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The stochastic determinants of happiness in South Africa: A micro-economic modelling approach

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Orientation: The levels of happiness in South Africa have deteriorated as witnessed by recent increases in public protests.

Research purpose: Based on a newly developed conceptual framework, the linear path of influence of a variety of determinants of happiness is challenged in this article. This is done by firstly postulating a potential sequence of influences through which underlying factors have impact on non-proximate factors, which in turn influence the proximate factors, which also affect happiness.

Motivation for the study: Given the global interest on well-being, happiness as an indicator of subjective well-being is an important trend to review and reflect on. Based on trends in happiness ratings, South Africans are no longer as satisfied and happy with their lives as they were previously. Given the apparent high level of unhappiness in South Africa, this article aims to identify the various stochastic determinants of happiness within the South African context.

Research approach/design and method: The predictability of the conceptual framework was tested by means of categorical regressions.

Main findings: The results indicate that a stochastic happiness determination path exists from underlying to non-proximate, to proximate to happiness outcomes and not necessarily the linear path as per the traditional approach of investigation. The results of the study challenge policymakers in South Africa to rethink their current strategies as the current status quo will not necessarily have the desired results. Moreover, higher levels of happiness will only be possible if positive macro-dynamics go hand in hand with positive micro-dynamics. These include high levels of cognitive abilities among the population, the population striving for happiness, planning their personal and financial futures, having access to financial and risk products, and having sustainable income sources.

Practical/managerial implications: Through the identification of the identification of the path by which happiness is influenced, programmes and policies designed to improve the subjective well-being of South Africans can be customised to ensure the correct action is taken at the correct level of initiation.

Contribution/value-add: One of the contributions of this article is the development of a conceptual framework concerning the path or chain of influences across several layers of variables and not only the direct relationships, as is the norm. Although the relationships between identified determinants and happiness have been researched extensively, limited information is available concerning the path of influence in South Africa. The second contribution is therefore not to identify the direct determinants of happiness in South Africa through the conventional methods, but rather to test the potential path of influence of these factors on one another as well as on happiness based on the developed conceptual framework.

Introduction

'Money doesn't buy happiness. Well, an economist might reply, at least not by itself' (Bernanke 2010). For many years, people have argued whether money can buy happiness and studies have shown that money indeed contributes to happiness, but as Bernanke (2010) said, not by itself. Happiness is seen as the self-evaluation of an individual's quality of life because an individual can best assess his or her own well-being (Møller 2001; Veenhoven 1991). Happiness is a measure of overall feelings of well-being or subjective well-being (Easterlin 2004). However, these concepts have been explored further and a summary of the work was published by the Organisation for Economic Co-operation and Development (OECD 2013). The latter provides a framework covering the following three concepts of subjective well-being:

- Life evaluation – focusing on a person's reflective assessment of their life or some specific aspect of it.
- Affect – reporting on measures of particular feelings or emotional states, normally measured with reference to a particular point in time. Distinction can be made between positive affect (capturing positive emotions such as the experience of happiness, joy and contentment) and negative affect (comprising the experience of unpleasant emotional states such as sadness, anger, fear and anxiety).
- Eudaimonia – focusing on the concept of good psychological functioning, sometimes also referred to as 'flourishing' or 'eudaimonic' well-being. (pp. 29–32)

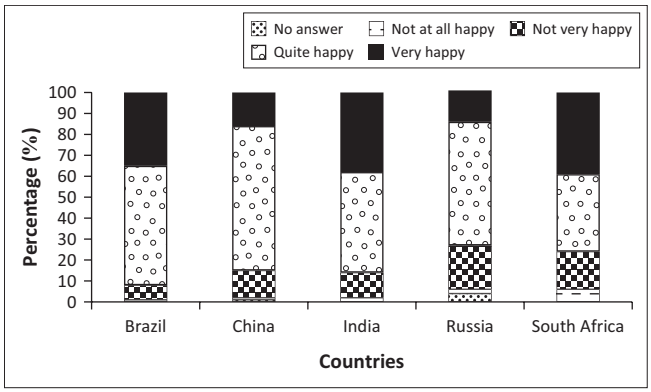
As will become evident from the conceptual framework ('Conceptual framework regarding the possible path of influence' section) and the data methodology description ('Research methodology' section), this article focuses on a component of the second dimension of subjective well-being, namely happiness, being a positive affect. The concept 'subjective well-being' encompasses happiness and life satisfaction (Easterlin 2013; Ebrahim, Botha & Snowball 2013). The terms 'happiness' and 'life satisfaction' are used interchangeably in the literature. Schyns (1998) concluded that a strong correlation exists between mean happiness and mean life satisfaction and therefore posited that these are similar concepts. Therefore, this article uses these terms in this light.

Norrish and Vella-Brodrick (2008) highlight that the benefits of investigating methods for increasing happiness include improvement in physical, psychological and social health and well-being. Around the world, many economists have found that a measure such as gross domestic product (GDP) is not the only metric worth using to measure economic progress as it only takes into account certain factors such as productivity and financial aspects and excludes other potentially important determinants such as income, health or religion (Ebrahim et al. 2013). However, analysts tend to confuse a short-term positive association between GDP and subjective well-being with the absence of a long-term association (Easterlin 2013). Joseph Stiglitz indicated in this regard that GDP is not an adequate measure of human well-being and progress, thus necessitating the development of alternative more comprehensive measures (OECD 2013). Happiness is an example of such a measure because its determinants take many other factors that contribute to economic development and growth into account, therefore endorsing the concept of broader measurement.

In studying the changing values and their impact on social and political life, the World Values Survey (WVS), which started in 1981, provides information to scientists and policymakers to help them understand the changes in the beliefs, values and motivations of people throughout the world (WVS 2016a). To provide an indication of the level of happiness in South Africa, it was decided to compare the results from the WVS with that of the other members of Brazil, Russia, India, China and South Africa (BRICS), a group of five major emerging economies of which South Africa is a member. When comparing the level of happiness of South Africans with that of the other BRICS countries for the period 2010–2014 (see Figure 1), South Africans appeared to have the highest portion of residents reporting to be 'very happy', albeit 39% compared to the 15% and 16% of Russia and China, respectively. However, should those reported to be 'quite happy' also be taken into consideration, South Africa has the lowest proportion of happy people. Specifically, 76% of people in South Africa reported that they are either very happy or quite happy, in contrast to 92% of Brazilians.

