

Living annuity satisfaction



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Orientation: As a standard practice, retirement capital is converted into either an immediate life annuity (annuitisation), affording significant protection against longevity risk or a living annuity (self-annuitisation), exposing capital to volatile investment returns.

Research purpose: This article presents a number of exploratory factors (based on annuity puzzle literature) that associate with retirees' satisfaction levels, with respect to the eventual outcome of their living annuity choice.

Motivation for the study: Reticence among retirees to protect themselves against longevity risk is an annuity puzzle that has been the subject of vigorous academic debate.

Research approach and method: A quantitative research approach was followed by performing an ordinary least squares (OLS) linear multiple regression analysis in order to ascertain which factors associate with the satisfaction levels of living annuitants.

Main findings: The most interesting conclusion is that, although one would expect active involvement in managing retirement capital among living annuitants to contribute to satisfaction levels, the desire to control and manage living annuity capital in the pursuance of capital growth, actually significantly contributes to retiree discontentment or dissatisfaction.

Practical implications: Financial education and counselling with respect to optimal annuity decision-making could restore the promise of retirement income security.

Contribution: Identifying the annuity puzzle factors (previously mainly reserved for immediate life annuities) that are associated with living annuitant satisfaction levels, serve as the basis for the contribution of this study.

Keywords: annuity puzzle; annuity income product(s); living annuity (self-annuitisation); immediate life annuity (annuitisation); annuity decision-making; investment risk; longevity risk; retirement satisfaction.

Introduction

Orientation

Longevity risk has been singled out as the biggest threat to retirement income security, especially in the wake of longer life expectancy, retirement savings being buffeted by continual increases in medical costs as well as poor investment performance from time to time (eds. Blitzstein, Mitchell & Utkus 2006 as cited in De Villiers-Strijdom 2021).

As a standard practice, retirees purchase an annuity income product (AIP) with their accumulated retirement fund capital, in the form of either an immediate life annuity (annuitisation) or a living annuity (self-annuitisation). An immediate life annuity is a contract between an annuitant and an insurance company, whereby the insurance company guarantees to pay the annuitant a predetermined income (largely based on prevailing interest rates) for the rest of his or her life, in exchange for an initial capital lump sum or premium. The annuitant forgoes the possibility of leaving a bequest to the heirs at death (except if a guarantee term applies). In contrast, a living annuity, also known as self-annuitisation, is an investment portfolio from which the annuitant withdraws income, with the possibility of leaving heirs a bequest of the remaining retirement capital at death. The hope/belief of earning superior investment returns in the case of a living annuity must be weighed against the risk of outliving retirement capital (because of excessive withdrawals and poor actual investment returns). Although an immediate life annuity guarantees an income throughout retirement, it provides poor value for money in the event of premature death (Milevsky 2013; National Treasury 2012 as cited in De Villiers-Strijdom 2021).

An immediate life annuity is the only AIP that protects its holders against longevity and investment risk; yet, contrary to the recommendation based on a substantial body of literature on

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the standard life-cycle model consumption-saving behaviour (Davidoff, Brown & Diamond 2005; Friedman & Warshawsky 1990; Yaari 1965), very few retirees avail themselves of the lifetime income stream that immediate life annuities offer (as cited in De Villiers-Strijdom 2021).

Scholars have been grappling with this phenomenon, dubbed the 'annuity puzzle', for many decades. For example, in Franco Modigliani's Nobel Prize for Economics acceptance speech delivered in 1985, he reiterated that the low uptake of immediate life annuities is still ill understood, and the reasons should be of considerable interest (Rusconi 2006 as cited in De Villiers-Strijdom 2021). The annuity puzzle is a central policy concern of our time, as it may hold the adverse economic implication that many retirees outlive their retirement capital (Peijnenburg, Nijman & Werker 2017 as cited in De Villiers-Strijdom 2021). There is an increased burden on retirees to ensure that they have a sustainable income stream for life in the light of the continued shift away from defined benefit to defined contribution retirement funds (Blitzstein et al. 2006 as cited in De Villiers-Strijdom 2021). Retirees are often ill-equipped to consider many interrelated factors (volatile financial markets, uncertainties about health, longevity) while choosing an appropriate AIP. An inappropriate AIP can leave retirees financially vulnerable, as they may have neither the time nor future income earning capacity (because of ill-health), nor the capability (especially if the spouse who handles the finances dies first), to recover from possible financial devastation.

The annuity puzzle could hold important implications for public policy, as many countries around the world, including South Africa, are in the process of retirement reform (Brown 2001; De Beer 2015 as cited in De Villiers-Strijdom 2021). The South African government published a discussion article in 2012 where concerns were raised regarding the large national uptake of living annuities (National Treasury 2012 as cited in De Villiers-Strijdom 2021). As a result, new regulations were introduced in September 2017 (with compliance expected by March 2019) providing for the establishment of a default annuity strategy, as well as the provision of retirement fund benefits counselling. The annuity strategy can involve living and life annuities. If a living annuity is chosen as part of the default annuity strategy, underlying investment portfolios, retirees' drawdown rates and advisor or intermediary fees are strictly controlled. The role of retirement benefit counsellors is to give individuals nearing retirement an objective and balanced overview of the benefits of the various AIPs on offer.

Research objective and purpose

The objective of this study was to identify the factors that associate with living annuitant satisfaction levels as they relate to the eventual outcome of their annuity choice, by empirically testing a theoretical framework based on annuity puzzle literature. Establishing the factors that associate with living annuitant satisfaction levels as they relate to annuity choice could re-shape the way professional financial educators, counsellors and planners educate and counsel

individuals with respect to optimal AIP decision-making and thereby contribute to a deeper understanding of the existing annuity puzzle for the future financial security of retirees.

