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How long do people expect to live? Results and implications

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ABSTRACT

We report the results of a survey of over 3500 individuals in Great Britain, questioned on how long they expected to live. On average, they under-estimated by 4.62 years (males), 5.95 years (females) compared with the estimates of the Government Actuary's Department, although on average they were optimistic in the sense of thinking they would live longer than other people of their age and sex. Relevant risk factors seem to be taken into account in forming expectations, but not always accurately; in particular, smokers appeared to under-state risks significantly. A "reference group effect" was apparent: those in poor health, and smokers, gave relatively low answers for how long they thought people of their age and sex would live. We also find that people who under-estimated how long the population was expected to live were significantly less likely to have bought a pensions policy.

The full version of the report is available on www.nottingham.ac.uk/business/cris and www.actuaries.org.uk

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HOW LONG DO PEOPLE EXPECT TO LIVE? RESULTS AND IMPLICATIONS

1. OBJECTIVES

The purpose of this research is to:

- Compare individuals' perceptions of mortality with official estimates of population mortality;
- Assess whether individuals' mortality perceptions are affected by relevant risk factors; and
- Determine the influence of mortality perceptions on purchases of life insurance and pensions.

2. INTRODUCTION

A number of surveys have been carried out, which asked people how long they expect to live to ("subjective life expectancy", SLE). One early study, by Hamermesh (1985) in the US, found that people estimated that they would live to slightly longer than the actuarial life tables, based on the mortality rates then current. Relevant risk factors such as health status, smoking and parental longevity, were also taken into account in forming expectations. Other surveys have found that people have lower values for expected lifetime than those provided by actuarial tables. Some research has also found that people with a low SLE had higher mortality rates than those with a higher SLE, indicating that SLE appears to have predictive value (Hurd & McGarry, 2002).

Recent work in the UK (Banks, Emmerson & Oldfield, 2004; Society of Financial Advisers, 2004) has compared estimates of how long people expect to live with actuarial tables that incorporate forecast improvements in mortality, and has concluded that people tend to under-estimate likely longevity.

In our work we compare individuals' SLE with expectations consistent with population mortality, for which we have two sets of figures:

- (i) expected age at death based on latest mortality rates, projected so as to be applicable at mid-2004 ("current life expectancy"); and
- (ii) as in (i) but incorporating future improvements based on the mortality assumptions underlying the population projections of the Government Actuary's Department ("forecast life expectancy").

We are grateful to the Government Actuary's Department (GAD) for supplying us with these figures, as applicable at mid-2004. A summary of the expectations at various ages is as follows:

Life expectancy: Government Actuary's Department figures

Age	Males		Females	
	Current life expectancy	Forecast life expectancy	Current life expectancy	Forecast life expectancy
20	76.9	81.1	82.4	86.4
30	77.3	81.3	82.3	86.0
40	77.8	81.5	82.1	85.7
50	78.7	82.2	82.1	85.6
60	80.2	83.3	82.8	86.1
70	82.7	85.1	84.3	86.8
80	87.2	88.5	87.8	89.1

3. METHODOLOGY AND DATA

We asked MORI to conduct a wide ranging public opinion survey covering various aspects of public perceptions of mortality, such as general level of health, smoking prevalence, alcohol consumption and life expectancy.¹

Summary demographic data of the sample

Gender		Age		Social class	
Male	49%	16-20	9%	AB	24%
Female	51%	21-24	6%	C1	27%
		25-34	19%	C2	21%
		35-44	18%	DE	28%
		45-54	16%		
		55-64	13%		
		65+	19%		

Some surveys have asked people the probability of living to a specified age. We felt that people may be uncomfortable with a probability question, and we therefore decided to ask: "to what age would you expect yourself to live? Estimate if unsure" (388 respondents answered 'don't know'). To our knowledge this is the largest survey ever carried out that has asked people the age to which they expected to live, as opposed to the chances of living to a specified age.

However, we were also concerned to establish what lies behind the formation of expectations. We therefore (first) asked a comparator question, "I would now like you to think of other people of the same sex and age as yourself. To what age would you expect them to live, on average? Estimate if unsure."