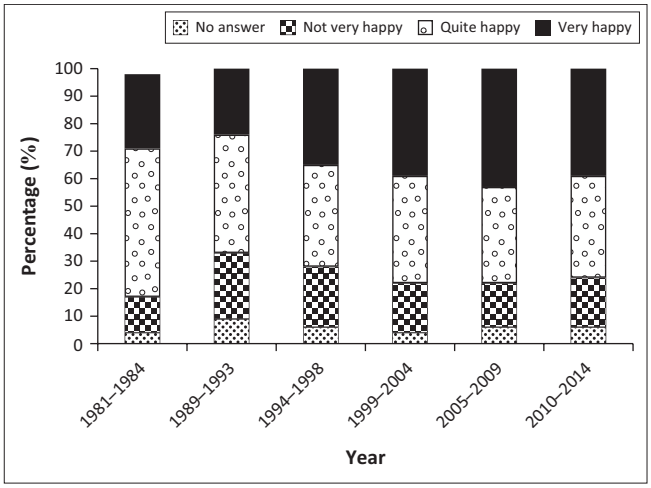
Furthermore, when focusing only on South Africa, the average reported level of happiness increased from 1989 up to 2009 (see Figure 2), where the lowest level of happiness (67%) was reported in the period 1989–1993 steadily improving to 78% for the periods 1999–2004 and 2005–2009. As a result, the proportion of happy people declined slightly to 76% in the period 2010–2014.

The Bloomberg World Misery Index postulates that South Africa is the country with the third most miserable population



Source: World Values Survey (WVS), 2016b, *World values survey – Time series data on happiness around the world*, viewed 05 July 2016, from http://www.worldvaluessurvey.org/WVSOnline.jsp

FIGURE 1: Brazil, Russia, India, China and South Africa countries' levels of happiness, 2010–2014.



Source: World Values Survey (WVS), 2016b, *World values survey – Time series data on happiness around the world*, viewed 05 July 2016, from http://www.worldvaluessurvey.org/WVSOnline.jsp

FIGURE 2: South Africans' levels of happiness, 1981–2014.

globally in 2015 (Bloomberg 2016). Things have clearly changed from the above-mentioned relatively satisfactory happiness score in 2014. The large number of protests during the past few years could also be indicative of a reduction in the level of happiness since 2014. Therefore, South Africans are no longer as satisfied and happy with their lives as they were previously. Given the apparent high level of unhappiness in South Africa, this article aims to identify the various stochastic determinants of happiness within the South African context.

From the concise literature review provided in the section 'Determinants of happiness based on the conventional approach', it will become evident that the direct relationship between identified determinants and happiness has been the focus of several researchers and institutions across the world. However, the summary provided on the direct determinants of happiness is by no means comprehensive. Yet it was done purposefully to show that there is already a wealth of information on the determinants of happiness. Nevertheless, limited research investigating the determinants of happiness has been conducted in South Africa (Botha, Wouters & Booysen 2017). The country remains plagued by significant inequalities, particularly across racial groups, impacted by the legacy of apartheid (Møller 2013). Cultural differences also affect the level of self-evaluated happiness or well-being, influenced by the unique functioning of families (Botha et al. 2017; Botha & Booysen 2014; Møller 2007). Further research into the determinants of happiness in South Africa is therefore necessary.

One of the unique contributions of this article is the development of a conceptual framework concerning the path or chain of influences across several layers of variables and not only the direct relationships, as currently is the norm. Although the relationships between identified determinants and happiness have been researched extensively, limited information is available concerning the path of influence in South Africa. As will become evident later in this article, the second unique contribution of this article is therefore not to identify the direct determinants of happiness in South Africa through the conventional methods, but rather to test the potential path of influence of these factors on one another as well as on happiness based on the developed conceptual framework. Based on the literature briefly discussed in the 'Determinants of happiness based on the conventional approach' section, the question that needs to be addressed is the following: What is the path of influence between a variety of demographic, socio-economic, social and psychological variables on the one hand and happiness on the other hand? In other words, is there a chain of interlinking factors that influence one another and therefore directly or indirectly result in an increase in a person's level of happiness?

By using respondent-level data, paths to happiness will be tested by focusing on:

- Do underlying demographical factors (such as education level or working status) influence social factors (marital status or religion)?
- Do social factors then influence cognitive factors (feelings and thoughts) and cognitive factors influence actions and decisions?
- Whether Are the said actions and decisions direct and immediate determinants of a person's level of happiness?

In order to address the overarching research question, this article is structured according to the following topics: a review of the literature on the determinants of happiness as per the current conventional methods is provided in the next section, followed by a section on the development of a conceptual framework to determine the path of influence of the determinants of happiness. The 'Research methodology' section discusses the methods used in the research and the 'Results and interpretations' section discusses the results of the study. The 'Concluding remarks' section provides concluding remarks on a summary of the findings and their policy implications.

Determinants of happiness based on the conventional approach

In previous studies, a large number of direct determinants of well-being and happiness have been identified. Frey and Stutzer (2000, 2002) indicated the usefulness of differentiating three sets of sources of individual well-being as follows:

- personality and demographic factors (e.g. age, gender, citizenship, extent of formal education, family setting and individual employment status)
- micro- and macro-economic factors (e.g. individual unemployment, income situation of the household or equivalence income, inflation)
- institutional (or constitutional) conditions in an economy and society, of which democracy and federalism are of greatest importance (e.g. an index for direct democratic rights and an index for the extent of local [communal] autonomy). (pp. 918-920)

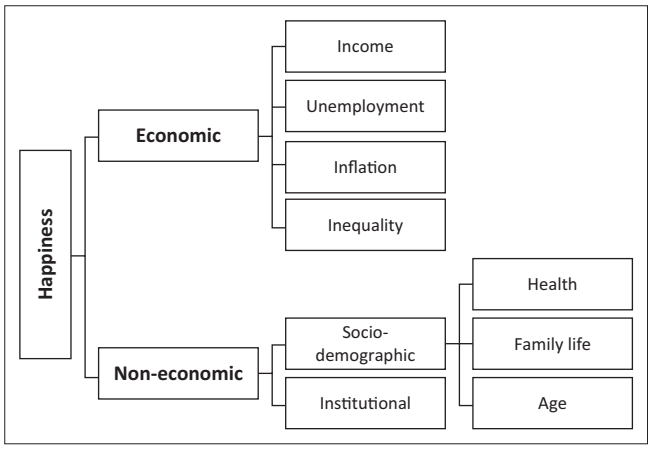
Frey and Stutzer (2002) summarised the main general results of previous studies conducted with data from different countries and different periods. Such studies obtained fairly similar results regarding the socio-demographic factors determining happiness, which include:

- Age: This affects happiness in a U-shaped manner. Young and old people report being happier than middle-aged people. The least happy people are found to be aged between 30 and 35 years.
- Gender: Women report being slightly happier than men.
- Children: Couples with and without children are happier than singles, single parents and people living in collective households.
- Nationality: Foreigners report being significantly less happy than nationals.
- Education status: People with higher education status indicate significantly higher levels of happiness.
- Health status: Bad health significantly lowers self-reported happiness.

Regarding the economic variables, Frey and Stutzer (2002) concluded that people who personally experienced unemployment are very unhappy, with joblessness reducing well-being more than any other single factor. They further reflected on the issue that unemployment in general makes people unhappy, even if people did not experience it personally.

