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Go Go, Slow Go, No Go

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With freedom comes confusion

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Effects of freedom & choice

Later annuitisation:

- Spending needs less clear in early years
- Mortality dividend from annuities is smaller for those in better health
- Annuity prices could fall with rises in interest rates (only beneficial if you have not invested in bonds)

Two challenging questions:

- *How do I manage my spending after I retire to avoid running out of money in later life?*
- *How do I know when is a good time to buy an annuity?*

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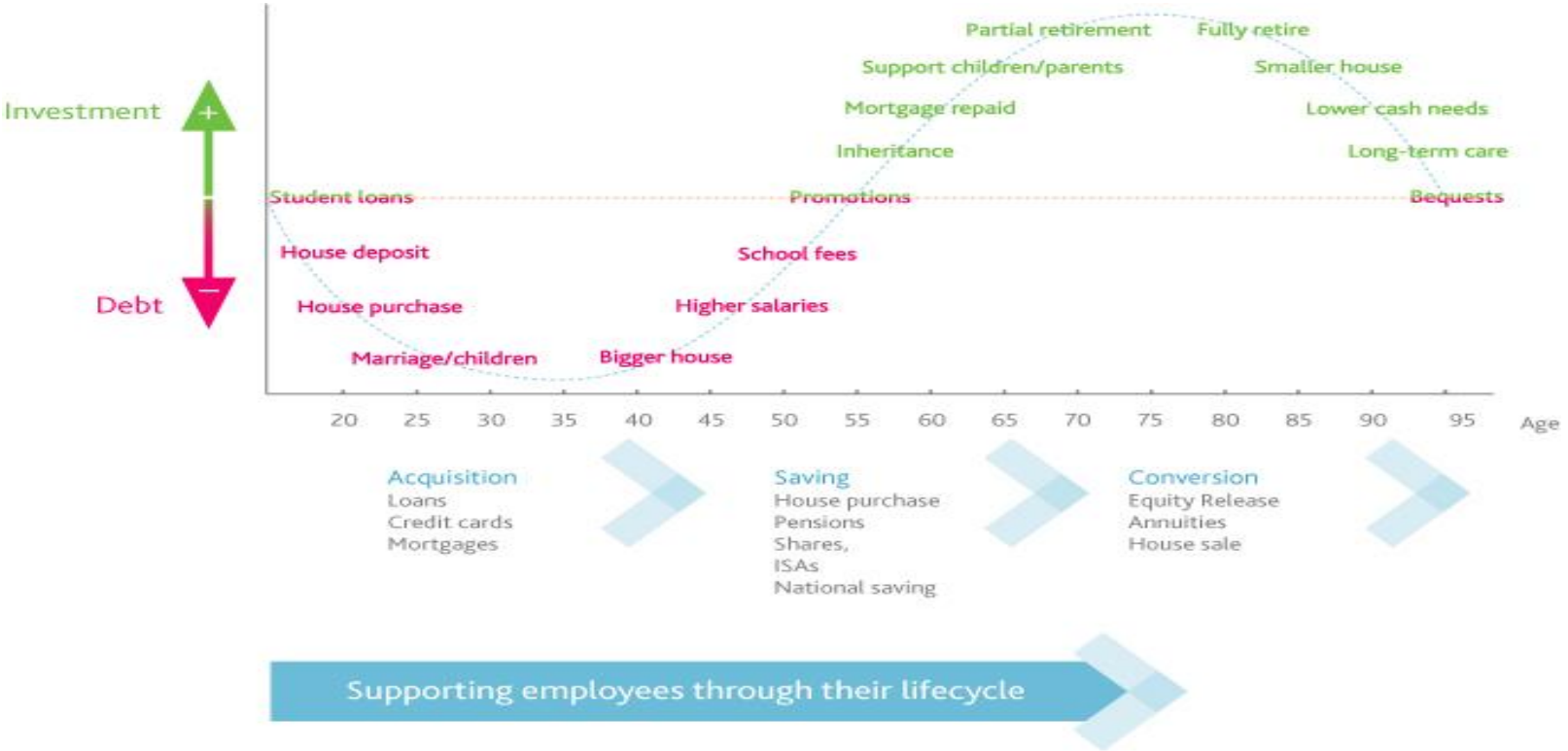
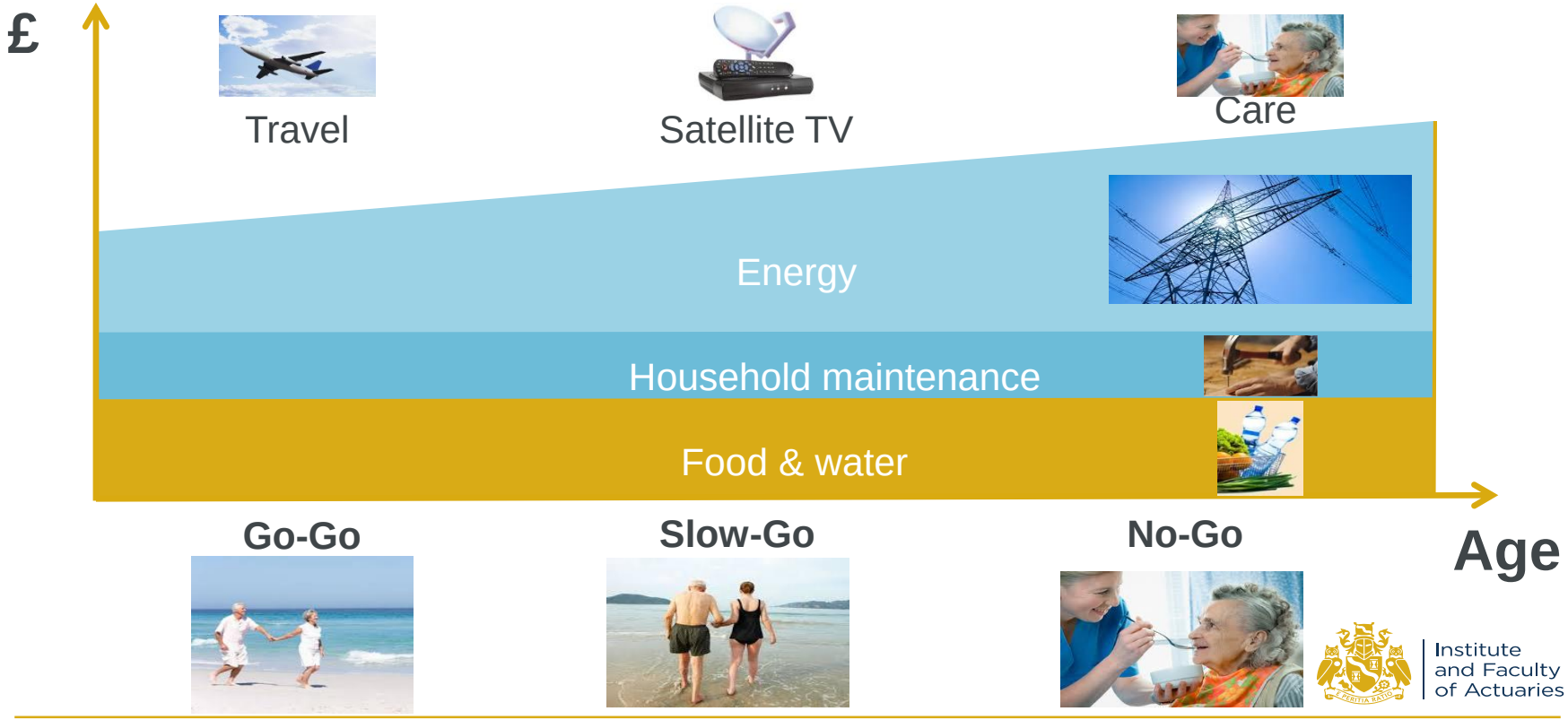
The lifecycle