4. RESULTS

Overall results

We first set out the overall averages of the age to which people expect those of the same age and sex to live (individuals' "population estimate"), then their answer for themselves (the "self-estimate"). We also show the corresponding results in accordance with the GAD current and GAD forecast tables.

¹ MORI interviewed a representative quota sample of 3,966 adults aged 16+ across Great Britain, conducted face-to-face, in-home as part of the MORI Omnibus. Interviews were conducted using CAPI (Computer Assisted Personal Interviewing) in 186 sampling points across two omnibus waves: the first between 3 and 9 June 2004 and the second between 17 and 23 June 2004. Data have been weighted to the known profile of the Great Britain population.

Overall averages of age to which people will live

	Individuals' population estimate	Self-estimate	GAD current	GAD forecast
Males	77.07	78.52	79.64	83.17
Females	79.45	80.30	82.76	86.35
Total	78.37	79.48	81.34	84.90

We can construct survival curves using the mortality rates implicit in the perceived self-estimated life expectancies, for males and females separately, and these are shown in Appendix 1. Note that the curves have vertical lines at quinquennial ages where there was a bunching of answers, especially at age 80. Also in Appendix 1 we show the distribution of:

- Self-estimate minus population estimate: we note that many respondents gave the same answer to the two questions;
- Population estimate minus GAD current estimate; and
- Self-estimate minus GAD current estimate.

We now focus on the number of years remaining that people still expect to live, and we compare the results for individuals' population estimates and their self-estimates (this data is restricted to people who answered both questions). We also show figures for the GAD estimates (current and forecast) as calculated for the age and sex distribution of those in the corresponding row: for example, the figures for those in poor health are markedly lower than those for excellent health, but this, to a substantial extent, reflects the fact that these people are relatively old, where the years of life remaining are relatively low.

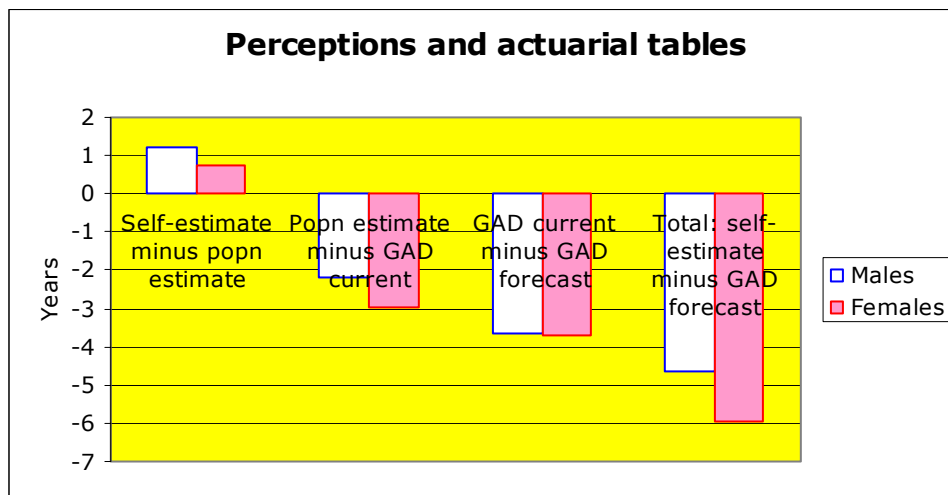
Average years' lifetime remaining

		Individuals' population estimate	Self-estimate	GAD current	GAD forecast
Males	Overall (N=1573)	31.32	32.51	33.49	37.13
	Health				
	Excellent	38.73	40.96	39.69	43.92
	Good	32.50	34.14	34.59	38.34
	Fair	24.42	24.50	27.32	30.34
	Poor	21.71	20.64	25.81	28.79
	Very poor	22.88	20.65	25.96	28.93
	Smoking				
	Current smoker	35.11	34.99	38.24	42.35
	Ex smoker	21.30	22.82	23.43	26.13
	Never-smoker	35.80	37.75	37.23	41.21
Females	Overall (N=1848)	35.10	35.86	38.09	41.81
	Health				
	Excellent	40.19	42.06	42.07	46.13
	Good	36.84	37.75	39.63	43.47
	Fair	29.28	29.27	33.05	36.35
	Poor	27.80	26.31	32.26	35.54
	Very poor	26.50	28.02	31.65	34.94
	Smoking				
	Current smoker	38.73	39.04	43.00	47.15
	Ex smoker	29.11	30.29	31.71	34.92
	Never-smoker	35.36	36.22	37.66	41.34