Literature review

Annuity puzzle

According to the life-cycle model (as originally developed by Franco Modigliani and Richard Brumberg in the early 1950s; Modigliani & Brumberg 1954), saving behaviour is governed by the individual's desire to smooth consumption patterns over his or her lifetime, within the constraints imposed by limited resources (as cited in De Villiers-Strijdom 2021). The standard life-cycle model suggests that individuals in retirement will dissave out of available resources as their life expectancies shorten. In the classic research article by Yaari (1965), the first economist to add immediate life annuities to the life-cycle model, he wrote:

One need hardly be reminded that a consumer who makes plans for the future must, in one way or another, take account of the fact that he does not know how long he will live. Yet, few discussions of consumer allocation over time give this problem due consideration. (p. 137)

The so-called Yaari life-cycle model continues to be the starting point for analysing annuity decision-making and his 1965 research article is the most widely cited research article in the annuity economics literature (Brown 2001; Milevsky 2013 as cited in De Villiers-Strijdom 2021). Yaari (1965) continued that rational consumers slowly draw on and spend their retirement wealth in proportion to their attitude towards longevity risk, thus gradually reducing their standard of living. He further stated that, if you give these same consumers the ability to purchase immediate life annuities to insure or hedge themselves against longevity risk, they would not have to reduce their standard of living as they age. He showed that immediate life annuities secure a higher level of consumption (because of the mortality premium and credit) compared with the investment alternative (a bond), if utility maximising consumers are concerned only about their own utility and have an uncertain date of death (this is possible as immediate life annuitants who die early subsidise those who live long.) Deductively, immediate life annuities increase consumption and eliminate risk. Yaari (1965) derived the optimal mix of an immediate life annuity and a bond, as a function of an individual's preference for bequests versus consumption during his or her lifetime. Yaari concluded in his classic 1965 article that a life-cycle consumer with no bequest motive would always choose full annuitisation in the presence of actuarially fair annuity markets. The so-called Yaari life-cycle model continues to be the starting point for analysing annuity decision-making and his 1965 research article is the most widely cited research article in the annuity economics literature (Brown 2001; Milevsky 2013 as cited in De Villiers-Strijdom 2021).

Many variations on the standard life-cycle framework of utility maximisation followed Yaari's model, but under

different assumed model parameters. For example, Davidoff et al. (2005) confirmed Yaari's result under a significantly less restrictive set of assumptions. In particular, Davidoff et al. (2005) proved that full annuitisation was optimal in the absence of a bequest motive, even in the case of actuarially unfair annuity markets. Davidoff et al. (2005) further showed that, in an incomplete market setting, where the income stream provided by annuitisation did not sufficiently match a desired consumption path, it was still optimal to annuitise a substantial portion of one's wealth. They argued that this finding should hold, even in the presence of a bequest motive (as cited in De Villiers-Strijdom 2021).

Many valuable insights have arisen from the economic body of literature seeking to solve the annuity puzzle within a rational framework, after conducting an extensive systematic literature review. The annuity puzzle resolutions put forward by scholars from a rational perspective are listed in Table 1 and are categorised in two columns of literature: either in support of or in opposition to the resolution. Table 1 includes references to six empirical studies on the factors influencing annuity choice, three of which are based on intentions (Brown 2001; Cappelletti, Guazzarotti & Tommasino 2013; Gardner & Wadsworth 2004) and three of which are based on actual decisions taken (Bütler & Teppa 2007; Hurd & Panis 2006; Inkmann, Lopes & Michaelides 2011). The factors reflected in Table 1 formed the basis for the development of the theoretical framework that was empirically tested in this study.

The following factors listed in Table 1 warrant further clarification:

- *Managing retirement capital* refers to the flexibility and control over retirement capital allowed within a living annuity with the hope to earn an above-average income. The immediate life annuity option is irreversible and allows the annuitant no control over asset allocation (individuals invest implicitly in the assets that insurers use to back their promise), income drawdown rates, and investment managers (National Treasury 2012; Rusconi 2006 as cited in De Villiers-Strijdom 2021). Gardner and

Wadsworth (2004), for example, suggested that the respondents in their study believed that they could earn a higher income (compared with the income stream provided by an immediate life annuity) by investing retirement capital themselves (with or without the help of a financial advisor) (as cited in De Villiers-Strijdom 2021). The significance of investor confidence as it relates to the appeal of a living annuity was also echoed by Goedde-Menke, Lehmensiek-Starke and Nolte (2014), who suggested that retirees may feel more competent than insurers in managing retirement capital (as cited in De Villiers-Strijdom 2021).

- *Awareness/financial literacy* captures consumers' financial knowledge and ability to engage with their finances in a responsible or optimal manner (Brown et al. 2017 as cited in De Villiers-Strijdom 2021). For example, according to Cappelletti et al. (2013), immediate life annuity demand is significantly lower for individuals with inferior financial literacy with respect to especially two proxies, namely knowledge of inflation and pension benefits (as cited in De Villiers-Strijdom 2021). Also, Bateman et al. (2013) found that people with higher AIP awareness are more engaged with the retirement allocation decision-making process, and thus better equipped to manage longevity risk (as cited by De Villiers-Strijdom 2021).

Life annuities represent poor value to those with high *mortality risk* as they may not receive many annuity income payments if they die soon after retirement, as suggested by Inkmann et al. (2011). In contrast, underlying living annuity capital is bequeathed to heirs upon the annuitant's death (as cited in De Villiers-Strijdom 2021):

- *Benefit perceptions* (or perceived value) can be defined as a judgement or a valuation of the comparison between the benefits obtained from an AIP and the perceived sacrifices or costs (Bigné, Moliner & Callarisa 2000; Gale 1994; Lovelock 1991; Monroe 1990; Teas & Agarwal 2000; Zeithaml 1988 as cited in De Villiers-Strijdom 2021). As benefit perceptions refer to the value perceived by the

TABLE 1: Annuity puzzle factors.