Three phases of retirement



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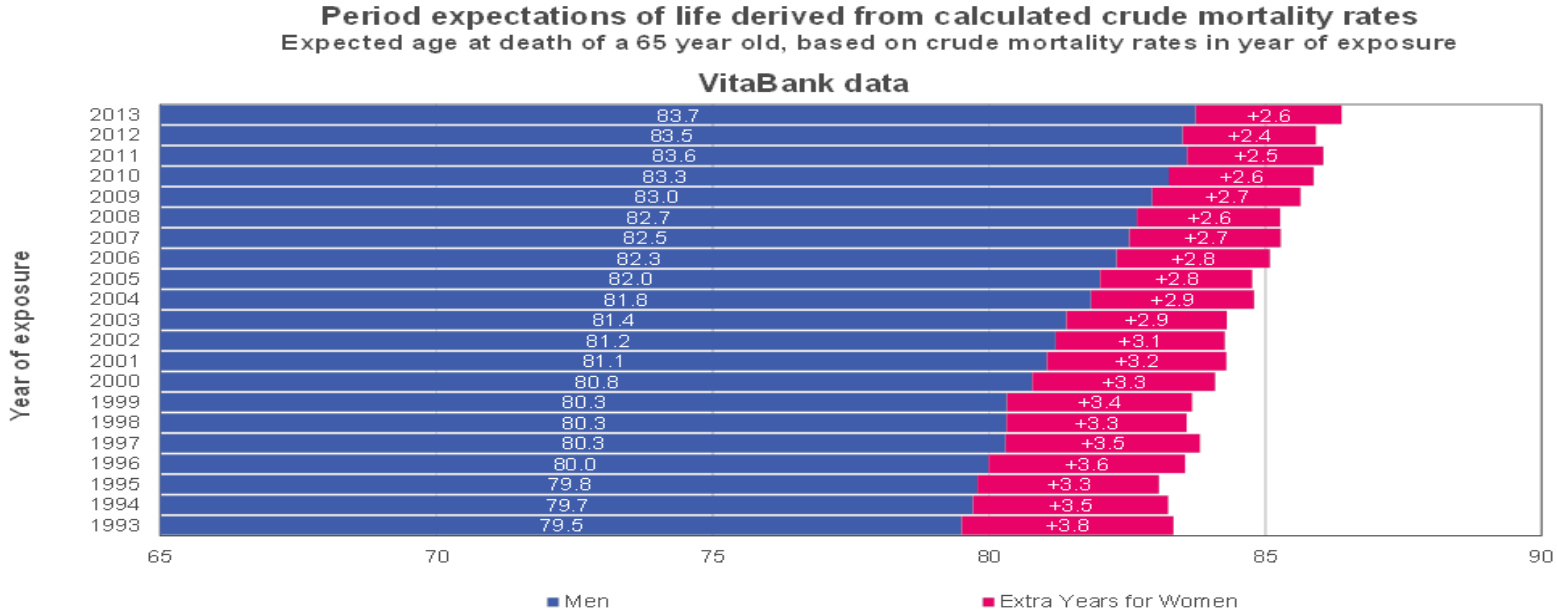
Great news….
12 more minutes every hour



Source:

CLUB VITA®

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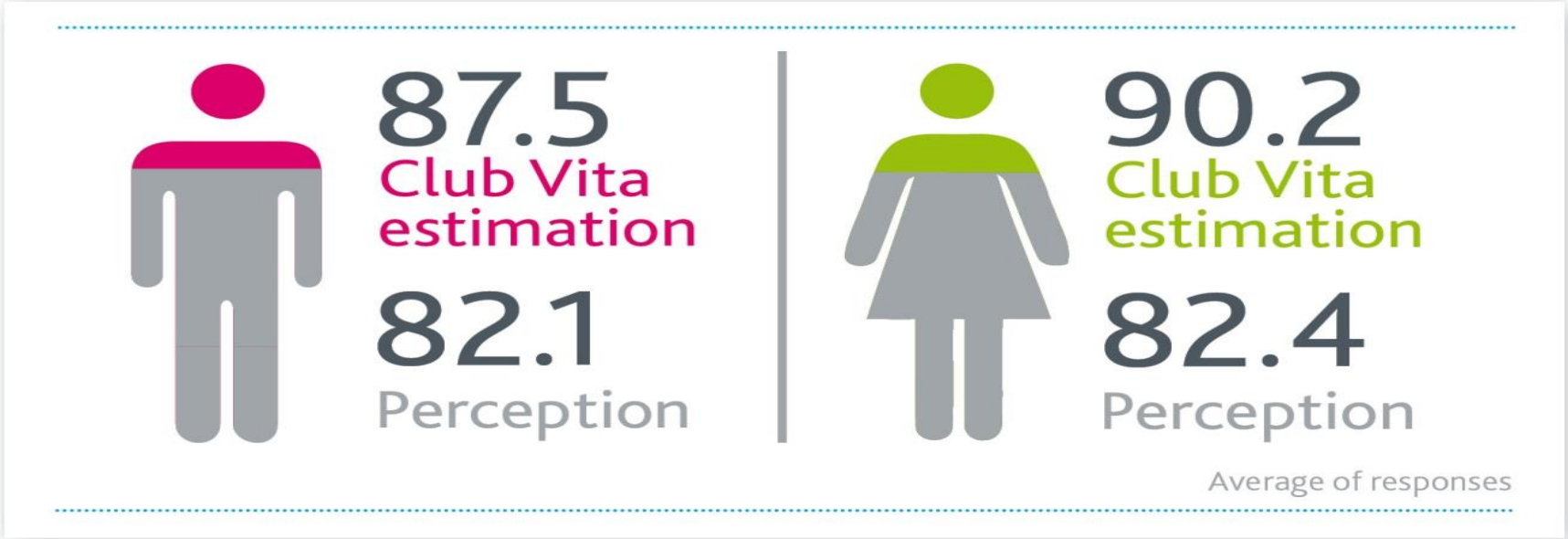
What age do you think you will live to?



Significant under appreciation of great news

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Helping people understand

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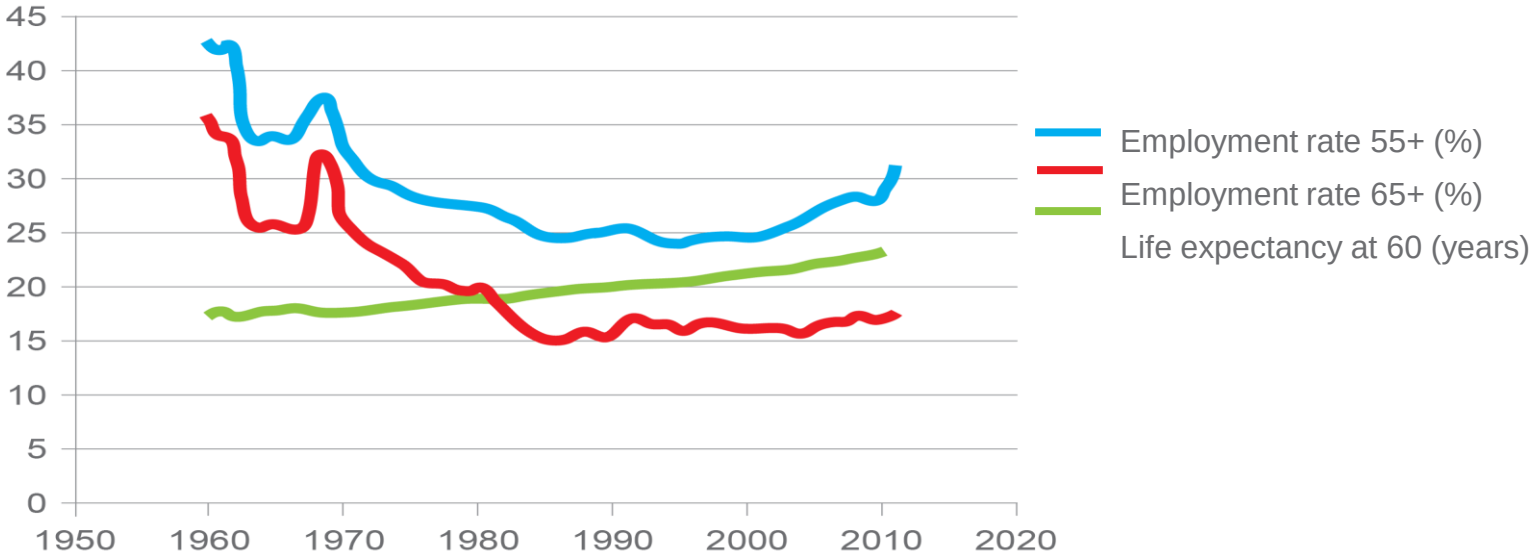
More older workers

