 2017), the sample was weighted by the gender groups and racial groups, to ensure greater representativeness of the South African population. Ideally, the sample should also be weighted by age, income, and education, because of the older, high earning, and highly educated sample. However, this was not possible due to the lack of accurate statistics on our variables of interest from the South African population. Instead, gender and race (two important factors in the context of South Africa) have been considered to address this issue. A *t* test was conducted with each of age, income, and education by gender, as well as a correlation analysis for race across age, income and education. These significant results indicate that weighting the data by gender and race subsequently addressed the weighting issues among the other variables for which there is no available data. Table 1 provides further detail regarding the final weighted sample of respondents.

3.2. Research process

To address the research question, the data were analyzed in four themes, namely (1) financial literacy, (2) thinking about retirement, (3) planning for retirement, and (4) financial behavior and attitude. Descriptive statistics and preliminary analyses for each of these themes are presented first.

3.2.1. Financial literacy

The basic financial literacy questions tested simple concepts that form the basis of basic financial decision-making and transactions. Table 2 shows the percentage of correct answers for the total sample of respondents in respect of each of the four questions.

Table 2 shows that while most respondents can do simple calculations (calculating interest) financial literacy is not comprehensive. The percentage of correct answers is not nearly as high as the 93% and 91% found by Lusardi and Mitchell (2017) for the numeracy and inflation questions, respectively. The results for the advanced financial literacy questions are shown in Table 3. These questions were more sophisticated than the basic questions and tested concepts regarding the share market, collective investment schemes, bonds, and risk.

More than half of the respondents have some knowledge of shares, long-period returns, variability of returns, and how risk diversification works. However, an analysis of the responses in respect of knowledge of and principles relating to bonds shows a lack of competence. Nearly half of the respondents (43%) responded that they did not know the answer to the bond principles question (that tested the link between bond prices and interest rates).

Table 1 Survey sample ($n = 753$)

	Minimum	Mean	Median	Maximum	
Age	24	43.16	44	65	
COE (in ZAR)	80 778	338 870	273 260	1 916 158	
	Male	Female			
Gender	415 (55%)	338 (45%)			
	African	Colored	White	Indian	Other
Race	600.42 (79.74%)	59.84 (7.95%)	58.11 (7.72%)	16.93 (2.25%)	17.70 (2.35%)
	Less than high school	High school	Higher certificate/diploma	College	Postgraduate
Education	0.33 (0.05%)	120.87 (18.31%)	66.78 (10.12%)	133.96 (20.30%)	338.05 (51.22%)
	Married	Single			
Marital status	477.40 (63.40%)	275.60 (36.60%)			

Source: Author's calculations.

A financial literacy score was then calculated for each respondent by deriving person scores from a three-parameter logistic item response model with a pseudo-guessing parameter common to all items. The financial literacy items had Kuder-Richardson coefficient of reliability of 0.81. Two items separated from the rest in terms of both difficulty and discrimination with both having markedly greater values on both parameters (Q21 and Q24 in Appendix B). The test information function showed that the instrument consisting of all financial literacy items provided the most information about participants with ability levels in the midrange of the presumed latent financial literacy. Persons scores were transformed to a standard *T*-score with a mean of 50 and standard deviation of 10, for example, a score of 60 is one standard deviation above the mean, while a score of 30 is two standard deviations below the mean. *T*-scores are positive and fall within the interval [0, 100]. The results are shown in Table 4 while classifying the sample of respondents into different subsets by socioeconomic characteristics, namely: (1) age, (2) gender, (3) race, (4) education level, (5) marital status, and (6) cost of employment. Within the race subset, respondents are classified as being either White, Colored (of mixed-race descent), African, Indian, or Other.

The mean financial literacy score for the total sample is 45 (SD = 9.8; median 44). The distribution is somewhat negatively skewed with a minimum value of 28 and maximum of 69. When analyzed for different socioeconomic characteristics, it is noticeable that male respondents, those respondents with postgraduate qualification levels, those respondents with higher earnings, and all racial groupings other than African, have mean scores higher than the average. African respondents have a mean score of 44 (SD = 9.6; median 41). The noticeable racial divide between the financial literacy scores might be caused by a variety of issues. Some possible explanations include:

Table 2 Percentage of correct answers by basic financial literacy question ($N = 753$)

	Numeracy	Inflation	Time value of money	Money illusion
Correct	72%	55%	59%	45%
Incorrect	7%	12%	28%	51%
Do not know	21%	33%	13%	4%

Source: Author's calculations. Sample weighted by gender and race.

Table 3 Percentage of correct answers by advanced financial literacy question ($N = 753$)

	Function of share market	Knowledge of shares	Knowledge of CIS's	Knowledge of bonds	Long-period returns	Highest variability	Risk diversification	Bond principles
Correct	46%	75%	44%	46%	50%	58%	66%	25%
Incorrect	19%	12%	14%	28%	38%	18%	20%	32%
Do not know	35%	13%	42%	26%	12%	24%	14%	43%

Source: Author's calculations. Sample weighted by gender and race.

1. The survey was in the English language. For Black respondents in particular, this might have been their second, or perhaps third language (Gough, 1996). The wording of the financial literacy questions was important in their construction and this could have been a disadvantage to those who are less fluent in English.
2. As a result of the racially exclusionist education policies implemented during the apartheid years in South Africa, many non-White South Africans might have experienced substandard schooling, or have grown up in households with parents who might never have had a formal qualification or exposure to finance and financial instruments (Draper and Spaull, 2015). As financial literacy is often acquired over time, this might have been another disadvantage to non-White respondents.