Factor	Verification in support	Verification in opposition
Managing retirement capital	Gardner and Wadsworth (2004); Rusconi (2006); Goedde-Menke et al. (2014)	
Accessibility	Brown (2001); Sinclair and Smetters (2004); Ameriks et al. (2011); Peijnenburg et al. (2017)	
Bequest motive (including risk-sharing strategies)	Friedman and Warshawsky (1990); Bernheim (1991); Laitner and Juster (1996); Gardner and Wadsworth (2004); Schmeiser and Post (2005); Post et al. (2006); Kopczuk and Lupton (2007); Pashchenko (2010); Ameriks et al. (2011); Lockwood (2012) For couples: Kotlikoff and Spivak (1981); Brown and Poterba (2000); Brown (2001); Hurd and Panis (2006); Bütler and Teppa (2007); Inkmann et al. (2011)	Hurd (1987, 1989); Hayashi, Altonji and Kotlikoff (1996); Wilhelm (1996); Cappelletti et al. (2013) For couples: Cappelletti et al. (2013)
Awareness/financial literacy	Rusconi (2006); Ganegoda and Bateman (2008); Bateman et al. (2013); Cappelletti et al. (2013); Brown et al. (2017)	
Mortality risk	Brown (2001); Gardner and Wadsworth (2004); Hurd and Panis (2006); Bütler and Teppa (2007); Inkmann et al. (2011)	
Risk aversion	Brown (2001); Bütler and Teppa (2007); Inkmann et al. (2011)	Cappelletti et al. (2013)
Patience/speed of financial decision-making	Brown (2001); Gardner and Wadsworth (2004); Hurd and Panis (2006); Cappelletti et al. (2013)	
Mortality salience	Salisbury and Nenkov (2016)	
Influence (exploratory)	Hawkins and Mothersbaugh (2013); Samson (2015); World Bank (2015)	
Trust in advisor (exploratory)	Rusconi (2006); Gardner and Wadsworth (2014)	
Benefit perception (exploratory)	Zeithaml (1988); Monroe (1990); Lovelock (1991); Gale (1994); Bigné et al. (2000); Teas and Agarwal (2000); Roig et al. (2006)	

Source: De Villiers-Strijdom, J., 2021, 'Annuity decision-making', Doctoral thesis, Stellenbosch University, viewed 14 February 2023, from <https://scholar.sun.ac.za/handle/10019.1/109846>.

individual or annuitant, it cannot be determined objectively by the seller. Only the individual or annuitant is able to perceive whether or not an AIP offers value (Roig et al. 2006 as cited in De Villiers-Strijdom 2021). According to Roig et al. (2006), benefit perceptions (or perceived value) as a multi-dimensional construct could have two dimensions, namely: (1) a functional dimension and (2) an emotional (or affective) dimension. Factors identified in the functional dimension include value for money (Sweeney, Soutar & Johnson 1999) and expected yield (Sweeney & Soutar 2001), whereas factors identified in the affective dimension captures the feelings or emotions elicited by the AIP (Sánchez et al. 2006) (as cited in De Villiers-Strijdom 2021). The question items used in this study to measure benefit perceptions capture both dimensions.

Annuity satisfaction

Despite the substantial body of scholarly literature that has attempted to explain the annuity puzzle (see Table 1 for a summary), there appears to be little empirical research focusing on the satisfaction levels of retirees relating to their retirement income choices. Most notably, Panis (2004), Bender and Jivan (2005) as well as more recently, Nyce and Quade (2012), have empirically investigated the effect of a guaranteed lifetime income stream on retirement satisfaction levels and conclusively showed that the more people can count on guaranteed lifetime income streams, the more satisfied they were throughout retirement (as cited in De Villiers-Strijdom 2021). Greater satisfaction of annuitants with a dependable income stream is ascribed to reduced anxiety about the risks of outliving retirement savings and ending up in poverty. A guaranteed lifetime income stream in these studies refers mostly to defined benefit pension pay-outs, and only in some cases were immediate life annuities included.

This study builds on previous studies by: (1) measuring satisfaction levels as they associate with AIP choice specifically (as opposed to satisfaction levels in general); (2) measuring respondents' emotions or feelings regarding their financial future specifically (as opposed to depression symptoms in isolation); and (3) including various factors, grounded in annuity puzzle theory that have not been previously included in retirement satisfaction studies (e.g. managing retirement capital in retirement).

Research design

Research approach

By following a quantitative research approach, this study attempted to answer the question: 'Which factors are associated with the satisfaction levels of living annuitants as they relate to the eventual outcome of the AIP choice?'

The systematic literature review was used to formulate the following hypotheses that were investigated in this study:

H0: There is no relationship between annuity puzzle factors and living annuitant satisfaction.

Ha: There is a relationship between annuity puzzle factors and living annuitant satisfaction.

Research method

Research participants

The target population for the study was retirees currently in receipt of either living or immediate life annuity income payments or a combination of both. The convenience (or non-probability) sample consisted of two sub-samples in order to be as representative as possible of the target population, namely: (1) former employees of Stellenbosch University (SU), who are fully retired from the University of Stellenbosch Retirement Fund (USRF) and (2) Glacier annuity clients. Unfortunately, because of so few participants having chosen an immediate life annuity as part of their retirement income strategy, as is predicted by the annuity puzzle, the final sample consisted only of living annuitants. The realised sample consisted of 44 SU pensioners. The average age with respect to the SU pensioners was 69.7 years and 80% of them reported to be in the higher-middle income to higher income bracket. Of the total SU sample 98% of the pensioners had at least one certificate or diploma or degree. The realised sample also consisted of 259 Glacier annuitants. Glacier is a subsidiary of Sanlam, which is regarded as one of the biggest insurance groups in South Africa. The average age with respect to the Glacier sample was 71.7 years and 64% of the annuitants reported to be in the higher-middle income to high income brackets. Of the total Glacier sample, 85% of the annuitants had at least one certificate or diploma or degree. The data from both samples was collected in June 2020.

Measurement instrument

As measurement instrument an online questionnaire was designed in Qualtrics, version 20 (Qualtrics LLC, Provo, Utah, USA), a survey software programme. The dependent and independent variables represent the theoretical framework on which this empirical analysis is based, with the purpose of ascertaining which factors associate with the satisfaction levels of annuitants. The theoretical framework was constructed after a reliability analysis was performed on the data. The hypothesised relationships tested in this study were formulated based on the final outcome of the reliability analysis.