Employment rates & life expectancy in OECD countries



Source: IEA Discussion Paper No. 52, Income from work –the fourth pillar of Income provision in old age

But lots more in 1960s

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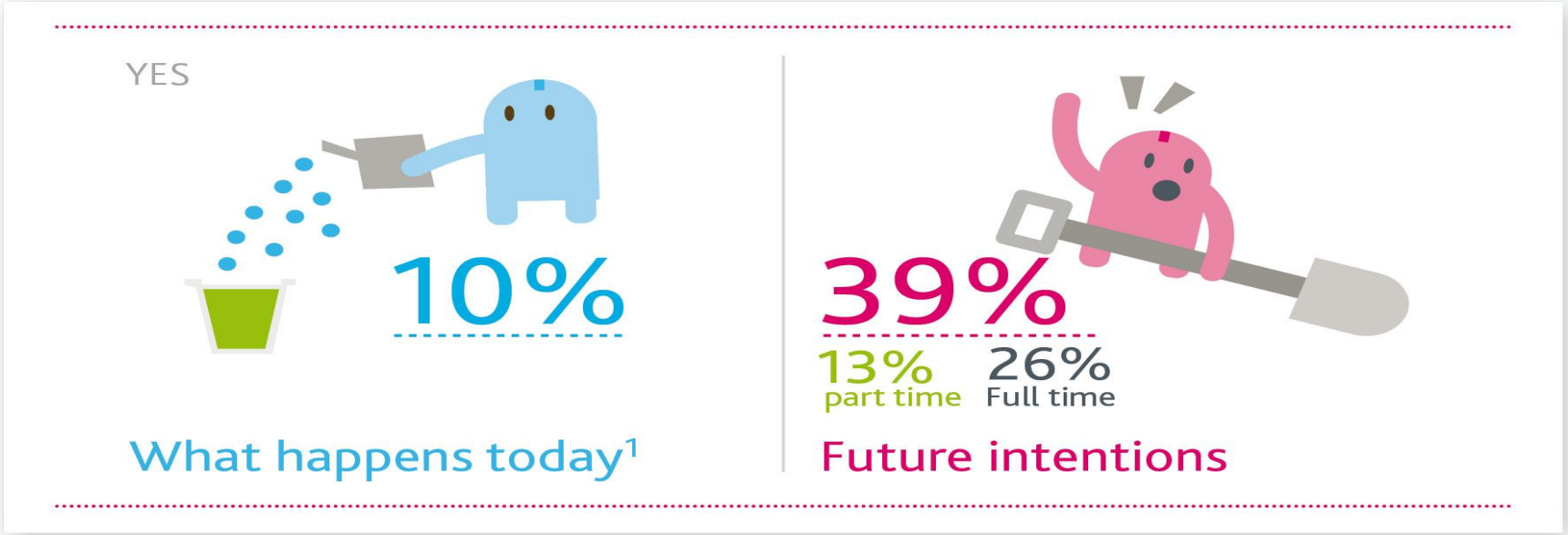
Do you expect to work beyond state pension age?



1 Source: ONS

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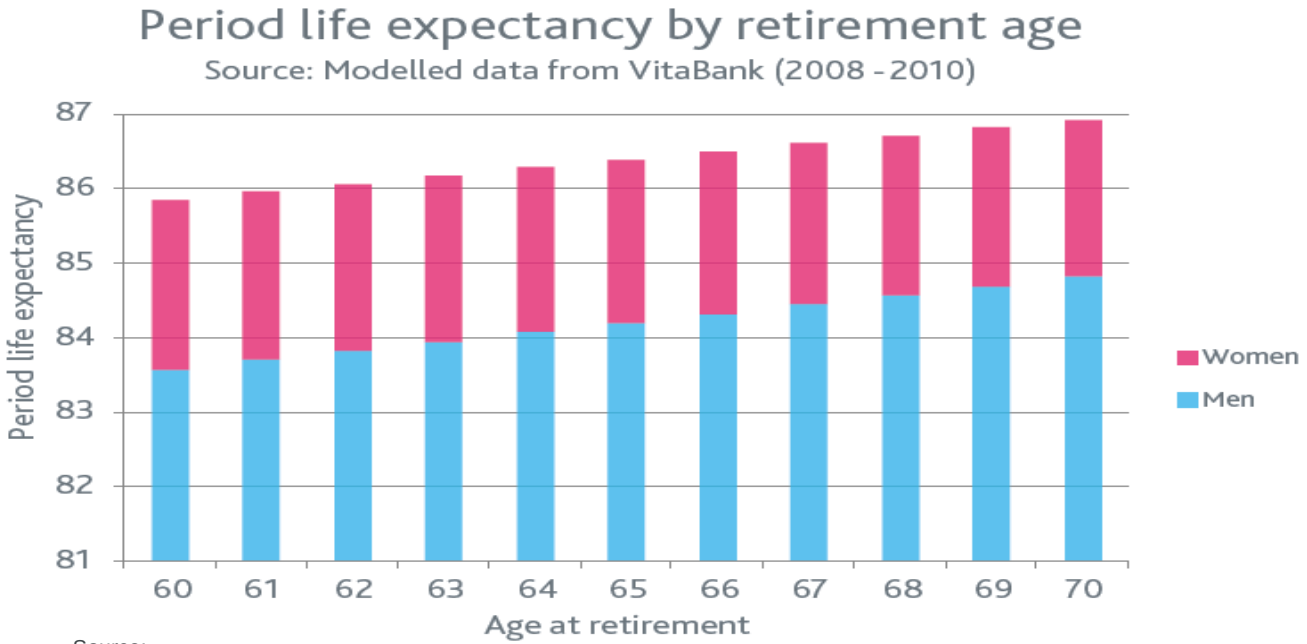
Work longer, live longer



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Is work good for you?