Other economic variables that have been studied extensively regarding the effect on happiness are the relationship between income and happiness as well as inflation and happiness. Income, both from a national comparative level across countries (such as income per capita) and the different levels of income in a specific country, has been found to show that people with higher incomes are happier than people with lesser incomes at a specific point in time (Easterlin 2001; Frey & Stutzer 2002). Combined time-series cross-sectional studies have shown that a higher inflation rate (which is indicative of high price increases) substantially reduces reported levels of happiness (Di Tella, MacCulloch & Oswald 2001).

Conceição and Bandura (2008) also conducted an extensive review of the growing literature regarding subjective well-being and what was commonly known at that stage as 'happiness'. The authors elaborated on the need for a more extensive measurement of progress, taking into account that the concept of well-being should be met with broader measures but not limited to solely GDP. In their literature review, they distinguished between 'objective' and 'subjective' measures of well-being. Objective measures refer to observable facts such as economic, social and environmental statistics. Conversely, subjective measures capture people's feelings or real experience in a direct way with happiness being part of it. Conceição and Bandura (2008) also followed Frey and Stutzer's (2002) organisation of the determinants of happiness, dividing them into economic (i.e. income, unemployment, inflation and inequality) and non-economic factors (i.e. personality, socio-demographic and institutional factors) as illustrated in Figure 3.



Source: Adapted from Conceição, P. & Bandura, R., 2008, *Measuring subjective wellbeing: A summary review of the literature*, Office of Development Studies, United Nations Development Programme, New York, viewed 30 June 2016, from https://pdfs.semanticscholar.org/1772/72a223411959e11966369c04b6f88a7b07c8.pdf

FIGURE 3: Determinants of happiness according to Conceição and Bandura.

Similar to the studies conducted by Frey and Stutzer (2000 & 2002), Dolan, Peasgood and White (2008) conducted a comprehensive review of the literature on factors associated with subjective well-being. From their research, several determinants of happiness were identified as illustrated in Figure 4.

Blaauw and Pretorius (2013) conducted an exploratory enquiry on the determinants of subjective well-being in South Africa based on data obtained from the National Income Dynamics Study (NIDS). Although their study focused on the broader concept of subjective well-being, the relationship between subjective well-being and happiness has been discussed in previous literature (OECD 2013). In their paper, Blaauw and

Happiness	Income	Relative income vs absolute income
		Differentiating income across countries
	Personal characteristics	Age
		Gender
		Ethnicity
		Personality
	Socially developed characteristics	Education
		Health
		Type of work
		Unemployment
	How time is spent	Hours worked
		Commuting
		Caring for others
		Community involvement and voluteering
		Exercise
		Religious activities
	Attitudes and beliefs	Attitudes towards our circumstances
		Trust
		Political persuasion
		Religion
	Relationships	Marriage and intimate relationship
		Having children
		Seeing family and friends
	Economic, social and political environment	Income inequality
		Unemployment rates
		Inflation
		Welfare systems and public insurance
		Degree of democracy
		Climate and the natural environment
		Safety and deprivation of the area
		Urbanisation

Source: Adapted from Dolan, P., Peasgood, T. & White, M., 2008, 'Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective wellbeing', *Journal of Economic Psychology* 29, 94–122. https://doi.org/10.1016/j.joep.2007.09.001

FIGURE 4: Determinants of happiness according to Dolan et al.

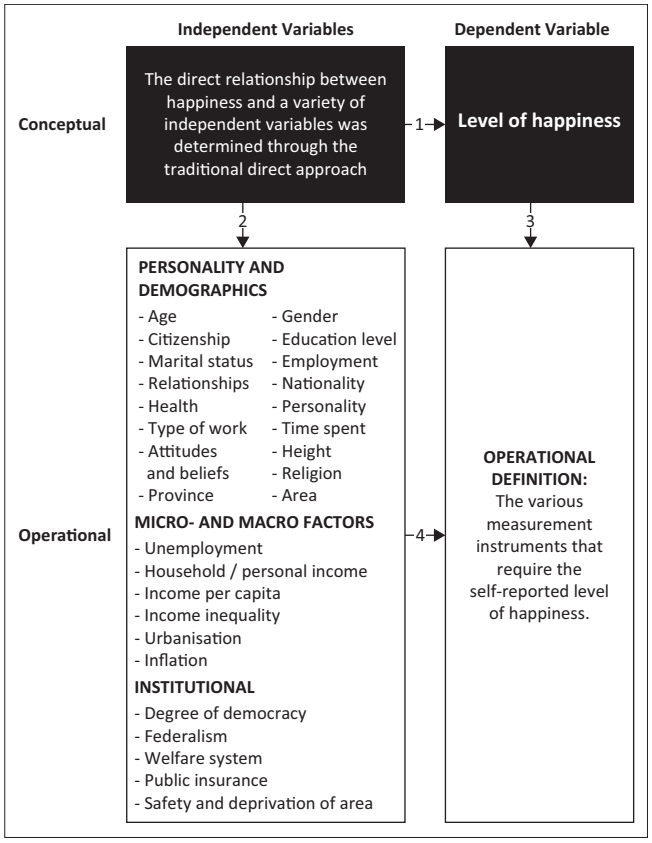
Pretorius (2013) postulated that subjective well-being could be explained by the following function:

> Well-being = *f*(Age, Race, Gender, Marital status, Health, Height, Education, Children, Importance of religion, Income, Urban, Province) (p. 183)

Other studies related to the South African context have indicated that addressing the basic material needs of poor South Africans and improving education could make South African residents happier (Botha 2014; Møller 2013). Specifically, Botha (2014) found that each additional year of education improves life satisfaction. Ebrahim et al. (2013) found differences in determinants of life satisfaction among racial groups. The level of life satisfaction of white people is highly influenced by physical health, while employment and physical income are more important for black people. In contrast, religious involvement was found to be a significant determinant of life satisfaction for Indians.

Based on the traditional approaches and the literature discussed, the predictive validity framework of the relationship between determinants and happiness is shown in Figure 5.

Figure 5 clearly illustrates that the traditional approach was to explore the direct relationship between a variety of determinants and happiness. As will become evident from the postulated conceptual framework described in the next section, the relationship might not be as straightforward as currently being portrayed.



Source: Adapted from Libby, R., Bloomfield, R. & Nelson, M.W., 2002, 'Experimental research in financial accounting', *Accounting, Organizations and Society* 27, 775–810. https://doi.org/10.1016/S0361-3682(01)00011-3

FIGURE 5: Predictive validity framework of happiness.

Conceptual framework regarding the possible path of influence

Bongaarts (1978) developed a conceptual model that was verified through empirical research, indicating that outcomes are usually brought about by proximate, non-proximate and underlying factors. Underlying, non-proximate and proximate factors do, however, not impact to the same extent or directly affect outcomes. There is rather a sequence of influence, namely the underlying factors impact the non-proximate factors, which subsequently influence the proximate factors, which in turn impact the outcomes. Therefore, the term 'proximate factors' refers to those factors that directly determine outcomes, while 'non-proximate factors' and 'underlying factors' refer to those factors that indirectly determine outcomes.