The *dependent variable* (living annuitant satisfaction levels as they relate to the eventual outcome of AIP choice) was measured as an overarching construct, consisting of the average of eight items derived from Panis (2004) and summarised as: (1) AIP satisfaction; (2) regret towards AIP choice; (3) would choose different AIP; (4) would change AIP in future; and feel (5) anxious; (6) comfortable; (7) hopeful; (8) worry about financial future (see Section C in Appendix A for survey items in full).

The *independent variables* refer to living annuity-related and other exploratory factors derived from annuity puzzle literature that could either increase or decrease satisfaction levels in retirement. Living annuity-related factors include:

managing retirement capital (the control and flexibility allowed within a living annuity product to earn an above-average income from a living annuity because of the expected growth generated by the underlying investment portfolio); accessibility to capital (the ability to access underlying funds in a living annuity to pay for unforeseen expenses, for example medical costs or home repairs); the bequest motive (annuitant's desire to leave his or her remaining retirement capital to heirs at death and includes risk-sharing strategies according to which heirs are willing to bear the risk of the annuitant outliving his or her money, in return for a possible bequest); awareness about AIPs (levels of understanding of the benefits and disadvantages of various AIPs); financial literacy (knowledge about retirement and investment-related matters); mortality risk (risk of dying); the fear of outliving retirement capital; risk aversion (willingness to accept financial or investment risk); patience (character trait); speed of financial decision-making; and mortality salience (increased accessibility of thoughts related to one's own death). Exploratory factors refer to the influence of peers and experts to choose a living annuity; trust in integrity of financial advisor selling living annuities; and finally, post-retirement benefit perceptions of a living annuity (see Table 1 for annuity puzzle literature on which these factors are grounded and Appendix A for the full survey questions).

The questionnaire was structured as follows: Firstly, individuals were asked if he or she had purchased a living annuity, an immediate life annuity, or a combination of both with his or her retirement fund capital. Secondly, independent variables, grounded in annuity puzzle theory, were measured in order to identify the factors associated with participants' satisfaction levels as they related to their annuity choice, by using a seven-point Likert scale (1 meant strongly disagree and 7 meant strongly agree). Hence, it was ascertained which reason(s) favouring the living annuity option, as predicted by annuity puzzle theory, translated into satisfaction or dissatisfaction in retirement. See Appendix A for the full survey questions used to measure the independent variables.

For example, in order to test the significance of *accessibility* to capital in retirement (independent variable) associated with individuals' satisfaction levels, respondents who had chosen a living annuity, indicated whether they agreed or disagreed with the following statement: 'A living annuity is desirable as it allows me access to my retirement capital to pay for unforeseen expenses, for example, medical costs or home repairs'. Other statements in the section related to various other living and immediate life annuity characteristics, either directly or indirectly.

The subsequent questions in the questionnaire were used as proxies to measure, for example, mortality risk, risk aversion and patience as derived from the U.S. Health and Retirement Study (HRS) (Brown 2001:42), the English Longitudinal Study of Ageing (ELSA) (Inkmann et al. 2011:285), and the

Italian Survey of Household Income and Wealth (SHIW) (Cappelletti et al. 2013:778).

In the studies by Panis (2004), Bender and Jivan (2005) as well as Nyce and Quade (2012), the respondents' general levels of satisfaction in retirement were measured. In this study, however, respondents' satisfaction levels regarding their chosen AIP (living annuity), were measured. Subsequently, three questions were asked to measure/assess retirees' regret about their decision to annuitise or not and their intention to make changes to their AIPs in the future.

Members of South African retirement funds are obligated by law to purchase either a immediate life annuity or a living annuity with a substantial portion of their retirement capital. Also, retirees are allowed to follow alternative annuity strategies, for example, to switch a living annuity to an immediate life annuity later in retirement (Nienaber & Reinecke 2009 as cited in De Villiers-Strijdom 2021).

The next four questions were similar to those used by Panis (2004). Mental health was established, similar to the Center for Epidemiologic Studies Depression (CES-D) scale (Radloff 1977), which is based on 20 self-reported questions designed to assess symptoms of depression (as cited in De Villiers-Strijdom 2021). The HRS administered a shortened version of nine questions as was used by Panis (2004). This survey used an even shorter version of only four questions and related specifically to how retirees felt about their financial future. A seven-point Likert scale was used to measure respondents' responses (1 meant strongly disagree and 7 meant strongly agree).

Finally, data on demographic variables was collected as derived from the HRS, ELSA and SHIW (Brown 2001:42; Cappelletti et al. 2013:778; Inkmann et al. 2011:285).

Research procedure and ethical considerations

Cross-sectional primary data were collected by virtue of an online survey for pensioners regarding their satisfaction levels about their living annuity income payments. Respondents' participation was voluntary and anonymous, thereby ensuring confidentiality. The necessary ethical clearance was obtained from the relevant university's Research and Ethics Committee (no. 9101) and the Division of Information Governance (no. IRPSD1251). Informed consent was obtained from all participants.

Statistical analysis

An ordinary least squares (OLS) linear multiple regression analysis in IBM SPSS Statistics for Windows, version 28 (IBM Corp., Armonk, N.Y., USA). version 26 was conducted to assess the hypothesised relationships between the independent variables and the satisfaction levels of living annuitants (dependent variables).

Results

Reliability analysis

The internal consistency of variables was evaluated after the data were collected to assess measurement reliability (Pallant 2010; Shelby 2011 as cited in De Villiers-Strijdom 2021). As a result of the novelty of the study and the subsequent absence of validated scales, a Cronbach's alpha (CA) of 0.5, as opposed to the generally accepted 0.7, was deemed acceptable per variable (Nunnally & Bernstein 1994 as cited in De Villiers-Strijdom 2021).

As CA does not necessarily imply unidimensional scales, additional exploratory factor analyses (EFA) were performed in SPSS for constructs with multi-dimensional scales, as advocated by Cronbach and Shavelson (2004 as cited in De Villiers-Strijdom 2021). New constructs or scales were developed from the EFA. Also, some constructs were split and a few items were deleted as a result of the EFA (see Table 2).