Overall the beneficial effects of work outweigh the risks of work, and are greater than the harmful effects of long-term unemployment or prolonged sickness absence. Work is generally good for health and well-being

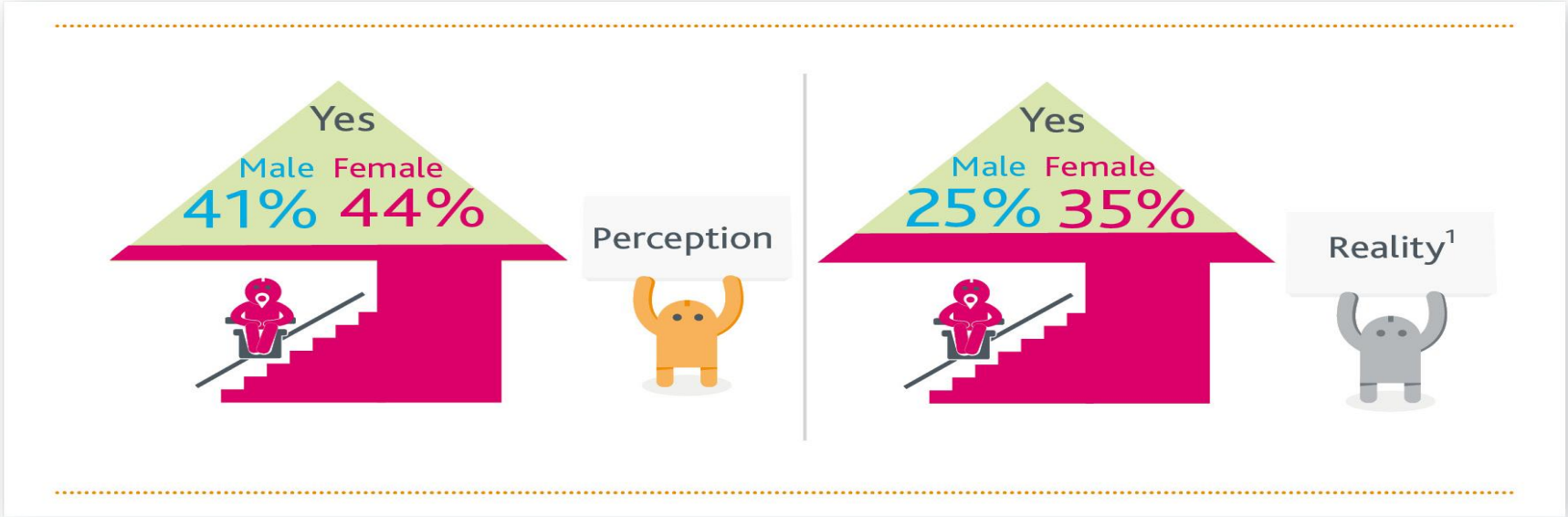
Additional research recommendation:

There is a need for longitudinal studies of the relative balance of adverse / beneficial effects of (early) retirement vs. continued working on the physical and mental health of older workers.

Waddell and Burton, 2006

http://www.kendallburton.com/Library/Resources/Is-work-good-for-you.pdf

Do you think you'll require long term care in retirement?



Source: 1 Rickayzen, B. (2007) An analysis of disability-linked annuities. Actuarial Research paper No. 180, (Cass Business School, London)

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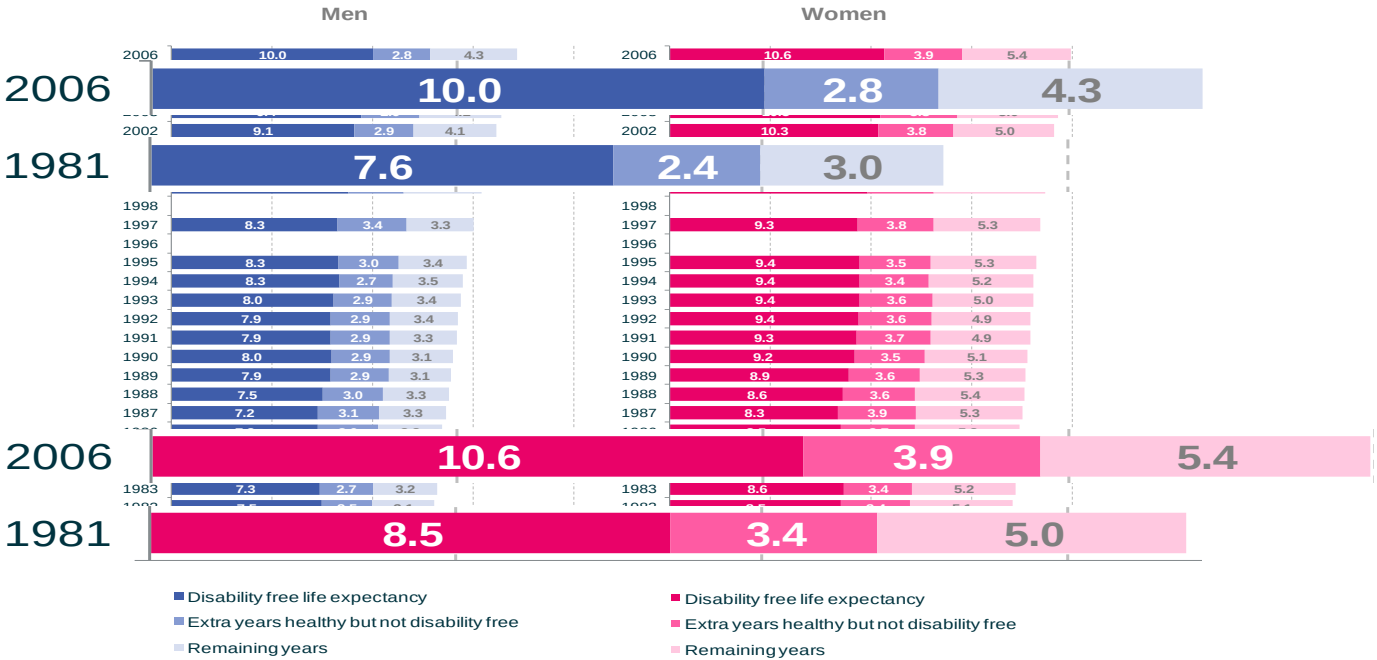
Life expectancy from age 65



Source: Hymans Robertson analysis of Government Actuary's Department and Office for National Statistics data for 2011 report, Living Longer and Prospering
http://www.ageing.ox.ac.uk/files/110110%20Living%20Longer%20and%20prospering%20Final.pdf

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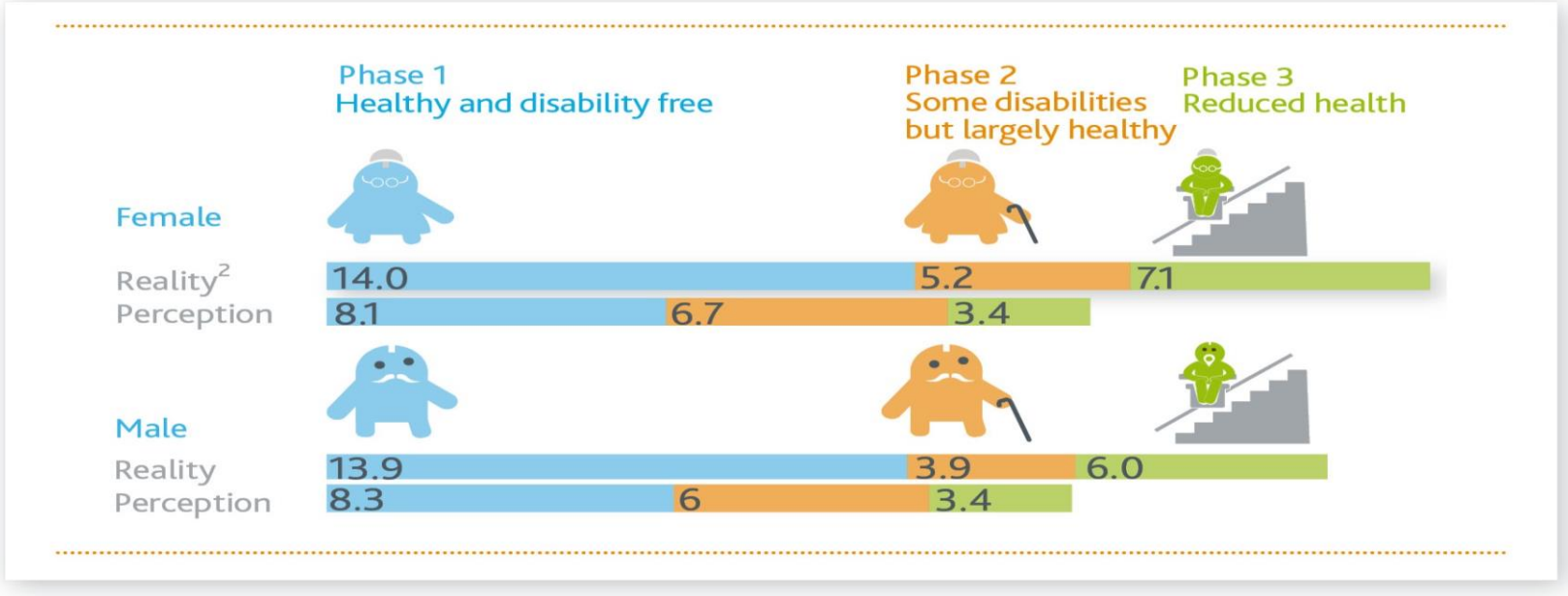
How many years do you think you'll be in the three phases of health in retirement