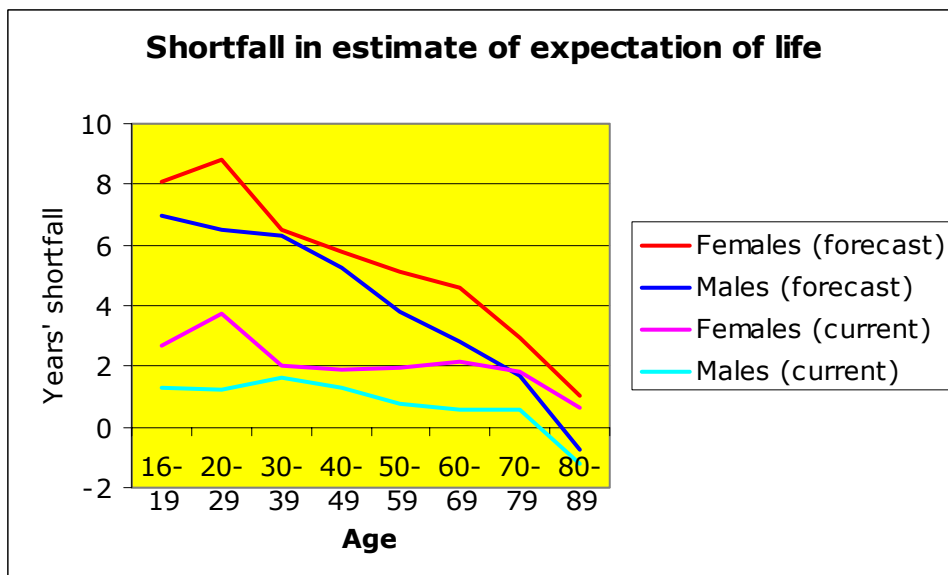
These results show that:

- People give self-estimates that are higher, on average, than their population estimates, by 1.19 years (males), 0.76 years (females): this may be regarded, in aggregate, as evidence of optimism;
- Individuals' self-estimates are below the GAD current figures by, on average, 0.98 years (males), 2.23 years (females); and
- People are a long way short of GAD forecast figures: by, on average, 4.62 years (males), 5.95 years (females).

The findings concerning the relative estimates made by males and females are consistent with all 10 other studies on this subject.



We can also illustrate the shortfall in individuals' self-estimates of expectation of life, compared with the GAD estimates (on "current" and "forecast" bases), analysed by age of respondent:



At age 80 plus the under-estimates have been reduced significantly. However, the respondents excluded people in institutions such as hospitals, care homes, etc, which means that, at high ages, our sample is expected, on average, to be in better health than the population.

While the differences compared with the GAD estimates are clearly greatest at young ages, the difference is still 2.83 years (males), 4.62 years (females) for people in their 60s, when they may be buying annuities. Since life insurers price annuities taking into account expected future mortality reductions, it may well be that purchasers of annuities under-estimate the value of annuities.