Furthermore, financial literacy appears to be at its highest for those over 65 years of age. However, there were only two respondents over the age of 65 years. Respondents between the ages of 35 years to 65 years had a mean financial literacy score lower than the average. This suggests a decrease in financial literacy with age, which is dissimilar to the finding of Xu and Zia (2012). This will be further analyzed in the regression analysis in Table 7. Xu and Zia (2012) found higher-income countries to perform better on financial literacy tests than lower-income countries, and that levels of financial literacy followed an inverted-U shape when plotted against age.

3.2.2. Thinking about retirement

To determine what influences retirement planning, survey respondents were asked a question assessing how much they thought about retirement. The results are shown in Table 5.

The largest proportion of the full sample of respondents have thought about retirement "a lot." This result is consistent within most of the socioeconomic cohorts into which the full sample is divided. The older the respondent, the greater the proportion of respondents who thought about retirement a lot. It might be expected that a consumer would be more inclined to think about retirement as they get older and near retirement.

Table 4 Summary statistics of financial literacy score

	Mean	Median	Standard deviation
Total sample ($N = 753$)	45	44	9.8
Age			
<35 ($n = 175$)	47	46	9.3
35 to 49 ($n = 397$)	44	42	9.5
50 to 64 ($n = 179$)	44	44	10.6
>=65 ($n = 2$)	55	57	9.9
Gender			
Male ($n = 415$)	47	46	10.4
Female ($n = 338$)	43	42	8.7
Race			
African ($n = 600$)	44	41	9.6
Colored ($n = 60$)	46	46	7.6
White ($n = 58$)	55	56	8.1
Indian ($n = 17$)	51	48	9.9
Other ($n = 18$)	52	54	5.8
Education			
Less than high school ($n = 1$)	34	34	N/A
High school ($n = 112$)	42	40	7.7
Higher certificate or diploma ($n = 62$)	41	38	7.8
College ($n = 125$)	40	40	7.0
Postgraduate ($n = 315$)	51	52	9.3
Unknown ($n = 138$)	40	40	8.2
Marital status			
Married ($n = 477$)	45	43	10.4
Single ($n = 276$)	45	44	8.8
Cost of employment			
<R400 000 p.a. ($n = 520$)	42	40	7.8
>R400 000 p.a. ($n = 233$)	53	54	9.5

Source: Author's calculations. Sample weighted by gender and race.

3.2.3. Planning for retirement

To determine what "type of planner" each respondent is, a series of questions were asked assessing whether each respondent had tried to determine how much to save for retirement, whether he or she had developed a plan to do so, and if so, whether he or she had conformed to that plan consistently. An analysis of responses has enabled the grouping of respondents in a manner similar to that used by Lusardi and Mitchell (2011), as shown in Table 6.

Approximately 27% of respondents had tried to determine how much to save for retirement. These results are somewhat less promising than the 31.3% noted by Lusardi and Mitchell (2011) and reflect a disappointing result in the sense that most respondents have not done this exercise. However, several studies show a similar trend with few consumers undertaking or understanding retirement planning.

Further questioning in the survey of these respondents (i.e., those who had indeed tried to determine out how much to save for retirement) revealed that almost 15% of such respondents had never developed a plan to undertake this saving. These respondents are termed "simple planners." One-third had developed a plan, while the majority (53.8%) had "more or less" developed a plan. These two groups were then further questioned to determine

Table 5 Responses to "thinking about retirement" by socioeconomic characteristics

How much have you thought about retirement?	A lot	Some	Only a little	Not at all
Full sample ($N = 753$)	35.4%	27.0%	29.4%	8.2%
Age				
<35 ($n = 175$)	24.2%	22.7%	35.5%	17.6%
35 to 49 ($n = 397$)	26.8%	33.3%	34.0%	5.8%
50 to 64 ($n = 179$)	64.8%	17.0%	13.7%	4.5%
>=65 ($n = 2$)	74.1%	19.7%	6.2%	0.0%
Gender				
Male ($n = 415$)	29.3%	30.0%	32.7%	8.0%
Female ($n = 338$)	42.8%	23.3%	25.4%	8.5%
Race				
African ($n = 600$)	34.2%	23.3%	32.9%	9.6%
Colored ($n = 60$)	40.7%	33.4%	20.0%	6.0%
White ($n = 58$)	41.5%	45.9%	11.1%	1.5%
Indian ($n = 17$)	41.9%	41.4%	16.7%	0.0%
Other ($n = 18$)	30.6%	53.0%	16.3%	0.0%
Education				
Less than high school ($n = 1$)	0.0%	100%	0.0%	0.0%
High school ($n = 112$)	40.8%	14.8%	44.3%	0.2%
Higher certificate or diploma ($n = 62$)	29.2%	23.4%	30.2%	17.1%
College ($n = 125$)	37.9%	35.6%	17.3%	9.3%
Postgraduate ($n = 315$)	33.9%	35.3%	28.3%	2.4%
Unknown ($n = 138$)	34.9%	11.5%	30.6%	23.1%
Marital status				
Married ($n = 477$)	35.0%	31.3%	23.8%	10.0%
Single ($n = 276$)	36.0%	19.5%	39.2%	5.3%
Cost of employment				
<R400 000 p.a. ($n = 520$)	33.9%	21.7%	32.8%	11.7%
>R400 000 p.a. ($n = 233$)	38.8%	38.8%	22.0%	0.5%

Source: Author's calculations. Sample weighted by gender and race.

whether they were able to conform to the plan that they had (or more or less had) developed. A cumulative 22.5% of these respondents had rarely or never conformed to the plan. These respondents are termed "serious planners," that is, they developed a plan, but just could not conform to it. The remaining respondents, who "always" or "mostly" conformed to their plans are termed "successful planners." These "successful planners" represent 17% of the total sample. Most of the total sample (73%) have never tried to determine how much they will need for their retirement. This grouping is termed "not a planner."