Source: 2 Club Vita calculations based on data received from the ONS

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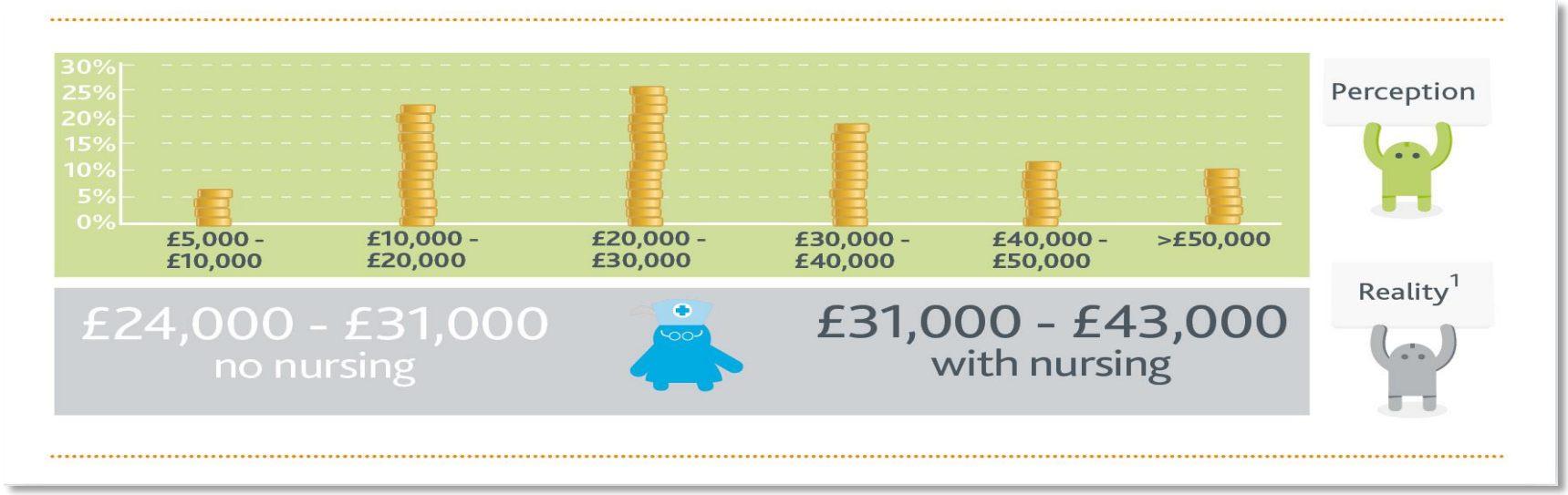
How much do you think it would cost to stay in a single room within a residential care-home, per year?



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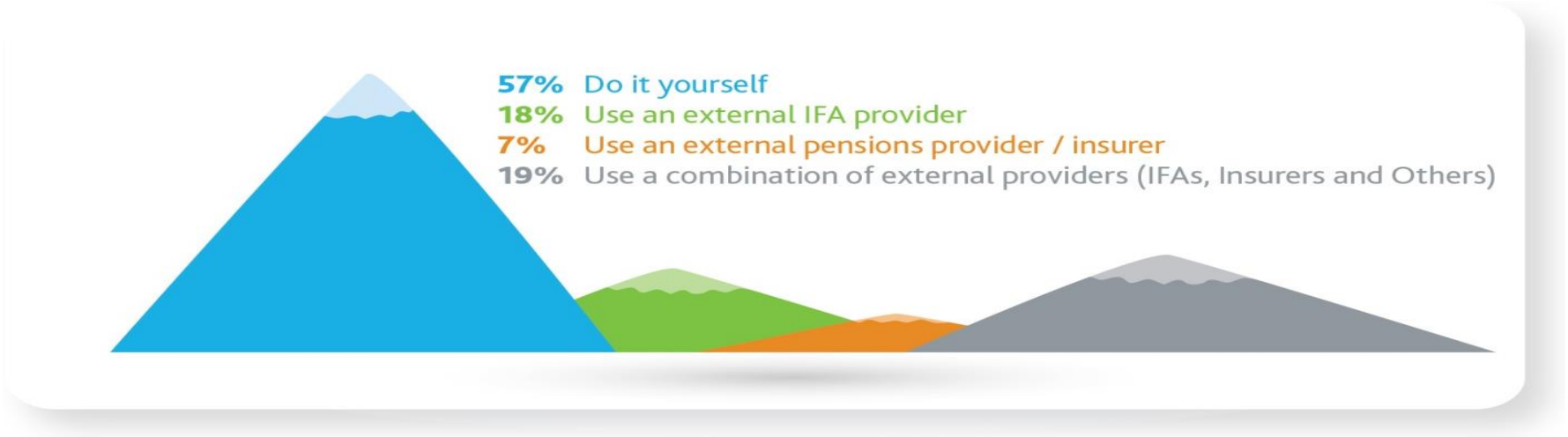
Guidance and advice - how will you ensure that you make the right decisions?