The first column in Table 2 represents the variables in the model, whereas the second column in Table 2 contains the number of items or questions that measure each variable. If the CA for any specific variable (third column in Table 2) was 0.5 or above, the variable remained unchanged. However, if the CA for a specific variable was below 0.5, an EFA was conducted, which, in some cases, resulted in new constructs

TABLE 2: Formation of variables.

Variables	Number of items	Cronbach's alpha (CA)	Newly formed scale (No. of items; CA)	Survey items in Appendix A (Section no.: Question no.)
Managing retirement capital	2	0.747	N/A	A: 1, 2
Accessibility_general	1	N/A	N/A	B: 14
Accessibility_retirement capital	1	N/A	N/A	A: 4
Awareness_AIPs	2	0.728	N/A	B: 3, 11
Awareness_living annuities	1	N/A	N/A	A: 14
Bequest motive	3	0.484 (0.744 if one item is removed)	Inter-item correlations within acceptable range, except for one item	A: 3, 6; B:15
Mortality risk	5	0.369	MORTALITY ESTIMATION (2; .863) FEAR OUTLIVE	B: 6, 7 A: 13
Risk aversion	2	0.578	N/A	B: 5, 12
Patience	1	N/A	N/A	B: 1
Mortality salience	1	N/A	N/A	A: 11
Influence	3	0.586	N/A	A: 15, 16, 17
Benefit perception	3	0.861	N/A	A: 5, 7, 9
Trust in advisor	2	0.752	N/A	A: 8, 10
Speed of financial decision-making	1	N/A	N/A	B: 9
Financial literacy	4	0.555	Inter-item correlations within acceptable range	B: 2, 4, 8, 10
Satisfaction	8	0.895	N/A	C: 1–8

Source: De Villiers-Strijdom, J., 2021, 'Annuity decision-making', Doctoral thesis, Stellenbosch University, viewed 14 February 2023, from <https://scholar.sun.ac.za/handle/10019.1/109846>. N/A, not applicable.

TABLE 3: Factors that related to the satisfaction levels of living annuitants.

Independent variable	Beta-coefficient	t-statistic	Collinearity statistics	
			Tolerance	VIF
Benefit perception	0.556	9.029***	0.477	2.096
Fear outlive	-0.313	-6.836***	0.866	1.154
Financial literacy	0.208	4.037***	0.680	1.471
Awareness_AIPs	0.177	3.422**	0.681	1.469
Managing retirement capital	-0.151	-2.689**	0.572	1.748
Awareness_living annuities	0.128	2.383*	0.629	1.589
Mortality risk (low)	0.096	2.171*	0.936	1.069
Trust in advisor	-0.047	-0.974	0.771	1.297
Accessibility_general	-0.077	-1.639	0.824	1.214
Accessibility_retirement capital	0.034	0.720	0.819	1.221
Bequest motive	0.018	0.369	0.777	1.287
Mortality salience	-0.036	-0.800	0.910	1.099
Patience	0.024	0.517	0.855	1.170
Speed of financial decision-making	0.080	1.710	0.830	1.205
Risk aversion	-0.083	-1.745	0.795	1.257
Influence	0.069	1.456	0.803	1.246

Source: De Villiers-Strijdom, J., 2021, 'Annuity decision-making', Doctoral thesis, Stellenbosch University, viewed 14 February 2023, from <https://scholar.sun.ac.za/handle/10019.1/109846>. VIF, variance inflation factor.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

(fourth column in Table 2). Final constructs were measured by the survey items as depicted in the fifth column in Table 2.

Satisfaction levels of living annuitants

As there are 16 independent variables, a minimum sample size of approximately 146 respondents was required (Stevens 1996:72 as cited in De Villiers-Strijdom 2021).

As expected, the majority of respondents chose the living annuity ($\approx 88\%$ of 44 USRF pensioners, $\approx 73\%$ of 259 Glacier pensioners and $\approx 75\%$ of 303 in the total group).

A multiple regression was performed to ascertain which factors associate with the satisfaction levels of living annuitants. Consequently, data from 229 respondents who had chosen a living annuity were analysed. The response rates for the two groups were approximately 11% (USRF) and 5% (Glacier). Unfortunately, a multiple regression could not be performed on the choice to annuitise, because of insufficient sample size.

According to the multiple regression results presented in Table 3, the R squared amounted to 61.60%. The standard error of the estimate was within the acceptable range ($SE = 0.77526$). The F -statistic was 21.219 ($p < 0.001$). No multiple regression analysis assumptions were violated. Descriptive statistics for all factors are given in Table B.1 in Appendix B.

The 16 independent variables are ranked according to significance of results. From the 16 hypotheses that were tested to assess the relationship between the satisfaction levels of living annuitants (dependent variable) and the independent variables listed in Table 3, seven factors proved to be significantly associated with living annuitants'

satisfaction levels relating to their annuity choice, as follows: (1) post-retirement benefit perceptions of living annuities, (2) fear of outliving retirement capital (inverse), (3) financial literacy, (4) awareness of AIPs in general, (5) awareness of living annuities specifically, (6) managing retirement capital (inverse) and (7) low risk of dying (inverse). The 16 hypotheses for the satisfaction levels of living annuitants, with a short interpretation, are given in Table C.1, Appendix C.

Discussion

Outline of the results

The *post-retirement benefit perceptions*, as measured by peace of mind, feeling a sense of financial security and believing that a fair return on investment is achieved from a living annuity, positively associated with satisfaction levels (no known studies exist to confirm or oppose this finding or result). A limitation of this factor is the potential for endogeneity.

Fear of outliving retirement capital reduced satisfaction levels. Living annuitants are exposed to the risk of their capital becoming depleted while still alive, especially in the face of unsustainably high withdrawal rates and poor investment returns. This fear of outliving capital can be paralysing, as it may not be possible to recover from capital losses in old age. Also, annuitants may be incapable of earning an income to supplement their pension because of ill health. In addition, a stable income stream may be particularly important late in life, as the need for medical care increases (suggested by Panis 2004).