Applying this reasoning to factors driving happiness we could expect that underlying factors such as a person's demographics (e.g. a person's place of residence, educational level, work status, living standards and age) would have an indirect influence on his or her happiness. Furthermore, social factors such as marital status, family size, religion and health could also indirectly influence a person's levels of happiness. Although such underlying factors would not directly give rise to a person's level of happiness, it can be expected that such underlying demographic and social variables would lay the foundation for the level of happiness that a person experiences.

The next level of factors influencing happiness is non-proximate factors that have a more direct impact on happiness than the underlying factors, although the said impact on happiness is not direct. Such factors include cognitive factors (feelings and thoughts) such as life satisfaction, the level to which happiness is a life goal, the importance of a healthy lifestyle, whether a person has a written plan or budget and the level to which dealing with finances is stressful.

Finally, a number of proximate factors that affect happiness directly have been identified. Such variables include, among others, the level to which technology is being used to stay connected; whether personal risk is addressed by having life insurance, medical aid and vehicle insurance; the level to which provision is being made for the future by means of a retirement annuity, provident fund and/or pension fund; and the source of income of a person.

This reasoning leads to the adoption of a micro-economic conceptual framework for the purposes of this article based on which it is postulated that what people think, feel and do influence their happiness outcomes. It is further postulated that the underlying variables will have an impact on the thinking and feeling (non-proximate) cognitive factors, which in turn will impact the doing (proximate) factors. Such proximate doing factors will

influence happiness (the outcome). Figure 6 shows the possible path of influence that is postulated in this article.

According to this underlying-thinking-feeling-doing-outcome (UTFDO) micro-economic framework, happiness is being influenced by various underlying variables. These include options that people consider and their preferences for specific options (thinking and feeling), the level to which people act to implement the options that they prefer (doing) and the happiness outcomes resulting from such implementation. When considering the way in which people identify, prefer and implement specific options, the assumption is often made that people act rationally. According to the well-known theory of institutional economics (Himmelweit, Simonetti & Trigg 2008), people are not always fully rational in their thinking, feeling and doing with respect to options. This theory subscribes to the principle of bounded rationality that postulates that people are influenced by certain factors when thinking, feeling and doing with respect to options. Dequech (2004) discusses the new institutional economics and the theory of behaviour under uncertainty by emphasising that people do not always make rational decisions. As a result, many decisions are characterised by bounded rationality because of limitations such as not all options being known and certain human needs which need to be satisfied interfering with the ability to make completely rational decisions. The implication of this is that although people have been known to make decisions to maximise utility, this is restricted by the complexity of the decision-making environment as well as the compulsion of people to satisfy human needs.

A complex and ever-changing sociopolitical and economic environment contributes to uncertainty that will influence the way people act and make decisions in the UTFDO process. Dequech (2004) demonstrates that many types of uncertainty limit people's ability to make purely rational decisions. Firstly, he refers to procedural and substantive uncertainty. Procedural uncertainty refers to a lack of information, whereas substantive uncertainty refers to limitations of the capability to process information (Dosi & Egidi 1991). Many people do not have access to information, while others do have but do not always know what to do with the information that they have access to and how to use such information to make better decisions. A distinction can be made between weak and strong uncertainty, referring to the extent to which a person is uncertain. Ambiguity and fundamental uncertainty were identified as types of strong uncertainty. Furthermore, ambiguity is uncertainty about probability although one knows all the possible events, while fundamental uncertainty is the possibility of creativity and non-predetermined structural change, therefore referring to a person's ability to explore new paths (Dequech 2004). Uncertainty adds to the complexity of the decision-making environment and may therefore negatively impact people's happiness outcomes as their ability to make rational decisions is clouded and therefore cannot truly maximise their utility.

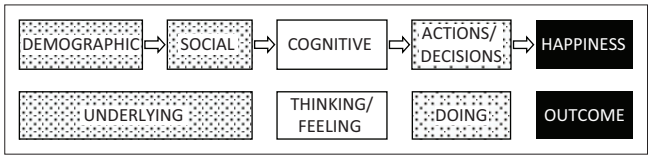


FIGURE 6: Path of influence postulated for this article.

Research methodology

It was assumed for the purposes of this study that happiness outcomes and its determinants could be studied by means of a quantitative research design. However, this assumption has its own limitations in the sense that happiness is inherently a qualitative subjective concept where people (respondents) provide ratings of their own levels of happiness. For such respondents, their levels of happiness are mostly determined by qualitative variables rather than quantitative variables. Nevertheless, it is extremely difficult to obtain a relatively scientific answer regarding the determinants of happiness by means of a qualitative research design where rigorous statistical tests of determination (antecedence and influence) are not possible. For that reason, a quantitative research methodology was decided upon for the purposes of this article without denying the possible shortcomings of such an approach. Furthermore, the term 'determinant' in the context of this article is judged upon an independent variable having a statistically significant influence on happiness outcomes.

Happiness can manifest in a variety of ways in ontological terms. Happiness can firstly be described as referring to the way a person feels at a specific moment. In addition, happiness could also refer to the way that a person feels over a longer period of life. Except for these purely emotive measurements of happiness, the term 'happiness' can in ontological terms also be expressed in terms of broader satisfaction with life, that is, 'I am happy with my life' or 'I am satisfied with my life'. The ontological meaning of the word 'happiness' that was used for the purposes of this article is the latter where the term 'happiness' is not a purely emotive expression but rather an assessment of personal well-being.

A suitable data set had to be identified to address the stated research problem. Such a 'suitable' data set had to include questions on happiness as well as questions dealing with possible determinants of happiness. The 2015 FinScope data set was selected for this purpose because it contains happiness and possible stochastic determinant variables with respect to happiness and the University of South Africa (UNISA) had easy access to this data set. As the data were derived from the 2015 FinScope survey conducted by TNS Research Surveys (TNS) on behalf of FinMark Trust, a brief exposition of the research process used by TNS in the 2015 FinScope study will be provided.

The adult population of 16 years and older who are South African residents was the target population of the survey. A nationally representative sample of 5000 South Africans aged 16 years and older was identified. The sample was drawn based on the Statistics South Africa mid-year population

estimates using probability proportional to size (PPS) sampling techniques. During the period 14 July–02 September 2015, the FinScope survey was conducted using a computer-aided personal interview (CAPI) system. Interviews were conducted by means of questionnaires in seven South African languages, namely Afrikaans, English, isiXhosa, isiZulu, Sesotho, Setswana and Sepedi. The said fieldwork covered six interviews in each of the 834-enumerator areas across South Africa selected for the purpose of the FinScope study. Households per enumerator area were randomly selected, while individual respondents in households were selected using the Kish grid (FinMark Trust 2016).

The characteristics of the survey respondents in the 2015 FinScope study are shown in Table 1. It appears from the table that the survey respondents of the FinScope study are distributed across all nine provinces, living standard measure (LSMs) groups, educational levels, age groups and employment status groups. This provides certainty that the analysed data are truly representative of all adults of 16 years and older in South Africa.