It may be useful to add in a table to illustrate the average answers for self-perceptions and the GAD forecast figures:

	Average self-perception	Average GAD forecast figure	Self-estimate minus GAD forecast figure
Males			
16-19	75.47	82.41	-6.94
20-29	75.83	82.34	-6.51
30-39	75.90	82.20	-6.30
40-49	76.84	82.09	-5.24
50-59	78.54	82.34	-3.79
60-69	80.61	83.45	-2.83
70-79	83.76	85.42	-1.66
80-89	89.97	89.19	0.77
90-99	98.75	96.45	2.30
Total	78.52	83.09	8.47
Females			
16-19	78.35	86.42	-8.07
20-29	77.40	86.22	-8.82
30-39	79.34	85.88	-6.53
40-49	79.85	85.66	-5.80
50-59	80.67	85.79	-5.12
60-69	81.82	86.44	-4.62
70-79	84.57	87.51	-2.94
80-89	89.44	90.46	-1.01
90-99	96.00	95.55	0.45
Total	80.31	86.28	-5.97

Smoking

We now show average figures separately according to whether people smoke. ²

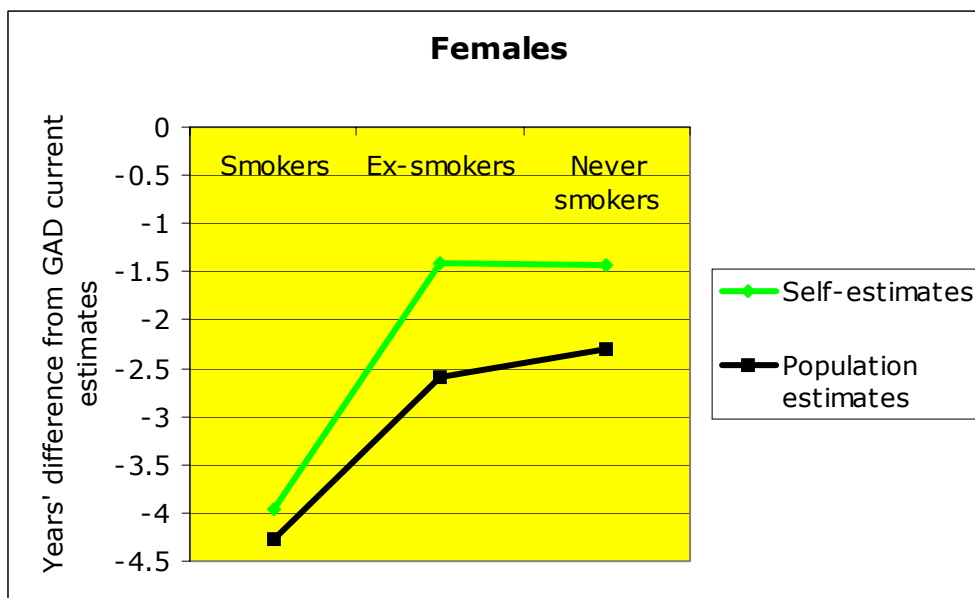
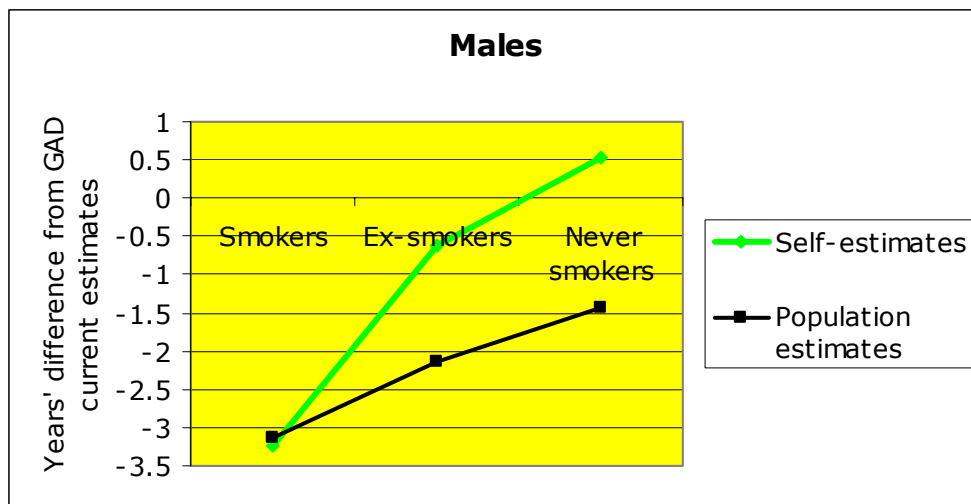
Estimates according to smoking status