3.2.4. Financial behavior and attitude

A score representing each respondent's financial behavior and attitude was calculated to assess whether the positive outcomes of being financially knowledgeable are driving behavior and whether a respondent's financial attitude drives his/her behavior. These scores were derived using a graded response model (see Appendix C for the questions). Persons scores were again transformed to *T*-scores.

Most of the items had great overlap among many of the response categories, resulting in those categories offering little in terms of placing people on the scale. The test information function showed that for both the behavior and attitude instrument, all seven behavior items

Table 6 Proportion of planners in respective sub-groups

Successful planner		Serious planner		Simple planner	Not a planner
Did you ever try to figure out how much to save for retirement?					
		Yes 26.9% ($n = 203$)			No 73.1% ($n = 550$)
Did you develop a plan?					
Yes 31.3% ($n = 64$)		More or less 53.8% ($n = 109$)		No 14.9% ($n = 30$)	
Were you able to stick to the plan?					
Always 23.1% ($n = 40$)	Mostly 51.4% ($n = 89$)	Rarely 19.1% ($n = 33$)	Never 6.4% ($n = 11$)		
Successful planner		Serious planner		Simple planner	Not a planner

Source: Author's calculations. Sample weighted by gender and race.

and all three attitude items provided the most information about participants. Trait levels were in the lower to midrange of the presumed latent financial behavior continuum and in the mid to upper range of the presumed latent financial attitude continuum. The Cronbach's α on the financial behavior items and financial attitude items was 0.76 and 0.70, respectively.

The financial behavior and attitude scores had a mean of 48 and 50, and median of 49 and 50, respectively (with a maximum of 66 on the behavior scale and a maximum of 62 on the attitude scale). A higher score indicates better behavior and attitude towards financial decisions. Both scores showed negatively skewed distributions.

4. Results

The results are presented in the same four themes, but with specific emphasis on the factors influencing those variables. Multivariate regression analyses are performed at each stage to assess the relationship among variables. Following that, a mediation analysis is performed.

4.1. Factors influencing financial literacy

After determining each respondent's financial literacy score, an ordinary least squares (OLS) regression was performed to determine whether any factors have a relationship with financial literacy. The regression analyses were performed using robust standard errors to account for heteroskedasticity. The assumption of homoskedasticity was evaluated using the Breusch-Pagan/Cook-Weisberg test ($\chi^2(1) = 43.62$, $p = <0.001$).

The independent variables listed are standard variables which the literature has found to be explanatory (Atkinson & Messy, 2012; Lusardi & Mitchell, 2011, 2017; Van Rooij et al., 2011). The reference groups for the racial categories grouping and education level variables will be the White racial group and high school education, respectively. The results are shown in Table 7. The model is as follows:

Table 7 OLS regression of financial literacy score

	Coefficient	(Std error)
Age	−0.575	(0.781)
Age-squared	0.004	(0.008)
Marital status	−1.538	(1.309)
Dependents	2.614	(2.782)
Gender: Male	2.803*	(1.352)
Race: Colored	−3.473*	(1.437)
Race: African	−7.166***	(2.011)
Race: Indian	−3.424*	(1.540)
Race: Other	−3.970	(2.331)
Log COE	8.744***	(2.071)
Qualification: Less than high school	−6.301*	(2.553)
Qualification: Higher certificate/diploma	0.500	(2.878)
Qualification: College	−2.743	(2.144)
Qualification: Post graduate	2.359	(2.616)
Qualification: Unknown	1.483	(2.442)
Constant	−46.38	(27.91)
Observations	753	
R^2	0.484	

Source: Author's calculations. Sample weighted by gender and race. Standard errors in parentheses. ***$p < .01$, ** $p < .05$, * $p < .1$.

$$\begin{aligned} \textit{Financial literacy score} = {} & \beta_0 + \beta_1 \textit{Age} + \beta_2 \textit{Age-squared} + \beta_3 \textit{Marital status} \\ & + \beta_4 \textit{Financial dependents} + \beta_5 \textit{Gender} \\ & + \beta_{6\text{-}10} \textit{Racial grouping dummies} \\ & + \beta_{11} \textit{Log of Cost of employment} \\ & + \beta_{12\text{-}17} \textit{Level of qualification dummies} + \epsilon \end{aligned} \tag{1}$$

The statistically significant factors affecting financial literacy are: being male, race, cost of employment, and qualification levels. Having a higher cost of employment or being male, as opposed to female, is associated with a higher financial literacy score on average, holding all else constant.

Being of a different racial grouping (to White) is expected to have a lower financial literacy score on average. The African racial grouping has the largest negative coefficient on financial literacy, in relation to the White racial grouping, which is significant at the one percentage level. The potential reasons for this are discussed earlier.

Lastly, a qualification less than high school, when compared with a high school qualification, is negatively associated with an increased financial literacy score. However, given there is only one respondent in this category, limited interpretation can be made of this result.

4.2. Factors influencing thinking about retirement

To determine the factors that influence thinking about retirement, a multinomial logistic regression that controls for a range of socioeconomic factors is shown in Table 8. This

model was applied in favor of an ordered logistic regression as the proportional odds assumption was not met. Because of the very small numbers in the less than high school education level group and both the Indian and Other race groups a subsample excluding these cases were considered for the model to avoid issues of multicollinearity and or complete or quasi-complete separation that may result in large standard errors and consequently misinterpretation of the results. The reference groups for the racial categories grouping and education level variables will be the White racial group and higher certificate or diploma education, respectively. The model is as follows:

$$\begin{aligned} \textit{Thinking about retirement} = {} & \beta_0 + \beta_1 \textit{Financial literacy} + \beta_2 \textit{Age} + \beta_3 \textit{Age-squared} \\ & + \beta_4 \textit{Marital status} + \beta_5 \textit{Financial dependents} \\ & + \beta_6 \textit{Gender} + \beta_{7\text{-}9} \textit{Racial grouping dummies} \\ & + \beta_{10} \textit{Log of Cost of employment} \\ & + \beta_{11\text{-}15} \textit{Level of qualification dummies} + \epsilon \end{aligned} \tag{2}$$