Lots of confused over 55s looking for help

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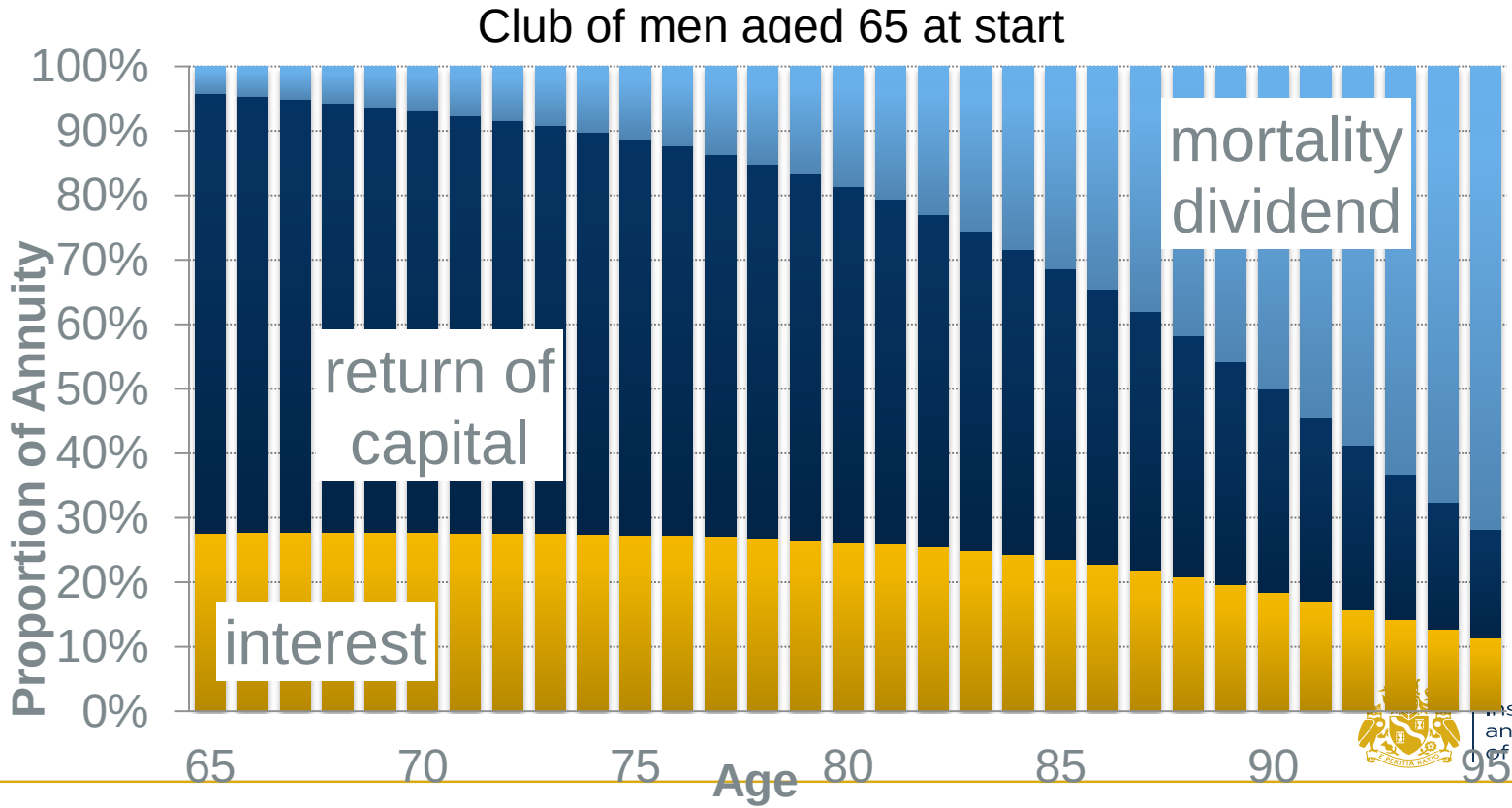
Decomposing annuities



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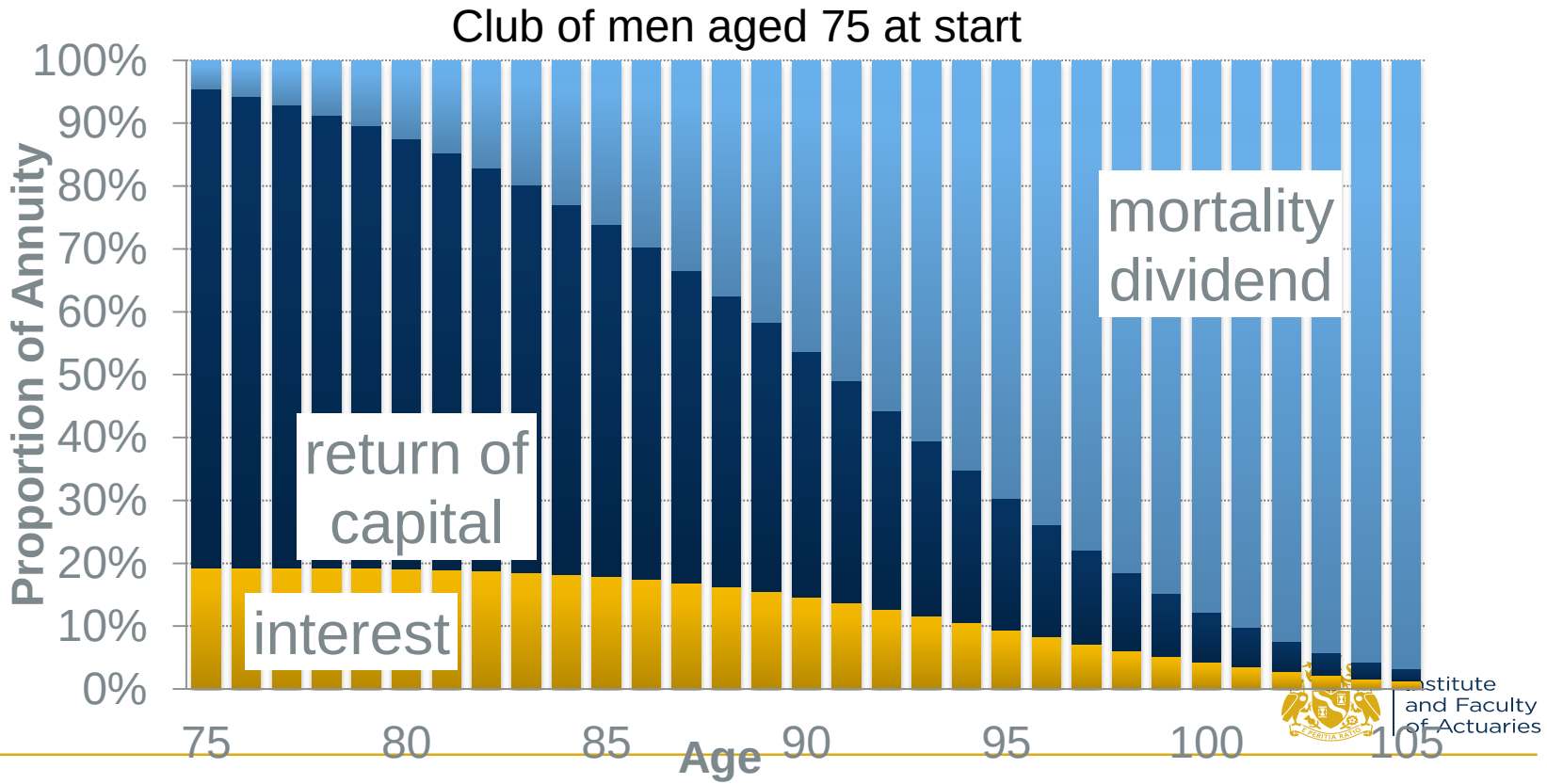
Annuities make more sense for less healthy



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So how do you know when to buy an annuity?

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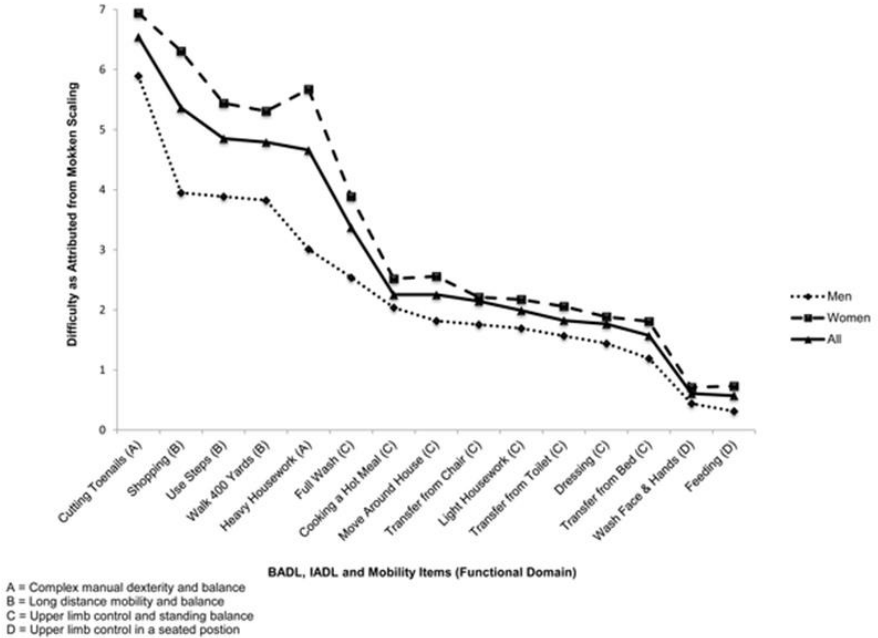
Unable to cut your own toenails?