		Self-estimate minus population estimate	Population estimate minus GAD current estimate	Self-estimate minus GAD current estimate
Total of males and females	Current smoker	0.12	-3.75	-3.64
	Ex smoker	1.37	-2.34	-0.98
	Never-smoker	1.32	-1.94	-0.63

² Those who have never smoked expect, on average to live to 80.5 years, while current smokers expect to live less long (76.8 years). The analysis in the main body of the paper considers, for each individual, how their estimate differed from the GAD figures for the individual's age and sex.

In other words, smokers estimate that their life expectancy is 3.64 years less than GAD current estimates, whereas never-smokers are only 0.63 years less. However, the striking finding is that smokers think their life expectancy is about the same as (actually 0.12 years more than) their estimate for the population. Smokers have a much lower estimate than non-smokers for the population life expectancy: they think the population will live 3.75 years less long than the GAD current estimate, compared with never-smokers thinking the population will live 1.94 years less long than the GAD current estimate.

We can illustrate this graphically, showing, for each of males and females the difference between each of their self-estimates and their population estimates, and the GAD current estimates.



We now set out the differences between smokers (current and ex) and never-smokers.

Estimates of smokers and ex smokers compared with never-smokers

	Smoking	Self-estimate minus population estimate	Population estimate minus GAD current estimate	Self-estimate minus GAD current estimate
Males	Current smoker	-2.08	-1.73	-3.77
	Ex smoker	-0.44	-0.70	-1.13
Females	Current smoker	-0.55	-1.98	-2.52
	Ex smoker	0.32	-0.29	0.03
Total	Current smoker	-1.20	-1.81	-3.01
	Ex smoker	0.05	-0.40	-0.35

The table shows that current smokers (males and females combined) expect to live 3.01 years less long than never-smokers. However, the real difference appears to be much greater. For example, Doll et al. (2004) found that, in reality, male British doctors who smoked lived 10 years less long than never-smokers. We conclude that the difference in life expectancy between smokers and never-smokers is significantly greater than the difference in perceptions between smokers and never-smokers.³

Multivariate analysis

We can derive implicit mortality rates age-by-age by applying multivariate statistical techniques to the data on perceived length of life. The results therefore show the marginal effect of each variable on the respondent's perceived mortality rate. Our model "scales" age-specific death rates in accordance with the variables. For example, the (perceived) mortality rate by females is 58.2% of that for males. For those in fair health it is 228.5% of those in excellent health. Household income and social class did not have any statistically significant effects.

³ Some current smokers may be anticipating giving up smoking, with a consequential benefit to life expectancy.

Implicit relative mortality rates as perceived

		Mortality ratio
Gender	Male	1.000
	Female	0.582**
Age		0.973**
Marital status	Married	0.786
	Living together	0.554**
	Single	0.555**
	Widowed	0.719
	Separated/divorced	1.000
Health status	Excellent	1.000
	Good	1.541**
	Fair	2.285**
	Poor	2.742**
	Very poor	2.145*
Smoking status	Never smoked	1.000
	Ex-smoker	1.067
	Current smoker	1.934**
Alcohol consumption	0 units	1.000
	1-10	0.802*
	11-20	1.070
	21-30	0.854
	> 30	1.701**
Education level	None of below	1.000
	Vocational (NVQ1+2)	0.878
	A levels	0.926
	Degree or PhD	0.741**
Parental age	Mother's age (alive)	0.989**
	Father's age (alive)	0.986**
	Mother's age (dead)	0.990**
	Mother's age (dead)	0.993

* significant at 10% level, ** significant at 5% level

Amongst the findings from the above is that those with a modest consumption of alcohol expect to live longer than those with zero or higher consumption, i.e. a J-shaped curve connecting alcohol consumption and perceived mortality.

We go on to show how self-perceptions differ from the GAD tables. We break the difference down into:

- The difference between self-estimates and individuals' population estimates; and
- The difference between individuals' population estimates and GAD (current) estimates.