Table 8 shows that an increase in financial literacy, age, cost of employment, or education level, increases the relative risk of thinking more about retirement. For age, it is understandable that as a consumer is closer to retirement (in most cases equating to being older) the more tangible retirement becomes necessitating more thoughts about it. An increased cost of employment suggests that having more disposable income enables the means to save for retirement and thus allows thoughts about it. For education level, the relative risk ratio of a respondent with a college or postgraduate degree thinking about retirement a lot, compared with not at all, is 4.7 and 3.8 times higher than the relative risk ratio for someone with only a higher certificate or diploma. This might indicate that higher education creates a greater awareness of retirement.

For those respondents who are married, have dependents or are male, the relative risk of thinking about retirement is lower. The gender variable is only statistically significant (at the five percentage level) when comparing thinking about retirement not at all, to a lot. A possible explanation for married respondents thinking less about retirement than single respondents might be explained by financial dependency on their partner. The presence of dependents in turn might necessitate thinking more about daily living expenses and providing for those dependents, rather than retirement.

Returning to financial literacy, the statistically significant positive association (mostly at the 1% level) with thinking about retirement suggests possible endogeneity. This might result in "thinking about retirement" influencing "financial literacy" rather than the inverse. A question was asked to assess each respondent's level of accounting and/or economics knowledge (Q4 in Appendix A). Based on the responses, each respondent was placed into one of three ordinal groups. The purpose of this was to use this ordinal variable as an instrumental variable associated with the financial literacy score. An instrumental multinomial probit model (first stage uncensored, second stage probit) was performed (Wald $\chi^2(57) = 1014.74$, p-value $= <0.001$) (Roodman, 2011). The output is given in Appendix D. The results show that financial literacy remains statistically significant in increasing the relative risk of a respondent thinking more about retirement. This emphasizes the importance of financial literacy. However, although thinking about retirement is a step in the right direction, it is the

Table 8 Multinomial logistic regression of thinking about retirement

	Only a little		Some		A lot	
	Coefficient (Std error)	Risk ratio	Coefficient (Std error)	Risk ratio	Coefficient (Std error)	Risk ratio
Financial literacy	0.093**	1.097**	0.156***	1.169***	0.111***	1.117***
	(0.033)	(0.036)	(0.033)	(0.039)	(0.033)	(0.037)
Age	0.173***	1.188***	0.141***	1.151***	0.224***	1.251***
	(0.330)	(0.039)	(0.034)	(0.039)	(0.033)	(0.042)
Marital status	−1.242**	0.289**	0.0897	1.094	−0.973**	0.378**
	(0.424)	(0.122)	(0.452)	(0.494)	(0.427)	(0.161)
Dependents	−1.738	0.176	−2.979**	0.051**	−2.333**	0.097**
	(1.144)	(0.201)	(1.154)	(0.059)	(1.155)	(0.112)
Gender: Male	−0.320	0.726	−0.519	0.595	−1.041**	0.353**
	(0.400)	(0.290)	(0.410)	(0.244)	(0.401)	(0.142)
Race: Colored	1.370	3.936	1.144	3.140	1.316	3.728
	(1.537)	(6.051)	(1.497)	(4.700)	(1.503)	(5.604)
Race: African	1.885	6.588	1.308	3.699	1.691	5.425
	(1.397)	(9.204)	(1.359)	(5.027)	(1.370)	(7.431)
log COE	1.009	2.742	1.813**	6.126**	1.408**	4.087**
	(0.628)	(1.724)	(0.641)	(3.926)	(0.637)	(2.605)
Qualification: High school	5.949**	383.55**	5.055**	156.79**	6.033**	416.82**
	(2.415)	(926.35)	(2.432)	(381.31)	(2.422)	(1009.69)
Qualification: College	0.649	1.914	1.666**	5.294**	1.551**	4.715**
	(0.633)	(1.211)	(0.631)	(3.340)	(0.628)	(2.960)
Qualification: Post-graduate	1.458**	4.297**	0.613	1.845	1.338*	3.811*
	(0.743)	(3.191)	(0.760)	(1.402)	(0.757)	(2.887)
Qualification: Unknown	0.143	1.154	−0.388	0.679	0.379	1.461
	(0.520)	(0.600)	(0.574)	(0.390)	(0.540)	(0.788)
Constant	−21.67**	<0.001**	−32.22***	<0.001***	−28.72***	<0.001***
	(7.334)	(<0.001)	(7.488)	(<0.001)	(7.470)	(<0.001)
Observations	708					
Pseudo R^2	0.2414					

Source: Author's calculations. Sample weighted by gender and race. Standard errors in parentheses.
***$p < .01$, ** $p < .05$, * $p < .1$.

transcendence of this thinking into actively planning for retirement that will assist in improving retirement savings. An analysis of this progression is examined next.