Figure 1. Relative Difficulty of BADL, IADL and Mobility Items (Domain of Disability [5]).



Source: https://www.crystallise.com/home/tiki-print_blog_post.php?postId=95

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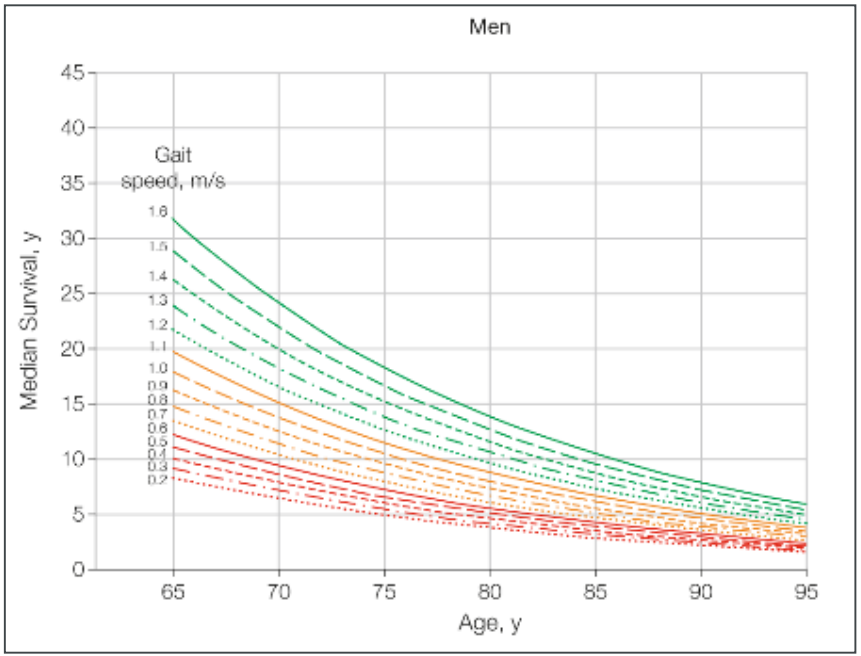
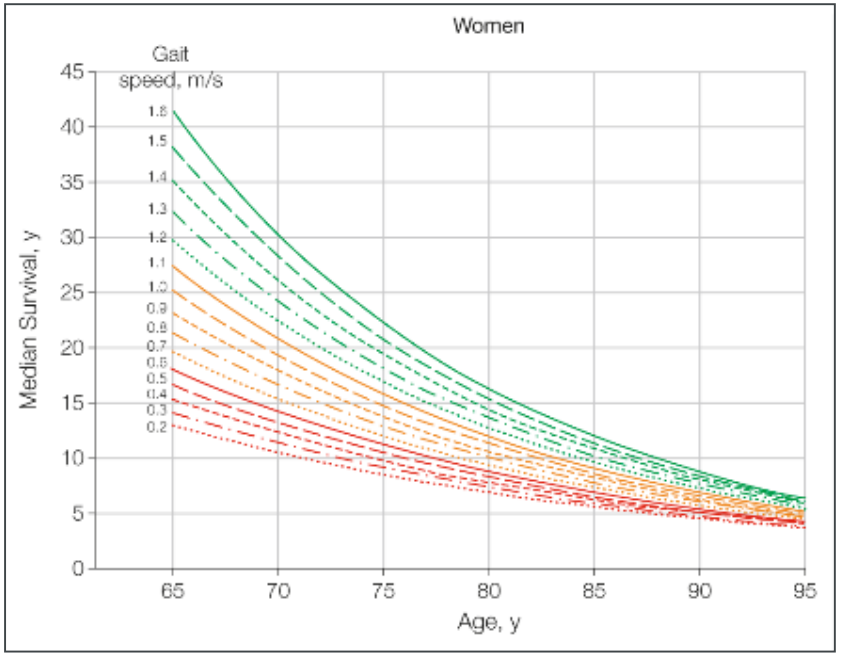
Or just monitor walking speeds?





Source: http://jama.jamanetwork.com/article.aspx?articleid=644554

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Questions

- How can we best engage older people in thinking about money, health and longevity in a joined-up way?
- Are there simpler predictive indicators of the ageing process that we should use?
- Will annuities come back into fashion?

“You cannae tak it with you”

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Questions

Comments

Thank you

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.

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The conundrum of using Activities of Daily living to predict times of Go-Go, Slow-Go or No Go

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08 May 2015

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The conundrum of using Activities of Daily living to predict times of Go-Go, Slow-Go or No Go

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Personal email: mre4@kentforlife.net

How are we going to tackle the conundrum

- Background on the Activities of Daily Living (ADLs)
- Dynamics of ADLs in old age – literature perspective
- Short follow-up vs longitudinal follow up dynamics
- The English Longitudinal Study of Ageing (ELSA)
- Motor skills, ADLs and instrumental ADLs
- Predictors of the dynamics of ADLs
- Discussion of the conundrum

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Physical disability

- measured by self-reported difficulties in the activities of the daily living (ADLs) at older ages have a dynamic pattern of deterioration and improvement, as seen in longitudinal studies (Hardy et al. (2005); Hardy and Gill (2004); Verbrugge et al. (1994); Anderson et al. (1998)).
- Physical disability are significant health indicators, both because of their high prevalence and because of their adverse consequences. On 2014, there were reported 5.1 million disabled people in Great Britain aged 65 and over (Clinical Commissioning Groups (CCGs) (2014)).

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How important is disability at old age?

- Disability is a crucial predictor of mortality at old age. Life expectancy with disability[1] at age 65 in England is 15 years for males and 18 years for females (Office of National Statistics (ONS) (2014)).
- Disability is also a strong predictor of utilisation of institutional long-term care and other health care services (Anderson et al. (1998) and others).
- Moreover, physical disability are sensitive and more meaningful measure of the burden of disease at old age than individual diagnoses, because the older people often have multiple diagnoses with varying severity.

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ADLs include activities such as:

- dressing (including putting on shoes and socks),
- eating (such as cutting up your food),
- using the toilet (including getting up and down),
- bathing and showering,
- getting in and out of bed, and
- walking across a room.

- ADLs are essential to maintaining independence at old age. The loss of function in one or more of these activities indicates a need for personal care from another person.

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Patterns and causes

- Factors that give the rise of difficulties in ADLs can be physical, mental, emotional, or memory problems.
- Patterns of disability were found to be highly variable, with some old persons experiencing prolonged or permanent disability, some experiencing a single discrete short episode of disability, and some experiencing recurrent episodes of disability (Hardy et al. (2005); Anderson et al. (1998)).

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Instability in disability at old age

- It is uncertain whether those with reported improved disability status, yet with risk for subsequent declines, have inherent patterns of recovery and recurrent disability episodes, or the reported recoveries were short-term gains in functioning that were realised from adaptations to disability (Anderson et al. (1998)).
- Older persons successfully adapting to disability may gain ability to function, and this could lengthen the time spent without severe disability.
- There is an appreciable instability in disability at old age, that is intriguing from a health care and policy perspective.

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Dynamics of disability at old age

- The dynamic nature of disability has been a topic of discussion in literature with the availability of multiple waves of data from longitudinal studies such as
  - the Established Populations for Epidemiological Studies of the Elderly (de Leon et al. (1999, 1997); Gill et al. (1997)),
  - the Longitudinal Study on Ageing (Rudberg et al. (1996); Anderson et al. (1998); Dunlop et al. (1997)), and
  - the National Long-Term Care Survey (Manton and Gu (2001)).
  - Moreover, the dynamics of recovery are seen when subjects were followed up more frequently; e.g. monthly interviews (Hardy et al. (2005)).