For the purposes of this study, 'self-rated happiness with current lifestyle' is used as the dependent variable. It is measured as categorical and ordinal outcomes with a clear ordering, as respondents were required to indicate whether they are happy with their current lifestyle according to a five-point Likert scale. The following question in the 2015 FinScope questionnaire was chosen as the basis for the self-reported level of happiness:

> I am going to read some statements to find out your feelings about your everyday life. Here is a scale where 1 means completely disagree and 5 means completely agree. Please use the scale to tell me how much you disagree or agree that you are happy with your current lifestyle. (n.p.)

This variable formed the basis for the analysis that follows. It was recoded to exclude the missing observations and cases where the respondent refused to answer. Analysing the variable reveals the distribution as presented in Figure 7. Although a normal distribution of happiness scores would have been expected in terms of the central limit theorem (Kallenberg 1997), this is not the case among South African adults. It appears from this figure that South African adults are generally happier with their lifestyles than would have been expected based on normal distribution assumptions.

Table 2 demonstrates a distribution of reported happiness by a range of geographic, demographic and socio-economic variables. Younger individuals tend to be happier with their current lifestyle. Similarly, individuals in higher LSM groups and with higher education indicated higher levels of happiness. Residents of the Western Cape and Gauteng tend to be happier than their counterparts.

The reliability of the FinScope questionnaire was determined by using Cronbach's alpha analysis. More specifically, such analyses were conducted on nine sections where the questions had the same scales in the questionnaire. The coefficients are expressed as a number between 0 and 1, where the score will be 0 if the items are not related and 1 when they are all exactly the same. A coefficient of 0.70 or greater is generally regarded as an indication of a satisfactory level of association (Bland & Altman 1997). It appears from Table 3 that the

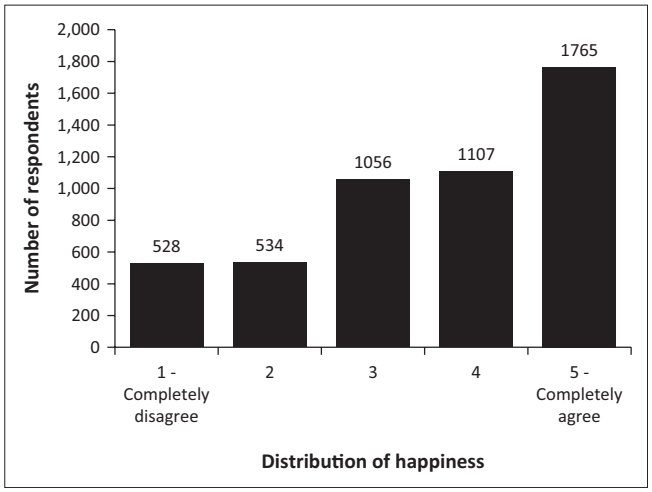
TABLE 1: Characteristics of survey respondents (n = 5000, unweighted).

Variable	Percentage (%)
Province	
Eastern Cape	11.5
Free State	9.4
Gauteng	18.5
KwaZulu-Natal	17.2
Limpopo	8.0
Mpumalanga	8.0
North West	8.3
Northern Cape	6.0
Western Cape	13.1
Total	**100.0**
Living style	
LSM 3	3.7
LSM 4	6.3
LSM 5	15.4
LSM 6	33.8
LSM 7	13.7
LSM 8	8.1
LSM 9	10.2
LSM 10	8.9
Total	**100.0**
Education	
No schooling	1.8
Primary school	7.7
Some high school	34.7
Matric	38.6
Apprenticeship	2.2
Diploma	8.6
University degree	6.1
Other (specify)	0.2
Total	**100.0**
Age group	
16–17 years	2.8
18–29 years	26.3
30–44 years	35.6
45–59 years	23.0
60+ years	12.2
Refused	0.1
Total	**100.0**
Working status	
Work full-time or 30 hours a week or more for yourself or in your own business	22.1
Work full-time or 30 hours a week or more for a company or individual	19.4
Work part-time or less than 30 hours a week for yourself or in your own business	3.9
Work part-time or less than 30 hours a week for a company or individual	8.0
Student or learner	8.0
Housewife or house husband	5.0
Pensioner or retired	10.7
Unemployed and looking for a job	19.1
Unemployed and not looking for a job	2.8
Other (specify)	0.9
Total	**100.0**

Source: Adapted from FinScope, 2015, *FinScope Consumer South Africa 2015 dataset in SPSS*, FinMark Trust, Midrand, South Africa

LSM, living standard measure.

Cronbach's alpha coefficients obtained are generally quite high, which is indicative of reliable data with generally satisfactory levels of association.



Source: Adapted from FinScope, 2015, *FinScope Consumer South Africa 2015 dataset in SPSS,* FinMark Trust, Midrand, South Africa

FIGURE 7: Distribution of happiness in South Africa based on the question whether respondents are happy with their lifestyles: 2015.

The construct validity of the scales in the FinScope questionnaire was determined by using factor analysis. Such analyses were conducted on the same sections as the Cronbach's alpha. Variables are considered to have a non-significant impact if the loading is lower than 0.3 (Field 2009). It appears from Table 4 that the factor loadings obtained are with a few exceptions satisfactorily high, which is indicative of valid data.

Categorical regression (CATREG) path analyses were conducted by regressing happiness on possible proximate stochastic determinants ('doing' variables), by regressing the said proximate variables on non-proximate ('thinking' and 'feeling' variables), while such non-proximate variables were in turn regressed on underlying social and demographic variables. Appendix 1 summarises the independent variables used in the empirical analysis and provides the questions from the FinScope survey and measurement properties used for each variable.

By means of such CATREG analyses, the impact of proximate, non-proximate and underlying stochastic determinants of

TABLE 2: Distribution of reported happiness level (scales 1–5) by a range of geographic, demographic and socio-economic variables.