Financial literacy contributed positively to satisfaction levels. This finding was echoed by Panis (2004) who showed that satisfaction levels were higher for individuals who had engaged in financial planning activities.

Annuity income product awareness increased satisfaction levels. Individuals who are familiar with retirement income options, and actively educate themselves on the topic, are more likely to experience high satisfaction levels (Confirmed by Panis 2004.)

Managing retirement capital, which refers to the control and flexibility to grow retirement capital in a living annuity, diminished retiree satisfaction. Living annuitants who believed that they could earn a superior return on their investment, experienced lower satisfaction during retirement, as they might feel the brunt of being exposed to poor investment choices and external investment shocks accompanied by unsustainably high withdrawal levels (no known studies exist to confirm or oppose this finding or result). The belief in earning above-average income because of the flexibility and control allowed within a living annuity suggests support for the framing effect, according to which living annuity characteristics are viewed through the investment frame (which focuses on the risk or return features of the AIP) as opposed to the consumption frame (which focuses on guaranteed consumption for life) (Brown

et al. 2008; Tversky & Kahneman 1981 as cited in De Villiers-Strijdom 2021).

Mortality risk (low) and having a low self-estimated risk of dying significantly enhanced satisfaction levels. As expected, respondents who felt that they were likely to live until an advanced age, experienced more satisfaction. It is observed that people may worry about their retirement money not lasting for their lifetime, but they may even be more worried about dying early than they are about outliving their money (no known studies exist to confirm or oppose this finding or result). They do not see dying early as a solution to their challenges. This could be explained by risk-order bias, where the likelihood of near events (dying soon) is easier imagined than far events (outliving retirement capital) (Tversky & Kahneman 1974 as cited in De Villiers-Strijdom 2021).

Practical implications

Financial advisors have a duty of care to inform and educate their clients about the possible dissatisfaction that could be experienced in retirement when choosing the living annuity income option. Being aware of the cognitive biases that guide our investment decisions, holistic thinking requires retirees to view the annuity decision through both the investment and consumption frames. The attractive feature of self-annuitising under the investment frame is the possibility of generating superior investment returns, whereas the unattractive feature of self-annuitisation under the consumption frame is the possibility of outliving retirement capital. Immediate life annuities are specifically designed to eliminate this risk. The unattractive feature of annuitisation in the investment frame will be the potential to receive poor value for money in the event of premature death (this negative consequence could be counteracted by having life insurance in place). Under the consumption frame, however, annuitisation is attractive, as it serves as a form of insurance for consumption throughout retirement.

If living annuitants are dissatisfied with their annuity choice after a thorough evaluation, the financial advisor could, after the validity of reasons for the client's discontent have been established, advise the client to switch either entirely or in part into an immediate life annuity. Annuitisation could be especially advantageous to older retirees with high longevity risk aversion and low mortality risk.

Limitations and recommendations

The factors that are associated with annuitants' satisfaction levels relating to the eventual outcome of their annuity decision were investigated. Unfortunately, because of annuitants' observed apprehension towards life annuitisation, the obtained sample was not large enough for reliable statistical analysis. Future research into the factors that are associated with the satisfaction levels of life annuitants, as well as annuitants that follow blended annuity income strategies, could further enhance understanding of the annuity puzzle.

As a result of the low response rate, a potential limitation is non-response bias, and consequently, the lack of generalisability of the findings to the target population. Financial market volatility during the data collection period could have had an influence on respondents' survey answers because of the coronavirus pandemic.

Questions used in this study to measure constructs were derived from questions used in other similar studies, but in some cases differ substantially. Also, the scales used in this study differ from the scales used in other studies. Hence, there appears to be empirical limitations with respect to the degree to which results offered by this study can be compared with results offered by other similar studies. The identification of factors that relate to annuity satisfaction could be further expanded by means of future validation studies, thereby contributing further to the existing body of literature on the annuity puzzle.

Conclusion

Few retirees protect themselves against outliving their assets; yet there appears to be little empirical evidence to guide our understanding of annuity decision-making behaviour. Identifying the annuity puzzle factors (previously mainly reserved for life annuities) that are associated with living annuitant satisfaction levels, serve as the basis for the contribution of this study. Post-retirement benefit perceptions, financial literacy, awareness about AIPs as well as a low risk of dying are positively associated with living annuitant satisfaction. In contrast, the desire to manage retirement capital in the pursuit of superior investment returns, as well as the fear of outliving retirement capital are associated with retiree dissatisfaction.

Individuals are often ill-equipped to consider the variety of complex interrelated factors while choosing an appropriate AIP before retirement. Financially inexperienced and illiterate individuals require strong guidance to sensibly compare the range of product features provided by different AIPs because an inappropriate choice can leave retirees financially vulnerable as they grow older, especially when they are no longer able to earn additional income or are no longer capable of managing living annuity capital that involves difficult trade-offs.

The freedom obtained by choosing the self-annuitant route carries a great responsibility and the burden to live with the potentially irremediable consequences of one's choice. Alternatively, receiving a guaranteed income stream affords the freedom to live without any further difficult investment decisions or possible detrimental consequences of outliving retirement capital.

The primary goal of retirement fund capital is to sustain oneself sufficiently throughout retirement. Immediate life annuities fully protect against longevity and investment risk, thereby providing certainty – a luxury indeed, especially in times of global political and economic uncertainty.

The identified factors that are associated with living annuitant satisfaction levels could enable professional financial educators, counsellors and planners to better assist retirees in choosing an optimal AIP. The rational evaluation of AIP suitability, without unwarranted prejudice could be achieved by educating and creating awareness regarding the forces/motives as well as cognitive biases present in annuity decision-making, as well as advocating annuitisation as a valuable part of an optimal AIP strategy.

The continued efforts of the academic community in recognising and analysing the forces that drive annuity satisfaction are significant in facilitating fruitful debate on optimal AIP decision-making. The financial security of retirees depends on it.