4.3. Factors influencing planning for retirement

A multivariate ordered logistic regression analysis showing the relationship between planning and financial literacy and planning tools, after controlling for several factors, is shown in Table 9. Two tests are performed. Test 1 only assesses the 351 respondents who were

classified as a type of planner (i.e., "simple," "serious," or "successful planner"). This is done to assess the influence of different planning tools, as only those respondents who indicated that they did try to determine how much to save for retirement were asked which planning tools they used. Test 2 assesses all 753 respondents, that is, simple, serious, and successful planners as well as those classified as not a planner. An approximate likelihood-ratio test of proportionality of odds across response categories was performed and the results showed no serious violation of the assumption (Test 1: $\chi^2(13) = 15.92$, $p = .2536$ and Test 2: $\chi^2(16) = 22.48$, $p = .1283$). The models are as follows:

$$\begin{aligned} \textit{Type of planner} = {} & \beta_0 + \beta_1 \textit{Talk to family/relatives} + \beta_2 \textit{Talk to co-workers/friends} \\ & + \beta_3 \textit{Attemded retirement seminars} \\ & + \beta_4 \textit{Used calculators or worksheets} \\ & + \beta_5 \textit{Consulted a financial planner} + \beta_6 \textit{Financial literacy} \\ & + \beta_7 \textit{Age} + \beta_8 \textit{Marital status} + \beta_9 \textit{Financial dependents} \\ & + \beta_{10} \textit{Gender} + \beta_{11\text{-}15} \textit{Racial grouping dummies} \\ & + \beta_{16} \textit{Log of Cost of employment} \\ & + \beta_{17\text{-}22} \textit{Level of qualification dummies} + \epsilon \end{aligned} \tag{3}$$

$$\begin{aligned} \textit{Type of planner} = {} & \beta_0 + \beta_1 \textit{Financial literacy} + \beta_2 \textit{Age} + \beta_3 \textit{Marital status} \\ & + \beta_4 \textit{Financial dependents} + \beta_5 \textit{Gender} \\ & + \beta_{6\text{-}10} \textit{Racial grouping dummies} \\ & + \beta_{11} \textit{Log of Cost of employment} \\ & + \beta_{12\text{-}17} \textit{Level of qualification dummies} + \epsilon \end{aligned} \tag{4}$$

Consulting a financial advisor or talking to family or relatives statistically significantly increases the odds of being a successful planner versus the combined simple and serious planner. The former shows that a respondent is 40 times more likely to be a more successful planner if he or she consults a financial planner. However, talking to co-workers or friends as a tool for retirement planning decreases the odds of being a more successful planner. This suggests that a more formal approach is a more successful approach. This is supported by Bashall, Willows, and West (2018) who found that investors acting with the assistance of professional advisors showed negative behavioral biases to a lesser extent. However, this does not extend as far as to improve investment returns (Allie, West, & Willows, 2016). The benefit of involving a professional might be limited to the behavioral element. However, the difference between financial planners and financial advisors are also pervasive.

Table 9 Two-stage ordered logistic regression of type of planner

	Test 1: Planners only				Test 2: All respondents			
	Coefficient (Std error)		Odds ratio		Coefficient (Std error)		Odds ratio	
Financial literacy	0.033	(0.040)	1.034	(0.041)	0.018	(0.013)	1.018	(0.013)
Talk to family/relatives	1.634**	(0.552)	5.124***	(2.827)				
Talk to co-workers/friends	−1.189*	(0.496)	0.305**	(0.151)				
Attended retirement seminars	−0.219	(0.470)	0.804	(0.377)				
Used calculators or worksheets	0.110	(0.541)	1.116	(0.604)				
Consulted financial planner	3.702***	(0.632)	40.531***	(25.599)				
Age	0.102***	(0.028)	1.107***	(0.031)	0.045***	(0.011)	1.046***	(0.011)
Marital status	0.969*	(0.415)	2.635**	(1.094)	−0.371	(0.215)	0.690*	(0.148)
Dependents	−1.185	(0.790)	0.306	(0.242)	0.898**	(0.326)	2.454***	(0.799)
Gender: Male	−1.083*	(0.493)	0.339**	(0.167)	0.164	(0.191)	1.178	(0.225)
Race: Colored	−0.798	(0.733)	0.450	(0.330)	−0.139	(0.427)	0.871	(0.372)
Race: African	0.852	(0.697)	2.345	(1.633)	−0.695	(0.357)	0.499*	(0.178)
Race: Indian	3.538*	(1.613)	34.409**	(55.506)	−0.349	(0.623)	0.705	(0.439)
Race: Other	−1.772	(0.948)	0.170*	(0.161)	−0.930	(0.595)	0.395	(0.235)
log COE	0.583	(0.703)	1.792	(1.259)	1.628***	(0.323)	5.093***	(1.643)
Qualification: Less than high school					−18.22	(29655.46)	<0.001	(<0.001)
Qualification: Higher certificate/diploma	0.286	(1.104)	1.331	(1.469)	−1.007	(0.524)	0.365*	(0.191)
Qualification: College	3.343***	(0.850)	28.300***	(24.060)	0.237	(0.323)	1.267	(0.409)
Qualification: Post-graduate	1.443	(0.792)	4.231*	(3.350)	−0.409	(0.337)	0.664	(0.224)
Qualification: Unknown	0.650	(0.918)	1.916	(1.758)	−0.376	(0.373)	0.687	(0.257)
Constant cut1	12.698	(8.646)			24.23***	(3.871)		
Constant cut2	15.275	(8.661)			24.50***	(3.874)		
Constant cut3					24.97***	(3.879)		
Observations	351				753			
Pseudo R^2	0.1449				0.1956			

Source: Author's calculations. Sample weighted by gender and race. Standard errors in parentheses.
***$p < .01$, ** $p < .05$, * $p < .1$.

Emphasis is placed on Test 2 for the discussion of the remaining variables. This includes those respondents who have never tried to determine how much they need to save for their retirement (i.e., those designated as not a planner). The results show that having dependents statistically significantly increases the odds of being a planner. This might be explained by the need to manage financial affairs to avoid problems for dependents (Dave, 2017). Either in the form of providing for their day-to-day need or upon the respondent's death.

The odds of being a planner increases as the respondent ages. This positive relationship was also seen in Table 8, showing the heightened awareness of both thinking and planning for retirement the closer it becomes a reality. Another noteworthy finding which mirrors the results from Table 8 is the positive relationship with cost of employment.