We show the results of the regression of predicted lifespan relative to the population, regressed on a number of variables.

Impact of individual variables on longevity perceptions

		Self-estimate minus individuals' population estimate (years)	Individuals' population estimate minus GAD current estimate (years)	Self-estimate minus GAD current estimate (years)
Female		-0.335	-0.954**	-1.223**
Age		0.028	0.036**	0.056**
Marital status	Married	1.526**	-0.740	0.758
	Living together	1.410**	0.643	2.175**
	Single	1.619**	0.605	2.019**
	Widowed	0.848	0.044	1.264
Health status	Excellent	0	0	0
	Good	-0.910**	-0.827**	-1.976**
	Fair	-2.163**	-1.164**	-3.467**
	Poor	-3.091**	-1.514**	-4.763**
	Very poor	-2.979*	0.113	-3.132**
Smoking status	Current smoker	-0.401	-1.978**	-2.367**
	Ex-smoker	-0.154	-0.246	-0.263
	Non-smoker	0	0	0
Alcohol consumption	0 units	0	0	0
	1-10	-0.348	1.005**	0.602
	11-20	-1.177**	0.595	-0.551
	21-30	1.018	0.055	0.261
	> 30 units	-2.320**	-0.075	-2.346**
Education level	Vocational (NVQ1+2)	0.236	0.353	0.752
	A levels	-0.239	0.454	0.187
	Degree or PhD	0.397	0.912**	1.224**
Parental age (10 years)	Mother's age (alive)	0.07	0.43**	0.49**
	Father's age (alive)	0.43**	0.23**	0.64**
	Mother's age (dead)	-0.01	0.27*	0.39**
	Mother's age (dead)	0.35**	0.03	0.35**

* significant at 10% level, ** significant at 5% level

For example, people in poor health expect to live 4.763 years less long than people in excellent health, controlling for the other factors in the analysis (age, gender, smoking, etc). Part of this is because they expect to live less long (by 3.091 years) than they think the population will live. However, their estimate of

population longevity is 1.514 years less than the estimate of people in excellent health.⁴

We also see that the impact of smoking (controlling for other factors) is to reduce the self-estimate of longevity by about 2.4 years. But smokers' lower estimate of population longevity accounts for 2.0 of this difference, and only 0.4 is attributed to a difference between themselves and the population (which is statistically insignificant).

We regard our findings as evidence of a "reference group effect", i.e. people view the population as similar to the group they are in (e.g. smokers, or those in poor health).

There are also some statistically significant relationships between parental longevity and estimates of population mortality.

Also, we find that ex-smokers do not give significantly different answers for their self-estimates, from never-smokers: this is different from the evidence (Surgeon-General, 1990).

Life insurance and pensions

We analyse life insurance and pensions bought by our sample within the last 5 years, against a number of variables, including longevity perception differences. We find that there are no significant effects from gender, age, marital status, health, alcohol consumption or parental longevity. Higher income individuals effect more voluntary pensions (by which we mean stakeholder and personal pensions), whole life and term insurance. Smokers are less likely to buy voluntary pensions or whole life insurance, but are more likely to buy term insurance.

There are also significant associations with longevity estimates, as shown in the following table. 1.310% of our sample had effected a voluntary pension in the last 5 years⁵. However, our model found that every one year of higher population longevity estimate is associated with an increase in the proportion buying voluntary pensions by 0.154%. Now recall that if longevity expectations were the same as GAD forecast figures they would be around 5 years higher. So if the effect in our model can be extrapolated, a correction of the 5-year underestimate would enhance voluntary pension take-up by 0.75% to over 2% - a dramatic increase of 50%.

The table also suggests that there could be a significant association with purchases of term insurance. However, the outcome we observe reflects the interaction between supply and demand, and we do not feel able to suggest what effect on term insurance purchases may arise from changes in demand arising from amended estimates of longevity.

⁴ The figures do not add up precisely because these are separate regressions.

⁵ This proportion appears rather low, and may reflect people having a poor understanding of their insurance and pension holdings.