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Authors' contributions

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Data availability

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Disclaimer

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Appendix 1: Survey questions

SECTION A

There are no correct or incorrect responses to the statements in this section. Describe your perceptions as accurately as possible by ticking one of the seven response options. For each statement, tick the response option that best describes your point of view. If you are unable to respond to a question, please tick number 4.

TABLE 1-A1: Survey questions.

Number	Statement	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
1.	I do better by investing my retirement capital in a living annuity because my capital has the potential to grow.									
2.	I like the flexibility and control of managing a living annuity.									
3.	At death, it is important to me to leave my remaining retirement capital to my heirs.									
4.	A living annuity is desirable as it allows me access to my retirement capital to pay for unforeseen expenses – for example, medical costs or home repairs.									
5.	The retirement income option I have chosen gives me peace of mind.									
6.	My family would fund any shortfall I might have in retirement, in return for inheriting any money left over in my living annuity.									
7.	The retirement income option I have chosen gives me a fair return on my investment.									
8.	Financial advisors selling living annuities pursue only their own self-interested goals.									
9.	The retirement income option I have chosen gives me a sense of financial security.									
10.	I believe that financial advisors selling living annuities have their clients' best interests at heart.									
11.	A living annuity makes me think about my own death.									
12.	I fear dying soon.									
13.	I fear outliving my retirement capital.									
14.	I am familiar with a living annuity as a retirement income option.									
15.	Most people I ask recommend a living annuity.									
16.	My financial advisor recommends a living annuity.									
17.	A living annuity, as far as I know, is the most popular retirement income option.									

Source: De Villiers-Strijdom, J., 2021, 'Annuity decision-making', Doctoral thesis, Stellenbosch University, viewed 14 February 2023, from <https://scholar.sun.ac.za/handle/10019.1/109846>.

SECTION B

There are no correct or incorrect responses to the statements in this section. Describe your perceptions as accurately as possible by ticking one of the seven response options. For each statement, tick the response that best describes your point of view. If you are unable to respond to a question, please tick number 4.

TABLE 2-A1: Survey questions.

Number	Statement	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
1.	I regard myself as someone who is patient.									
2.	Investing in retirement funds has the same tax advantages as other investment funds.									
3.	I am familiar with retirement income options.									
4.	All retirement funds guarantee to pay retirees a pension until their death.									
5.	I prefer investments that offer high returns, even if it is a risky decision.									
6.	It is likely that I will survive to age 85.									
7.	It is likely that I will survive to age 90 and beyond.									
8.	It makes sense to invest money in the shares of more than one company.									
9.	I make financial planning decisions quickly.									
10.	Pension fund law prohibits retirement funds to invest in shares.									
11.	I educate myself on retirement income options.									
12.	I try to avoid financial risk.									
13.	I am uncertain about my own biological survival prospects.									
14.	It is important to have access to cash during retirement for emergencies.									
15.	It is important to me to leave an inheritance to my heirs at death.									

Source: De Villiers-Strijdom, J., 2021, 'Annuity decision-making', Doctoral thesis, Stellenbosch University, viewed 14 February 2023, from <https://scholar.sun.ac.za/handle/10019.1/109846>.

SECTION C

There are no correct or incorrect responses to the statements in this section. Describe your perceptions as accurately as possible by ticking one of the seven response options. For each statement, tick the response that best describes your point of view.

TABLE 3-A1: Survey questions.

Number	Statement	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
1.	I am satisfied with my chosen retirement income option.									
2.	I feel regret towards my choice of retirement income option.									
3.	I would choose a different retirement income option, if I could choose again.									
4.	I would change to a different retirement income option in the future, if possible.									
5.	I feel anxious about my financial future.									
6.	I feel comfortable about my financial future.									
7.	I feel hopeful about my financial future.									
8.	I worry about my financial future.									

Source: De Villiers-Strijdom, J., 2021, 'Annuity decision-making', Doctoral thesis, Stellenbosch University, viewed 14 February 2023, from <https://scholar.sun.ac.za/handle/10019.1/109846>.

Appendix 2: Results

TABLE 1-A2: Descriptive statistics for all variables.

Variables	Mean	Standard deviation	Median
Satisfaction	5.0	1.2	5.1
Benefit perception	5.0	1.4	5.3
Fear outlive	4.3	1.9	5.0
Financial literacy	5.3	0.9	5.3
Awareness_AIPs	5.2	1.1	5.5
Managing retirement capital	5.7	1.2	6.0
Awareness_living annuities	5.0	1.0	6.0
Mortality risk (low)	4.3	1.5	4.0
Trust in advisor	4.1	1.4	4.0
Accessibility_general	6.1	0.9	6.0
Accessibility_retirement capital	4.0	1.9	4.0
Bequest motive	4.6	1.2	4.7
Mortality salience	3.4	1.6	4.0
Patience	4.9	1.5	5.0
Speed of financial decision-making	4.1	1.6	4.0
Risk aversion	3.6	1.4	3.5
Influence	4.6	0.9	4.7

AIP, annuity income product.

Appendix 3: Hypotheses

The following hypotheses were tested in order to explore the relationship between the dependent and independent variables as shown in Table 1.3. In all cases the null hypothesis was addressed.

TABLE 1-A3: Hypotheses for the satisfaction levels of living annuitants.