4.4. Factors influencing financial behavior and attitude

An OLS regression analysis was performed to determine whether a consumer's financial attitude and/or financial literacy and/or the type of planner he or she is influences his or her financial behavior. The regression analyses were performed using robust standard errors to account for heteroskedasticity. The assumption of homoskedasticity was evaluated using the Breusch-Pagan/Cook-Weisberg test (χ^2 (1) = 6.12, p = <0.013). Not being a planner is the reference group for the type of planner variable. These results are shown in Table 10. The model is as follows:

$$\begin{aligned} \textit{Financial behavior} = {} & \beta_0 + \beta_1 \textit{Financial attitude} + \beta_2 \textit{Financial literacy} \\ & + \beta_{3\text{-}6} \textit{Type of planner dummies} + \beta_7 \textit{Age} + \beta_8 \textit{Age-squared} \\ & + \beta_9 \textit{Marital status} + \beta_{10} \textit{Financial dependents} \\ & + \beta_{11} \textit{Gender} + \beta_{12\text{-}16} \textit{Racial grouping dummies} \\ & + \beta_{17} \textit{Log of Cost of employment} \\ & + \beta_{18\text{-}23} \textit{Level of qualification dummies} + \epsilon \end{aligned} \tag{5}$$

The effect of financial attitude is statistically significant (at the 1% significance level) in influencing financial behavior after controlling for a range of factors. This result supports the finding of Atkinson and Messy (2012) that a person with a negative attitude towards saving for his or her future will be less inclined to actually save. Being a serious planner (i.e., developing a plan) or successful planner (i.e., sticking to that plan), compared with those that are not a planner, results in a more positive financial behavior. This suggests that considered decisions in terms of figuring out how much to save for retirement and developing a plan to do so will influence an individual's financial behavior. This might be because careful consideration on spending behavior is required to stick to the plan.

An increase in age positively influences financial behavior, but only after the age of 44 years. A negative coefficient is noted before the age of 43 years. However, both these coefficients are small. Lastly, Indian respondents (when compared with White respondents), on average, had a higher financial behavior score, holding all else constant.

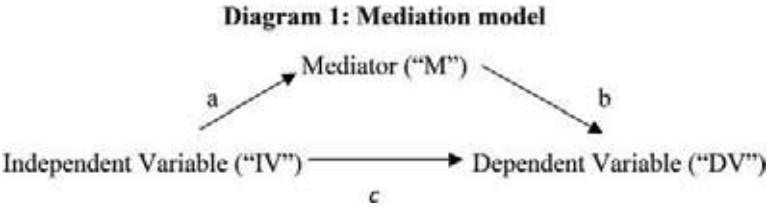
Table 10 OLS regression of financial behavior

	Coefficient	(Std error)
Financial attitude	0.501***	(0.090)
Financial literacy	0.004	(0.012)
Simple planner	0.258	(0.182)
Serious planner	0.610**	(0.305)
Successful planner	0.563**	(0.219)
Age	−0.122*	(0.066)
Age-squared	0.001**	(<0.001)
Marital status	0.0208	(0.213)
Dependents	0.185	(0.173)
Gender: Male	0.160	(0.168)
Race: Colored	0.228	(0.162)
Race: African	0.163	(0.210)
Race: Indian	0.425**	(0.167)
Race: Other	0.233	(0.255)
log COE	0.170	(0.184)
Qualification: Less than high school	−0.205	(0.293)
Qualification: Higher certificate/diploma	0.154	(0.431)
Qualification: College	0.103	(0.305)
Qualification: Post-graduate	−0.0887	(0.236)
Qualification: Unknown	−0.151	(0.276)
Constant	−0.531	(2.979)
Observations	753	
R^2	0.390	

Source: Author's calculations. Sample weighted by gender and race. Standard errors in parentheses
***$p < .01$, ** $p < .05$, * $p < .1$.

4.5. Financial attitude as a mediator

The results of Table's 9 and 10 both show that financial literacy is not associated with the type of planner a respondent is, nor whether he or she will have a more positive financial behavior. However, financial attitude and being a serious or successful planner does show a positive relationship with financial behavior. Further consideration is given as to whether there is connection among these three variables. This is diagrammatically explained as follows:



M = Financial attitude; IV = Type of planner; DV = Financial behavior.

A mediation model, as proposed by Baron and Kenny (1986) suggests that rather than hypothesizing a direct causal relationship between the IV and DV (that is represented by path c in Diagram 1), that the IV affects the DV through its association with M (represented by paths a and

b in Diagram 1). To test for such mediation, the direct and indirect effects were derived after fitting a multiple linear regression.

The direct and indirect effects of being a more successful planner on financial behavior are statistically significant. However, the coefficient for the direct effect (0.173) is greater than the indirect effect (0.042). The results indicate that part of the reason why a positive financial attitude positively influences financial behavior is because being a more successful planner positively influences a respondent's financial attitude. The root mean squared error of approximation is very small that suggests that this model was able to reproduce the covariance matrix accurately. Furthermore, the standardized root mean squared residual was also very small. The model fit was satisfactory with a relatively small root mean square error of approximation (RMSEA; <0.001) and standardized root mean square residual (SRMR; <0.001). The R^2 and adjusted R^2 are 0.2485 and 0.2465, respectively.

5. Conclusion

The positive effects of planning for retirement are apparent. It positively influences an individual's financial attitude and, in turn, his or her financial behavior. Increased focus on assisting individuals to try figure out how much to save for retirement is necessitated. Further emphasis on then developing a plan and sticking to that plan is even more beneficial.

The results showed that consulting with a financial planner statistically significantly increases the odds of being a more successful planner. This is noteworthy as it indicates an active step that can be taken to positively influence an individual's financial behavior. Additionally, individuals should be discouraged from talking to co-workers or friends to get advice on how to save for retirement. The key finding should be that a formal approach is the preferred approach.