Effect of longevity estimates on pension and insurance purchase

	Personal pension & stakeholder pension	Whole life	Term life
Mean probability of purchase	1.310%	2.354%	1.483%
Marginal effects			
Self-estimate minus individuals' population estimate	-0.016%	-0.035%	0.077%
Individuals' population estimate minus GAD current estimate	0.154%**	-0.059%	0.129%**

5. COMMENTS

Key conclusions

- On average, people under-estimate how long they are likely to live: by over 5 years:
 - They tend to ignore expected mortality improvements;
 - The under-estimation for males is 4.62 years, but even greater for females, 5.95 years;
 - The under-estimation is still significant in their 60s (when people may be buying annuities): the under-estimation is 2.83 years (males), 4.62 years (females).
- People are optimistic: they think they will live longer, on average, than people of their own age and sex: by 1.19 years (males), 0.76 years (females).
- People take into account the impact of health, smoking, alcohol and parental longevity on their own lifespan:
 - For example, those with a modest consumption of alcohol expect to live longer than those with zero or higher consumption;
 - But people are not always accurate - in particular:
 - The risks to smokers are significantly higher than they think;
 - Former smokers fail to recognise that they should expect to live less long than never-smokers.
- There is a link between the answers given for how long people expect to live, with how long they expect others of the same age and sex to live (a "reference group effect"):
 - Compared to people in excellent health, those in ill-health give lower answers for how long they expect the population to live;
 - Most of the difference between smokers' perceptions and those of never-smokers is a result of smokers thinking that the population tends to live less long: they do not perceive a significant difference between themselves and the population.
 - The impact of smoking (controlling for other factors) is to reduce the self-estimate of longevity by about 2.4 years. But smokers' lower estimate of population longevity accounts for 2.0 of this difference, and only 0.4 is attributed to a difference between themselves and the population (which is statistically insignificant).

- People with higher perceptions of population longevity have bought more personal/stakeholder pension policies:
 - If this effect can be extrapolated, a correction of the 5-year underestimate in longevity would enhance voluntary pension take-up by 0.75% to over 2% – a dramatic increase of 50%.

Suggested implications

- Were the population to have a better understanding of how long they were likely to live they may be more likely to buy pensions than they are now (perhaps there is a role for the Financial Services Authority here in connection with education);
- Insurers may wish to consider developing a way of stressing the value-for-money of annuities they offer;
- Employers may wish to consider using data on life expectancy to highlight the value of occupational pensions they are providing; and
- Those involved in health (including smoking) policy may wish to take into account the findings on perceptions and, in particular the way in which people tend to view the general population as having some similar characteristics to themselves.