Variable	Completely disagree – Completely agree†					Mean	Standard deviation
	1	2	3	4	5		
Total population	**12.00**	**12.30**	**22.80**	**21.30**	**31.60**	**3.48**	**1.36**
Age							
16–17 years	9.10	9.90	16.70	25.90	38.40	3.74	1.31
18–29 years	11.80	11.90	23.90	17.90	34.40	3.51	1.37
30–44 years	11.60	13.60	19.90	22.20	32.70	3.51	1.37
45–59 years	13.60	10.80	27.00	23.00	25.60	3.36	1.33
60+ years	12.10	12.70	23.50	24.10	27.50	3.42	1.33
Living standard							
LSM 3	40.00	22.30	20.60	8.70	8.50	2.24	1.29
LSM 4	24.50	21.80	22.60	12.30	18.90	2.79	1.43
LSM 5	20.50	19.30	23.80	15.80	20.60	2.97	1.41
LSM 6	7.70	11.80	28.20	22.20	30.00	3.55	1.24
LSM 7	7.10	6.40	21.50	27.90	37.10	3.81	1.20
LSM 8	0.90	2.60	16.70	28.30	51.50	4.27	0.89
LSM 9	4.20	4.20	12.50	28.40	50.80	4.17	1.07
LSM 10	1.10	2.20	10.10	27.40	59.20	4.41	0.84
Education level							
No schooling	35.90	16.30	24.00	10.50	13.30	2.49	1.41
Primary school	25.00	20.50	23.80	13.50	17.20	2.78	1.41
Some high school	15.00	15.40	25.20	19.90	24.50	3.23	1.37
Matric	7.50	9.60	22.20	22.90	37.90	3.74	1.26
Apprenticeship	1.40	5.20	13.90	42.90	36.60	4.08	0.91
Diploma	4.80	4.90	17.80	26.80	45.60	4.03	1.12
University degree	1.90	3.10	15.60	25.90	53.50	4.26	0.96
Other	0.00	0.00	16.00	18.0e	66.00	4.50	0.75
Province							
Eastern Cape	14.90	15.30	29.50	20.20	20.10	3.15	1.32
Free State	8.40	15.30	24.90	17.20	34.30	3.54	1.32
Gauteng	8.50	7.90	19.80	26.40	37.30	3.76	1.26
KwaZulu-Natal	13.10	10.60	21.50	17.90	37.00	3.55	1.41
Limpopo	17.40	23.80	27.70	14.40	16.80	2.90	1.32
Mpumalanga	16.50	11.50	16.50	20.80	34.80	3.46	1.47
North West	12.10	16.50	30.80	19.30	21.20	3.21	1.28
Northern Cape	20.60	14.70	17.60	16.80	30.30	3.21	1.52
Western Cape	7.70	8.00	20.60	26.40	37.30	3.78	1.24

Source: Adapted from FinScope, 2015, *FinScope Consumer South Africa 2015 dataset in SPSS,* FinMark Trust, Midrand, South Africa.

†, percentage distribution.

LSM, living standard measure.

TABLE 3: Reliability results of the FinScope questionnaire.

Scale questions	Theme	Cronbach's alpha
A6	Feelings about everyday life	0.442
L1	Financial attitudes and perceptions	0.546
L3	Financial planning	0.645
L5	Attitudes towards personal finance	0.758
L6	Worldview	0.726
L7	Financial attitudes	0.771
L8	Banking perceptions	0.892
L11	Financial risk mitigation	0.783
L16	Financial vulnerability	0.880

TABLE 4: Validity results of the FinScope questionnaire.

Scale questions	Theme	Factor loadings
A6	Feelings about everyday life	0.444–0.710
L1	Financial attitudes and perceptions	0.336–0.469
L3	Financial planning	0.311–0.592
L5	Attitudes towards personal finance	0.246–0.643
L6	Worldview	0.201–0.584
L7	Financial attitudes	0.373–0.623
L8	Banking perceptions	0.528–0.707
L11	Financial risk mitigation	0.494–0.693
L16	Financial vulnerability	0.386–0.646

happiness could be determined. According to Moss (2016), CATREG is very much the same as conventional multiple regressions, with the exception that this method of regression can accommodate nominal and ordinal variables by effectively transforming such variables into interval variables. Furthermore, as is the case with conventional multiple regression, CATREG results in the same outcome metrics, namely coefficients of determination, f-ratios, beta coefficients and probability indicators. Accordingly, the said metrics were used in this article to test for relationships between variables. Except for testing for reliability and validity as reported above, tests associated with regression analysis were also conducted to test for possible serial correlation among the included independent variables. Such tests showed that there were very low levels of serial correlation present.

The following definitional equation was constructed for the analysis purpose of this article:

$$\text{Happiness} = \sum \beta_i(U, TF, D) \qquad \text{[Eqn 1]}$$

where:
U: Underlying variables
TF: Thinking and feeling variables
D: Doing variables
β_i: Beta coefficients.

Although it would have been preferable to test for causality (temporal antecedence) between the various independent variables and happiness outcomes in a deterministic world, life is not deterministic but rather stochastic, with the consequence that the independent variables only partially impact happiness outcomes. Therefore, in testing the stochastic path of influence of independent variables, it will be possible to determine the strength of the relationships (indicated by the size of the coefficient) between the various variables in the UTFDO path.

Results and interpretations

It was postulated for the purposes of this article that two layers of underlying variables that could have an influence on happiness outcomes are demographic and social variables. It is being postulated that the demographic variables will influence the social variables as a first step in stochastically determining happiness outcomes. To test this research question, CATREGs were conducted to determine the extent to which demographic variables influence the social variables included in the data. It is noteworthy that although literally hundreds of analyses were conducted between the various variables in the FinScope 2015 data set, not all of them are being reported in this article. The relationships between the various variables and the happiness with current lifestyle outcome variable being reported in this article are the variables identified as possible variables influencing happiness outcomes in line with the conceptual model formulated. Such conclusions are based on statistical significance and a beta coefficient greater than 0.1 in absolute value (indicated in bold in Tables 5–8).

The first social variable tested for the level to which demographic variables influence it was 'health'. The influence of five demographic variables on health was tested: educational attainment, working status, province, age and living standards. As shown in Table 5, these five variables jointly explained about 16.6% of the variation in the health variable. It became evident from the CATREG analyses conducted for the purposes of this article that the three main demographic variables influencing health include education level ($\beta = 0.159$), working status ($\beta = 0.179$) and age ($\beta = -0.123$). This process was repeated for the remainder of the social variables with the results summarised in Table 5.

Having determined the relationships between the two layers of underlying variables, the focus shifted to the level to which the underlying variables influence the outcomes of the non-proximate 'thinking' and 'feeling' variables, with the results illustrated in Table 6. The data set in bold indicate the main stochastic determinants based on significance and the size of the beta coefficient of each of the tested non-proximate variables.

The non-proximate stochastic determinants of happiness whose level of influence on the proximate determinants of happiness was tested include satisfaction with life, having as

TABLE 5: Results of the sequential analysis illustrating the relationship between the various underlying demographic and social variables.

Demographic variables	Sequence of analysis of social variables			
	1. Health	2. Marital status	3. Family size	4. Religion
Educational level	**0.159****	**0.101****	**-0.166****	-0.033
Working status	**0.179****	**0.310****	**0.189****	0.070**
Province	0.065**	0.073**	**0.109****	**0.156****
Age	**-0.123****	**-0.367****	**-0.101****	-0.003
Living standards	**0.108****	**-0.170****	**0.146****	-0.062*
Explanatory value (R^2)	0.166	0.452	0.103	0.039

Note: Data in bold indicates variables identified as possible determinants (statistically significant and has a beta coefficient greater than 0.1 in absolute value). *, significant at 5% level; **, significant at 1% level.

TABLE 6: Results of the sequential analysis illustrating the relationship between the underlying social variables as stochastic determinants of the non-proximate (thinking and feeling) variables.