Number	Independent variable	Hypothesis accepted	Null hypothesis (H0) and Alternative hypothesis (Ha)	Interpretation
1.	Benefit perception	Directional (positive)	H0 ¹ : There is no relationship between the post-retirement benefit perceptions of a living annuity and the satisfaction levels of living annuitants. Ha ¹ : There is a relationship between the post-retirement benefit perceptions of a living annuity and the satisfaction levels of living annuitants.	The <i>p</i> -value is significant at the 0.1% confidence level (<i>p</i> = 0.000). The null hypothesis must therefore be rejected. Deductively, perceiving a living annuity as beneficial in retirement contributes positively to satisfaction levels.
2.	Fear outlive	Directional (negative)	H0 ² : There is no relationship between the fear of outliving retirement capital and the satisfaction levels of living annuitants. Ha ² : There is a relationship between the fear of outliving retirement capital and the satisfaction levels of living annuitants.	The <i>p</i> -value is significant at the 0.1% confidence level (<i>p</i> = 0.000). The null hypothesis must therefore be rejected. Deductively, the fear of outliving retirement capital reduces satisfaction levels.
3.	Financial literacy	Directional (positive)	H0 ³ : There is no relationship between financial literacy and the satisfaction levels of living annuitants. Ha ³ : There is a relationship between financial literacy and the satisfaction levels of living annuitants.	The <i>p</i> -value is significant at the 0.1% confidence level (<i>p</i> = 0.000). The null hypothesis must therefore be rejected. Deductively, financial literacy contributes positively to satisfaction levels.
4.	Awareness_AIPs	Directional (positive)	H0 ⁴ : There is no relationship between general annuity income product awareness and satisfaction levels of living annuitants. Ha ⁴ : There is a relationship between general annuity income product awareness and satisfaction levels of living annuitants.	The <i>p</i> -value is significant at the 1% confidence level (<i>p</i> = 0.001). The null hypothesis must therefore be rejected. Deductively, AIP awareness increases satisfaction levels.
5.	Managing retirement capital	Directional (negative)	H0 ⁵ : There is no relationship between the control and flexibility to grow retirement capital and the satisfaction levels of living annuitants. Ha ⁵ : There is a relationship between the control and flexibility to grow retirement capital and the satisfaction levels of living annuitants.	The <i>p</i> -value is significant at the 1% confidence level (<i>p</i> = 0.008). The null hypothesis must therefore be rejected. Deductively, the control and flexibility to grow retirement capital within a living annuity, diminish satisfaction levels.
6.	Awareness_Living Annuities	Directional (positive)	H0 ⁶ : There is no relationship between living annuity product awareness and satisfaction levels of living annuitants. Ha ⁶ : There is a relationship between living annuity product awareness and satisfaction levels of living annuitants.	The <i>p</i> -value is significant at the 5% confidence level (<i>p</i> = 0.018). The null hypothesis must therefore be rejected. Deductively, living annuity product awareness heightens satisfaction levels.
7.	Mortality risk (low)	Directional (positive)	H0 ⁷ : There is no relationship between low mortality risk and the satisfaction levels of living annuitants. Ha ⁷ : There is a relationship between mortality risk and the satisfaction levels of living annuitants.	The <i>p</i> -value is significant at the 5% confidence level (<i>p</i> = 0.031). The null hypothesis must therefore be rejected. Deductively, having a low self-estimated risk of dying enhances satisfaction levels.
8.	Trust in advisor	Null	H0 ⁸ : There is no relationship between trusting financial advisors selling living annuities and the satisfaction levels of living annuitants. Ha ⁸ : There is a relationship between trusting financial advisors selling living annuities and the satisfaction levels of living annuitants.	The <i>p</i> -value is non-significant (<i>p</i> > 0.05). Therefore, null hypothesis cannot be rejected.
9.	Accessibility_general	Null	H0 ⁹ : There is no relationship between general accessibility to capital and the satisfaction levels of living annuitants. Ha ⁹ : There is a relationship between general capital accessibility and satisfaction levels of living annuitants.	The <i>p</i> -value is non-significant (<i>p</i> > 0.05). The null hypothesis therefore cannot be rejected.
10.	Accessibility_retirement capital	Null	H0 ¹⁰ : There is no relationship between retirement capital accessibility and the satisfaction levels of living annuitants. Ha ¹⁰ : There is a relationship between retirement capital accessibility and satisfaction levels of living annuitants.	The <i>p</i> -value is non-significant (<i>p</i> > 0.05). The null hypothesis therefore cannot be rejected.
11.	Bequest motive	Null	H0 ¹¹ : There is no relationship between the bequest motive and the satisfaction levels of living annuitants. Ha ¹¹ : There is a relationship between the bequest motive and the satisfaction levels of living annuitants.	The <i>p</i> -value is non-significant (<i>p</i> > 0.05). Therefore, the null hypothesis cannot be rejected.
12.	Mortality salience	Null	H0 ¹² : There is no relationship between mortality salience and the satisfaction levels of living annuitants. Ha ¹² : There is a relationship between mortality salience and the satisfaction levels of living annuitants.	The <i>p</i> -value is non-significant (<i>p</i> > 0.05). Therefore, the null hypothesis cannot be rejected.
13.	Patience	Null	H0 ¹³ : There is no relationship between general patience and the satisfaction levels of living annuitants. Ha ¹³ : There is a relationship between general patience and the satisfaction levels of living annuitants.	The <i>p</i> -value is non-significant (<i>p</i> > 0.05). Therefore, the null hypothesis cannot be rejected.
14.	Speed of financial decision-making	Null	H0 ¹⁴ : There is no relationship between speed of financial decision-making and the satisfaction levels of living annuitants. Ha ¹⁴ : There is a relationship between speed of financial decision-making and the satisfaction levels of living annuitants.	The <i>p</i> -value is non-significant (<i>p</i> > 0.05). Therefore, the null hypothesis cannot be rejected.
15.	Risk aversion	Null	H0 ¹⁵ : There is no relationship between risk aversion and the satisfaction levels of living annuitants. Ha ¹⁵ : There is a relationship between risk aversion and the satisfaction levels of living annuitants.	The <i>p</i> -value is non-significant (<i>p</i> > 0.05). Therefore, the null hypothesis cannot be rejected.
16.	Influence	Null	H0 ¹⁶ : There is no relationship between influence and the satisfaction levels of living annuitants. Ha ¹⁶ : There is a relationship between influence and the satisfaction levels of living annuitants.	The <i>p</i> -value is non-significant (<i>p</i> > 0.05). Therefore, null hypothesis cannot be rejected.

Source: De Villiers-Strijdom, J., 2021, 'Annuity decision-making', Doctoral thesis, Stellenbosch University, viewed 14 February 2023, from <https://scholar.sun.ac.za/handle/10019.1/109846>. AIP, annuity income product.