While the level of financial literacy is seen to show significant differences among respondents of different gender, race, cost of employment, and qualification levels, the relevance of financial literacy in thinking about retirement, planning for retirement or financial behavior is not as apparent. This is a somewhat hopeful outcome. There is little an individual can do to change those factors that determine his or her level of financial literacy. But, the steps to becoming a more successful planner are linear and achievable.

Proposed educational interventions should be focused on the decisions around determining and conforming to retirement plans. The improvement in such understanding can in turn, assist consumers to behave better financially and make better retirement savings decisions. Fernandes et al. (2014) propose an immediate approach to financial education by targeting specific behaviors at the point in time when the need arises. However, consideration should also be given to other interventions, such as auto-enrolment plans and default options, to "nudge" individuals towards improved savings (Thaler & Sunstein, 2008, p. 67).

Note

1 The user written command for a multinomial model with instrumental variable by Roodman (2011) is unable to cater for weighted data. Thus, this output is seen as exploratory and preliminary.

Appendix A Socioeconomic questions: Select the answer that most correctly reflects your situation

Question	Source
Q1 Please indicate your marital status: ☐ Single ☐ Married ☐ Separated ☐ Divorced ☐ Widowed ☐ Living with a partner	Original to this study
Q2 Do you have any dependents that is, someone who relies on you to financially support them? ☐ Yes ☐ No	Original to this study
Answer If Do you have any dependents that is, someone who relies on you to financially support them? Yes is selected Q3 What is your relationship with this dependent? (You may choose more than one option.) ☐ My child/children ☐ My spouse/partner ☐ My brother/sister ☐ My mother/father ☐ Other _____	Original to this study
Q4 Have you ever taken economics or accounting as a course or subject? (You may choose more than one option.) ☐ Yes, in high school. ☐ Yes, for a short period of time at university/college/technicon. ☐ Yes, as one of my majors at university/college/technicon. ☐ No	Lusardi and Mitchell (2017), amended.
Q5 How much have you thought about retirement? ☐ A lot ☐ Some ☐ Only a little ☐ Not at all	Lusardi and Mitchell (2017), response options tailored slightly

(continued on next page)

Appendix A (Continued)

Question	Source
Q6 Have you ever tried to figure out how much your household would need to save for retirement? ☐ Yes ☐ No	Lusardi and Mitchell (2011)
Answer If Have you ever tried to figure out how much your household would need to save for retirement? Yes is selected Q7 Did you develop a plan for retirement saving? ☐ Yes ☐ More or less ☐ No	Lusardi and Mitchell (2011)
Answer If Did you develop a plan for retirement saving? Yes is selected or did you develop a plan for retirement saving? More or less Is Selected Q8 How often were you able to stick to this plan? ☐ Always ☐ Mostly ☐ Rarely ☐ Never	Lusardi and Mitchell (2011)
Answer If Have you ever tried to figure out how much your household would need to save for retirement? Yes is selected Q9 In what ways have you tried to figure out how much your household would need? You may select more than one option (if applicable) ☐ I talked to family and relatives ☐ I talked to co-workers or friends ☐ I attended retirement seminars ☐ I used calculators or worksheets that are computer or internet-based ☐ I consulted a financial planner or advisor or an accountant ☐ Other _____	Lusardi and Mitchell (2011), "attended retirement seminars:" included by author as it is an option with the UCTRF.

Appendix B Financial literacy questions: For each question, select the answer that you think is most correct

	Question	Source
Numeracy	Q10 Suppose you had R100 in a savings account and the interest rate was two percentage 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 R102 ☐ Exactly R102 ☐ Less than R102 ☐ Do not know	Lusardi and Mitchell (2011)
Inflation	Q11 Imagine that the interest rate on your savings account was one percentage per year and inflation was two percentage 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 ☐ Do not know	Lusardi and Mitchell (2011)
Time value of money	Q12 Assume a friend inherits R10,000 today and his brother inherits R10,000 three years from now. Who is richer because of the inheritance? ☐ My friend ☐ His brother ☐ They are equally rich ☐ Do not know	Lusardi and Mitchell (2017), "sibling" changed to "brother" for clarification.
Money illusion	Q13 Suppose that in the year 2020, your income has doubled and prices of all goods have doubled too. In 2020, how much will you be able to buy with your income? ☐ More than today ☐ The same as today ☐ Less than today ☐ Do not know	Lusardi and Mitchell (2017)
Function of the share market	Q14 Which of the following statements describes the main function of the share market (also referred to as the "stock market" or "equity market")? ☐ The share market helps to predict share earnings ☐ The share market results in an increase in the price of shares ☐ The share market brings people who want to buy shares together with those who want to sell shares ☐ None of the above ☐ Do not know	Lusardi and Mitchell (2017), 'stock' (American terminology) replaced with "share" (South African terminology), and further example's given to ensure clarity.