Social variables	Sequence of analysis of non-proximate 'thinking' and 'feeling' variables				
	1. Life satisfaction	2. Happiness as goal in life	3. Healthy lifestyle	4. Written budget	5. Finances is stressful
Health	**-0.193****	-0.089**	**-0.126****	-0.095**	0.044
Marital status	0.094**	0.045**	0.033**	**0.181****	**0.143****
Family size	0.019	-0.015	0.007	**0.142****	0.119
Religion	0.063**	**0.290****	**0.269****	0.047**	0.012
Explanatory value (R^2)	0.050	0.096	0.092	0.064	0.037

Note: Data in bold indicates variables identified as possible determinants (statistically significant and has a beta coefficient greater than 0.1 in absolute value).
*, significant at 5% level; **, significant at 1% level.

TABLE 7: Results of the sequential analysis regarding the non-proximate (thinking and feeling) variables as stochastic determinants of the proximate variables.

Non-proximate 'thinking' and 'feeling' variables	Sequence of analysis of proximate determinants of happiness									
	1. Technology makes people more organised	2. Technology makes people stay connected	3. Have a retirement annuity	4. Have a provident fund membership	5. Have a pension fund membership	6. Have vehicle insurance	7. Have life insurance	8. Have medical aid membership	9. Source of income: Salary	10. Source of income: No money
Life satisfaction	0.088***	0.052***	0.045***	0.053***	0.046***	0.076***	0.070***	0.055***	0.064***	0.048***
Happiness as goal in life	0.049**	0.041**	0.005	0.004	0.001	0.016	0.015	0.016	0.003	0.055***
Healthy lifestyle	0.071***	0.077***	0.031*	0.024	0.015	0.052***	0.052***	0.084***	0.035**	0.002
Written budget	**0.100*****	**0.129*****	**0.265*****	**0.219*****	**0.264*****	**0.299*****	**0.338*****	**0.309*****	**0.180*****	**0.117*****
Finances are stressful	0.087***	0.046***	**0.102*****	**0.110*****	**0.110*****	**0.131*****	**0.146*****	**0.114*****	**0.205*****	**0.175*****
Explanatory value (R^2)	0.041	0.036	0.097	0.075	0.098	0.136	0.171	0.140	0.105	0.064

Note: Data in bold are variables identified as possible variables influencing happiness outcomes in line with the conceptual model formulated are based on statistical significance and a beta coefficient greater than 0.1 in absolute value.
*, significant at 10% level; **, significant at 5% level; ***, significant at 1% level.

a life goal to be happy, the importance of having a healthy lifestyle, having a written plan or budget and viewing dealing with finances as stressful. Table 7 summarises the results achieved. Having a written budget and the feeling that finances are stressful were found to be the greatest stochastic determinants of the majority of proximate variables.

A total of ten statistically significant proximate stochastic determinants of happiness were identified, which jointly predict 14.2% in the variance of the happiness outcome. The results are summarised in Table 8, from which it appears that technology makes people happy. The summary of the complex path of influence based on the formulated thinking-feeling-doing-outcome (TFDO) model is illustrated in Figure 8.

TABLE 8: Results of the sequential analysis regarding the proximate stochastic determinants of happiness.

Direct proximate variables	Happiness
Technology makes people more organised	**0.172****
Technology makes people stay connected	**0.160****
Have retirement annuity	0.053*
Have provident fund membership	0.039**
Have pension fund membership	0.050**
Have vehicle insurance	0.060**
Have life insurance	0.052**
Have medical aid membership	0.073**
Source of income: Salary	0.091**
Source of income: No money	0.038*
Explanatory value (R^2)	0.142

Note: Data in bold are variables identified as possible variables influencing happiness outcomes in line with the conceptual model formulated are based on statistical significance and a beta coefficient greater than 0.1 in absolute value.
*, significant at 5% level; **, significant at 1% level.

Discussion of results

The results of this study show that the path of influence postulated in the statement of the research problem ('Introduction' section) is indeed present. It appears that the following demographical factors were found to significantly influence social variables as postulated in the statement of the research problem:

- educational attainment
- working status
- province
- age
- living standards.

These demographical variables form the baseline conditions for a person to be happy. However, these variables are not by themselves direct stochastic determinants of happiness. Such variables rather form the foundation for happiness. It is further evident from the study that the said demographical variables influence social variables such as health status, marital status, family size and religion, which in turn influence the way in which people think or feel about life. Moreover, such thinking and feeling variables being influenced by social variables include *inter alia* life satisfaction, attitude towards happiness as a life goal, the desirability of having a happy lifestyle, the level to which financial planning is being conducted as well as the level of which it is stressful in dealing with finances.

The chain of influences from demographical to social to thinking and feeling variables as baseline conditions for happiness is very much in line with the micro-economic conceptual framework developed for the purposes of this article, as shown in 'Conceptual framework regarding the possible path of influence' section. In terms of this UTFDO framework, the chances for happiness outcomes will be optimised when underlying factors have a positive influence on thinking and feeling (cognitive) factors. This would make it possible for people to experience happiness