References

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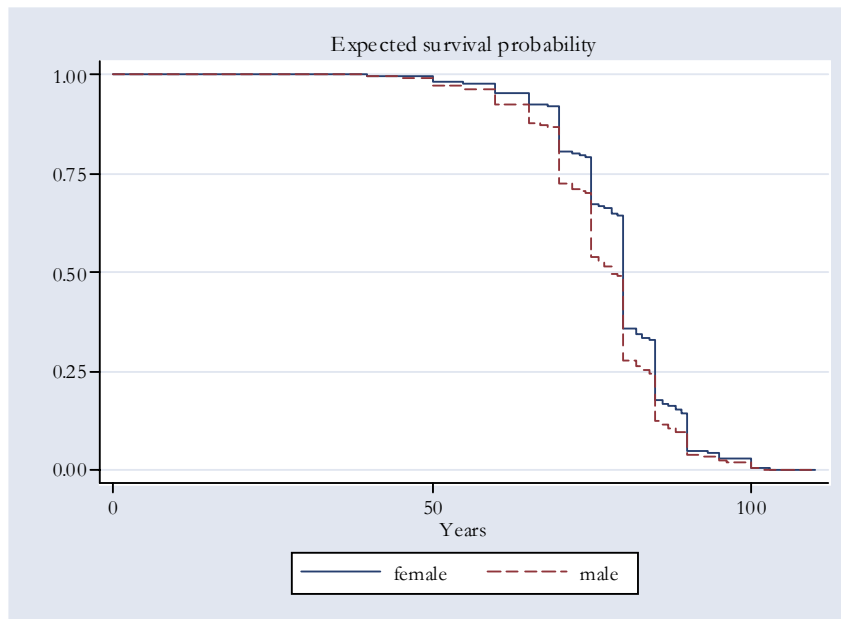
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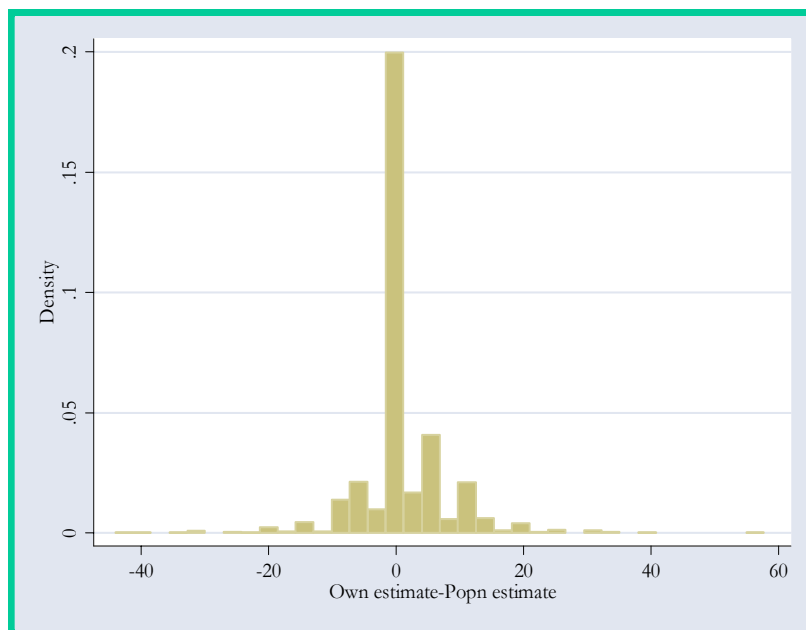
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APPENDIX 1

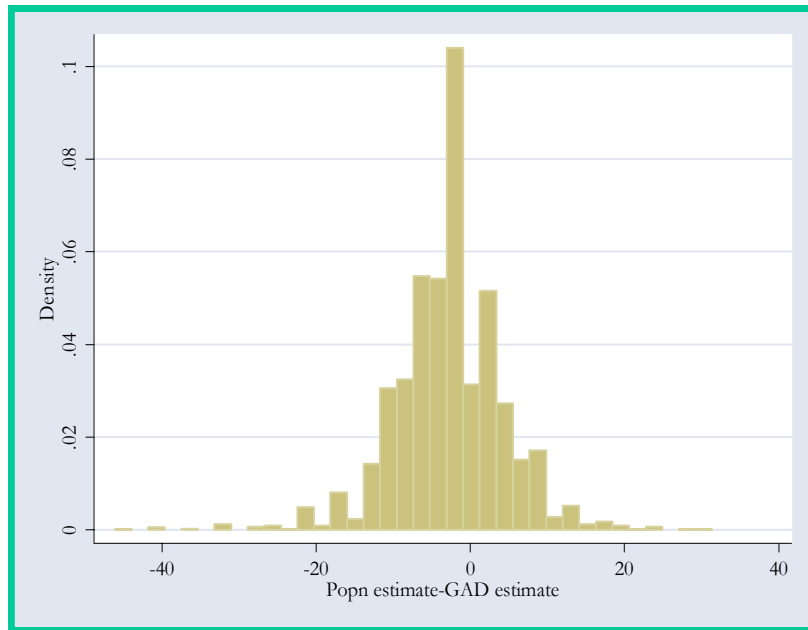
Survival curve based on self-perceptions



Distribution of difference between self-estimate and population estimate



Distribution of difference between population estimate and GAD current estimate



Distribution of differences between self-estimates and GAD current estimates