(continued on next page)

Appendix B (Continued)

	Question	Source
Knowledge of shares	Q15 Which of the following statements is correct? If somebody buys a share of company B in the share market: ☐ He owns a part of company B ☐ He has loaned money to company B ☐ He is liable for company B's debts ☐ None of the above ☐ Do not know	Van Rooij et al. (2011), "stock" (American terminology) replaced with "share" (South African terminology).
Knowledge of CIS's	Q16 Which of the following statements is most correct? ☐ Once you invest in a collective investment scheme that is, "unit trust," you cannot withdraw the money in the first year ☐ Unit trusts can invest in several asset classes, for example; shares/equity, bonds, property, and cash. ☐ Unit trusts pay a guaranteed rate of return that depends on their past performance ☐ None of the above ☐ Do not know	Lusardi and Mitchell (2017), "mutual fund" (American terminology) replaced with "collective investment scheme" (South African terminology), and lay terminology of "unit trust" also given to ensure clarity.
Knowledge of bonds	Q17 Which of the following statements is correct? If somebody buys a bond issued by company B: ☐ He owns a part of company B ☐ He has loaned money to company B ☐ He is liable for company B's debts ☐ None of the above ☐ Do not know	Van Rooij et al. (2011)
Long-period returns	Q18 Considering a long time period (e.g., 10 or 20 years), which asset normally gives the highest return? ☐ Savings accounts/cash ☐ Bonds ☐ Shares/equity ☐ Do not know	Lusardi and Mitchell (2017), multiple terms for cash and equity given to ensure clarity.
Highest variability	Q19 Normally, which asset displays the highest variability of return over time? ☐ Savings accounts/cash ☐ Bonds ☐ Shares/equity ☐ Do not know	Lusardi and Mitchell (2017), multiple terms for cash and equity given to ensure clarity.
Risk diversification	Q20 Complete the sentence. When an investor spreads his or her money among different assets, the risk of losing money should: ☐ Increase ☐ Decrease ☐ Stay the same as if the investor hadn't spread his or her money ☐ Do not know	Lusardi and Mitchell (2017), response for "stay the same" extended to make complete sentence.

(continued on next page)

Appendix B (Continued)

	Question	Source
Bond principles	Q21 True or false? If you buy a 10-year bond, it means you cannot sell it after five years without incurring a major penalty. ☐ True ☐ False ☐ Do not know	Van Rooij et al. (2011)
	Q22 True or false? Equity/shares are normally riskier than bonds. ☐ True ☐ False ☐ Do not know	Lusardi and Mitchell (2017), multiple terms for equity given to ensure clarity.
	Q23 True or false? Buying a share of a consumer company usually provides a safer return than a general equity unit trust. ☐ True ☐ False ☐ Do not know	Lusardi and Mitchell (2017), "mutual fund" (American terminology) replaced with "unit trust" (South African terminology).
	Q24 If the interest rate rises, what should happen to bond prices? ☐ Rise ☐ Fall ☐ Stay the same ☐ None of the above ☐ Do not know	Lusardi and Mitchell (2017)

Appendix C Financial behavior and attitude questions: For each statement, circle your answer (or use the slider) on a scale from 1 to 5, where 1 means "never" and 5 means "always". (*Source:* Atkinson & Messy, 2012)

Statement	Never Always
Before I buy something I carefully consider whether I can afford it	1 2 3 4 5
I pay my bills on time	1 2 3 4 5
I keep a close personal watch on my financial affairs	1 2 3 4 5
I set long term financial goals and strive to achieve them	1 2 3 4 5
I'm personally (or jointly) responsible for day to day money management decisions in my household	1 2 3 4 5
I live in a household with a budget	1 2 3 4 5
I borrow money to make ends meet	1 2 3 4 5
I find it more satisfying to spend money than to save it for the long term	1 2 3 4 5
I tend to live for today and let tomorrow take care of itself	1 2 3 4 5
Money is there to be spent	1 2 3 4 5

Appendix D Instrumental variable: Instrumental variable probit of thinking about retirement[1]

	Only a little		Some		A lot		Financial literacy	
Financial literacy	0.099**	(0.044)	0.142***	(0.041)	0.098**	(0.041)		
Age	0.006	(0.014)	0.0320**	(0.013)	0.071***	(0.013)	0.025	(0.027)
Marital status	−0.188	(0.264)	−0.022	(0.252)	0.015	(0.256)	−0.062	(0.559)
Dependents	0.546*	(0.305)	0.198	(0.284)	0.341	(0.289)	−0.001	(0.582)
Gender: Male	−0.514*	(0.284)	−0.609**	(0.267)	−0.487*	(0.270)	2.980***	(0.535)
Race: Colored	0.369	(0.436)	0.081	(0.418)	0.195	(0.414)	−4.589***	(0.670)
Race: African	0.873	(0.592)	0.167	(0.585)	0.535	(0.569)	−6.687***	(0.985)
Race: Indian	4.900	(245.6)	4.800	(245.6)	4.913	(245.6)	−3.406**	(1.191)
Race: Other	3.860	(736.8)	3.939	(736.8)	3.654	(736.8)	−1.657	(2.414)
log COE	0.143	(0.447)	−0.064	(0.427)	0.149	(0.426)	5.015***	(0.644)
Qualification: Less than high school	1.072*	(0.562)	1.006*	(0.556)	1.131**	(0.545)	8.243	(6.791)
Qualification: Higher certificate/diploma	0.766	(0.516)	0.605	(0.492)	0.548	(0.491)	7.789	(6.804)
Qualification: College	0.445	(0.409)	0.397	(0.390)	0.340	(0.384)	7.604	(6.790)
Qualification: Post-graduate	0.213	(0.471)	0.0238	(0.455)	−0.025	(0.450)	9.892	(6.813)
Qualification: Unknown							6.446	(6.780)
Accounting and economics score							3.506***	(0.404)
Constant	−6.847	(4.359)	−6.363	(4.195)	−9.004**	(4.194)	−25.52**	(10.09)
lnsig_5 Constant							1.904***	(0.0258)
atanhrho_25 Constant							−0.496*	(0.289)
atanhrho_35 Constant							−0.687**	(0.327)
atanhrho_45 Constant							−0.317	(0.235)
Observations	753							
Wald $\chi^2(57)$	1014.74							

Source: Author's calculations. Standard errors in parentheses.

[1]The user written command for a multinomial model with instrumental variable by Roodman (2011) is unable to cater for weighted data. Thus, this output is seen as exploratory and preliminary.

***$p < .01$, ** $p < .05$, * $p < .1$.

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