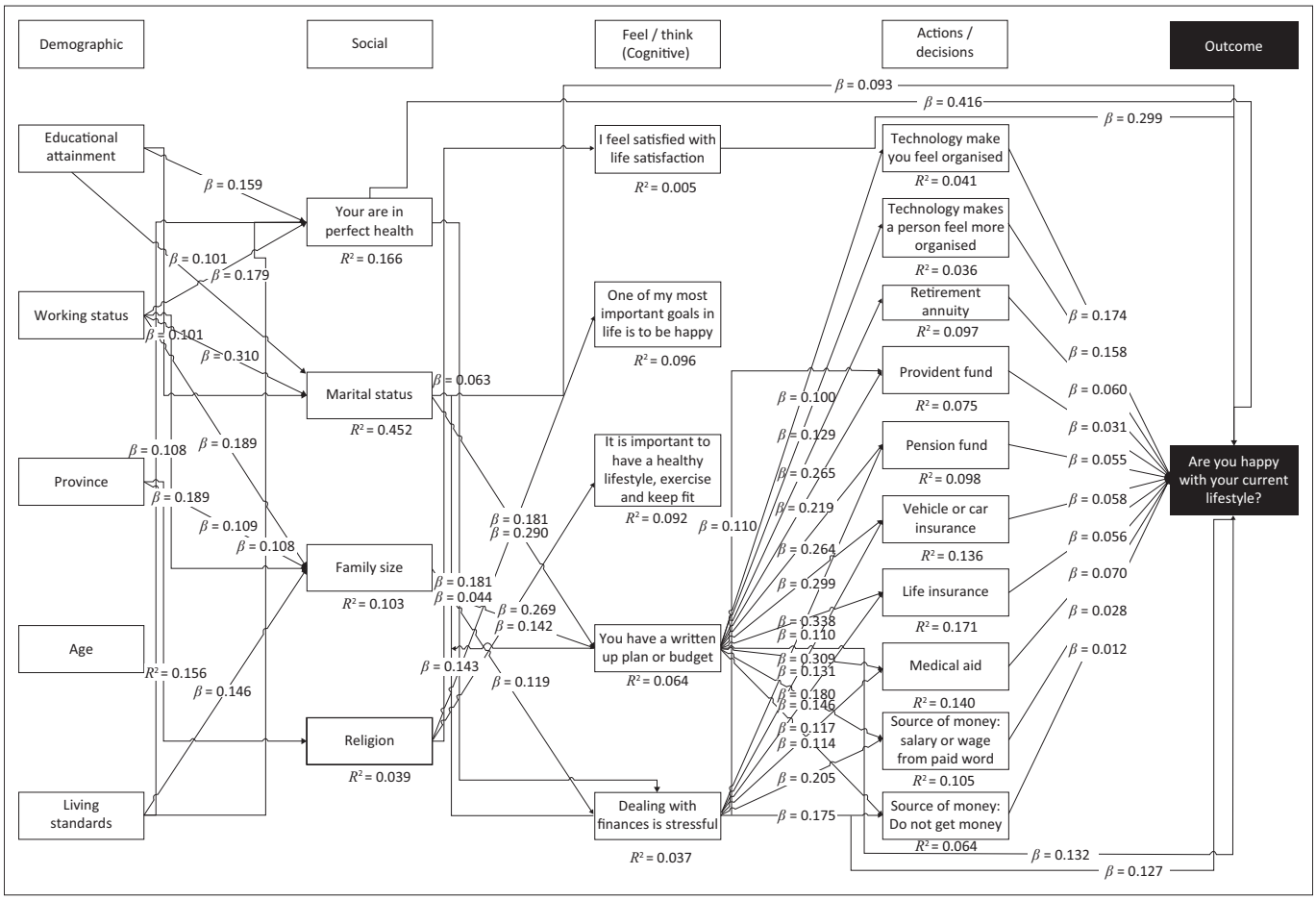


FIGURE 8: Intrinsic relationship among the various layers of variables with happiness.

on a continuous basis. Furthermore, should the said underlying demographical and social as well as the thinking and feeling (cognitive) factors not be facilitative towards the realisation of happiness, the state of uncertainty is highly likely (Dosi & Egidi 1991). This will give rise to a situation where people will experience short periods of happiness but will be impacted by a broad series of negative life events which will negatively influence the realisation of continuous happiness. Furthermore, a person experiencing high levels of uncertainty owing to unfavourable demographic and social conditions will also be less likely to explore creative avenues (riskier) in life, which will also detract him or her from being happy on a continuous basis.

As shown in the results, the thinking and feeling variables in turn influence the proximate (action or doing) variables, which in turn influence the happiness outcome. Such action or doing variables include the level to which people engage with technology, the level to which they conduct lifetime income smoothing (via retirement annuities, provident funds and pension funds), the level to which they mitigate risks (i.e. through insurance) and the level to which they generate sufficient money to have a decent life.

The implication of the findings of this study is that happiness is not simply influenced by a limited number of variables all directly impacting happiness. Instead, it is influenced by a complex chain of influences from underlying demographical and social variables all the way to a large number of proximate variables influencing happiness outcomes.

This study uncovered the chain of stochastic happiness determinants. These results could therefore imply that the macro-measures proposed by the National Development Plan (NDP) (National Planning Commission 2012) to ensure higher levels of economic growth to create more jobs contributing to better living standards and in turn enhance national well-being could not necessarily have the desired results. Such macro-measures will rather contribute to laying the foundation for the generation of well-being and happiness. As found in this study, the realisation of higher levels of happiness will only be possible if positive macro-dynamics go hand in hand with positive micro-dynamics. These include high levels of cognitive abilities among the population, the population striving for happiness, the population planning their personal and financial futures, the population having access to financial and risk products as well as the population having sustainable income sources in order to grow their savings and net wealth.

Conclusion

It appears from the findings of this article that a stochastic happiness determination path exists from underlying to non-proximate, to proximate to happiness outcomes. The implication of this is that an underlying variable such as

education does not make a person happy per se, but provides the basis for a person to become employed to earn an income that lays the foundation for the person to be happy. Demographic factors such as working status and educational level have an effect on social factors like marital status, family size and health. Such social factors in turn influence cognitive factors such as life satisfaction and life planning as well as dealing with financial stress which in turn influence what people do and the decisions they take, which in turn impact their levels of happiness.

The implications of the path are that material conditions (i.e. educated population, high levels of employment and high incomes) are a necessary precondition for creating a happy society. However, as indicated above, when such preconditions for happiness are in place, a large number of micro-variables will influence a person's level of happiness directly. Limitations of this study are that children were not included and therefore their happiness levels and the stochastic determinants of their happiness could not be determined. Alternative data sets, such as the South African Audience Research Foundation (SAARF)'s All Product Media Survey (AMPS) or the NIDS, could provide scope for such analysis. Furthermore, provided that the data are cross-sectional, no specific comments or conclusions concerning causality can truly be made. Nevertheless, the results rather provide indications of factors that stochastically influence happiness levels in South Africa at a specific time. Having uncovered the chain of influences, follow-up research could concentrate on the reasons why people living under similar macro- and micro-conditions often have very different levels of happiness. In this case, a large number of intra-psychological aspects not included in this study could play an important role in determining happiness.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

C.J.v.A. conceptualised the study, was involved in the data analysis and the first draft of the results. J.M. provided support in the data analysis and the writing up of the results. B.d.C. did the literature review and the drafting of the discussion and concluding remarks. All authors were involved in the editing of the manuscript and the approval of the final version of the article.

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Appendix starts on the next page →

Appendix 1

	Variable	Question in survey and measurement property
Dependent variable		
Outcome	Happiness	You are happy with your lifestyle (ordinal)
Independent variables		
Underlying variables (demographic and social factors)	Province	Province (nominal)
	Education	Education level (ordinal)
	Work	Personal working status (nominal)
	LivingStandard	LSM 2014 (nominal)
	Age	Age of respondent (16 years+) (nominal)
	MaritalStatus	Marital status (nominal)
	FamilySize	Number of people in household (nominal)
	Health	Would you say that you are in perfect health (nominal)
	Religion	A supreme being/God/Allah made the universe that we live in (nominal)
Thinking and Feeling variables (cognitive factors)	LifeSatisfaction	I feel satisfied with my life (nominal)
	LifeGoal	One of the most important goals in my life is to be happy (nominal)
	HealthyLifestyle	It is important to have a healthy lifestyle (nominal)
	Budget	You have written up a plan or budget (nominal)
	Stressful	Dealing with personal finances is stressful (nominal)
Doing variables (proximate factors)	TechnologyOrganised	Technology helps make your life organised (ordinal)
	TechnologyConnectedness	You like to be connected (ordinal)
	RetirementAnnuity	Retirement annuity (nominal)
	Provident	Provident fund (nominal)
	Pension	Pension fund (nominal)
	VehicleInsurance	Vehicle or car insurance (nominal)
	LifeInsurance	Life insurance or life cover (nominal)
	MedAid	Medical aid or medical scheme (nominal)
	IncomeSources	The ways money is received to pay for things (nominal)

LSM, living standard measure.

FIGURE 1-A1: Variables used in analysis.