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Short term dynamics of disability

- Although, longitudinal surveys have long periods between follow-ups (e.g. one year or two years) the analysis of self reported disability has shown dynamics of improvements and recovery.
- The dynamics of disability and recovery occur in short term as well; e.g. when subjects were followed up more frequently; namely monthly interviews (Hardy et al. (2005); Hardy and Gill (2004)).
  - When subjects were followed up on monthly basis; the vast majority of newly disabled older persons were observed to recover independent function, usually within the first 6 months after disability onset (Hardy and Gill (2004)).

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More on short dynamics of disability

- Moreover, it was found that the transition rate of recovery of independence was high from any disability regardless of the disability being mild or severe (Hardy et al. (2005)).
- Although, these disability episodes are very short, they bear the development of subsequent disability and death.
- The foundation of these research raises the question about whether reported recoveries in longitudinal studies where ADL reporting happens less often were actually during episodes of short recovery before recurrent disability.

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The English Longitudinal Study of Ageing

- The English Longitudinal Study of Ageing (ELSA), an interview based survey of a sample from the population of England aged 50 years or older on 1 March 2002.
- The sample was drawn from respondents to the Health Survey for England (HSE), which was designed to be representative of the English population living in private households.
- The technical details of this study and the results of primary analyses have been published elsewhere (Scholes et al. (2009); Steptoe et al. (2012)) and are also available at the web site of the Institute of Fiscal Studies (http://www.ifs.org.uk/elsa/).

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More on ELSA

- A total of 11,392 subjects responded to wave 1 (2002-2003) interview (also referred to as baseline interview in this paper). Wave 1 was followed up by six biennial waves.
- All waves included questions about any difficulties the respondent has with motor skills, ADLs and IADLs.
  - Motor skills only include limitations because of physical illness and problems.
  - ADLs and IADLs include limitations because of any physical and mental illness or memory problem as well. ADLs include physical activities (e.g. sitting), and mixed physical and mental activities (e.g. dressing). IADLs include mental activities (e.g. using a map).

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Motor skills

- Difficulties in motor skills were self-reported. All interviews included a question whether, "because of a health problem," the respondent had "any difficulty" (yes/no) with any of the motor skills.
- Respondents were shown cards that listed 10 skills;
  - six questions covered skills dependent mainly on using lower limbs, hips and waist (walking, sitting, getting up, climbing stairs, and stooping), and
  - four skills dependent mainly on using upper limbs (reaching, pulling/pushing, carrying/lifting, and picking a coin).

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Activities of Daily Living

- Difficulties with ADLs were self-reported. All interviews included a question whether, "because of physical, mental, emotional, or memory problems," the respondent "had any difficulty" (yes/no) with ADL.
- Respondents were shown cards that listed 6 ADLs:
  - dressing (including putting on shoes and socks),
  - eating (such as cutting up your food),
  - using the toilet (including getting up and down),
  - bathing and showering,
  - getting in and out of bed, and walking across a room.

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Instrumental Activities of Daily Living

- Difficulties with IADLs were self-reported. All interviews included a question whether, "because of physical, mental, emotional, or memory problems," the respondent "had any difficulty" (yes/no) with IADL.
- Respondents were shown cards that listed 7 IADLs:
  - Using a map
  - Preparing a hot meal
  - Shopping for groceries
  - Making a phone call
  - Taking medication
  - Work around the house or the garden
  - Managing money - such as paying bills

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Are motor skills and IADLs suitable measures

- Although any difficulty in motor skills activities does not imply loss of independence, but they indicate problems that can lead to the need for care.
- IADLs are significant health indicators and evident predictors of mild cognitive impairment and dementia, but the definition of an IADL impairment only group is subject to the question of whether or not certain IADL impairments are sex biased (e.g. using a map (Chang and Antes (1987); Brown et al. (1998))).
- Moreover, IADL disabilities may be caused, not only by physical or mental limitation, but also by cultural expectations, environmental obstacles, or lack of motivation and training. For example, a traditional elderly widower who has developed weakness after a stroke may be physically able to cook but, because his late wife always did the cooking, he does not attempt it (Boult et al. (1994)).

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Combinations of disabilities in ADLs

- There are 64 combinations of disabilities in ADLs
  - No disabilities 1
  - 1 disability only 6
  - 2 disabilities at a time 15
  - 3 disabilities at a time 20
  - 4 disabilities at a time 15
  - 5 disabilities at a time 6
  - All 6 disabilities in ADLs 1

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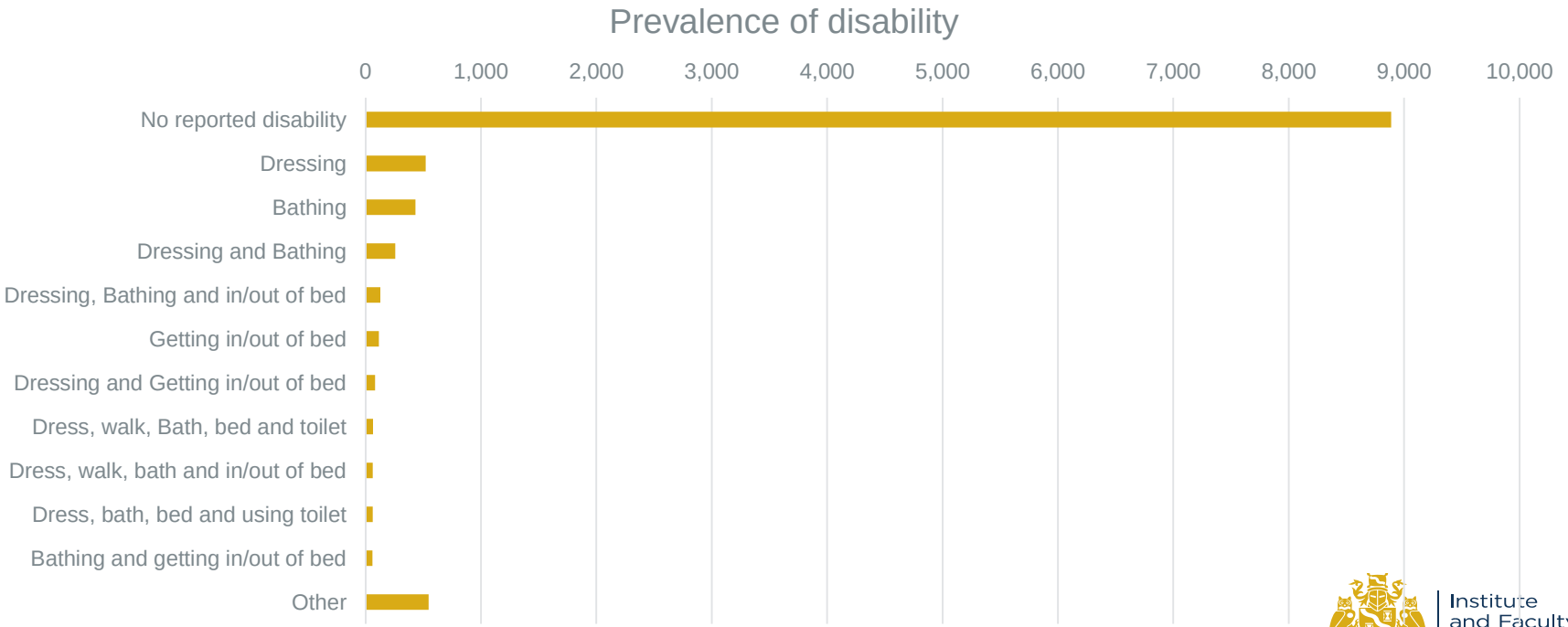
Prevalence of disability among ELSA respondents



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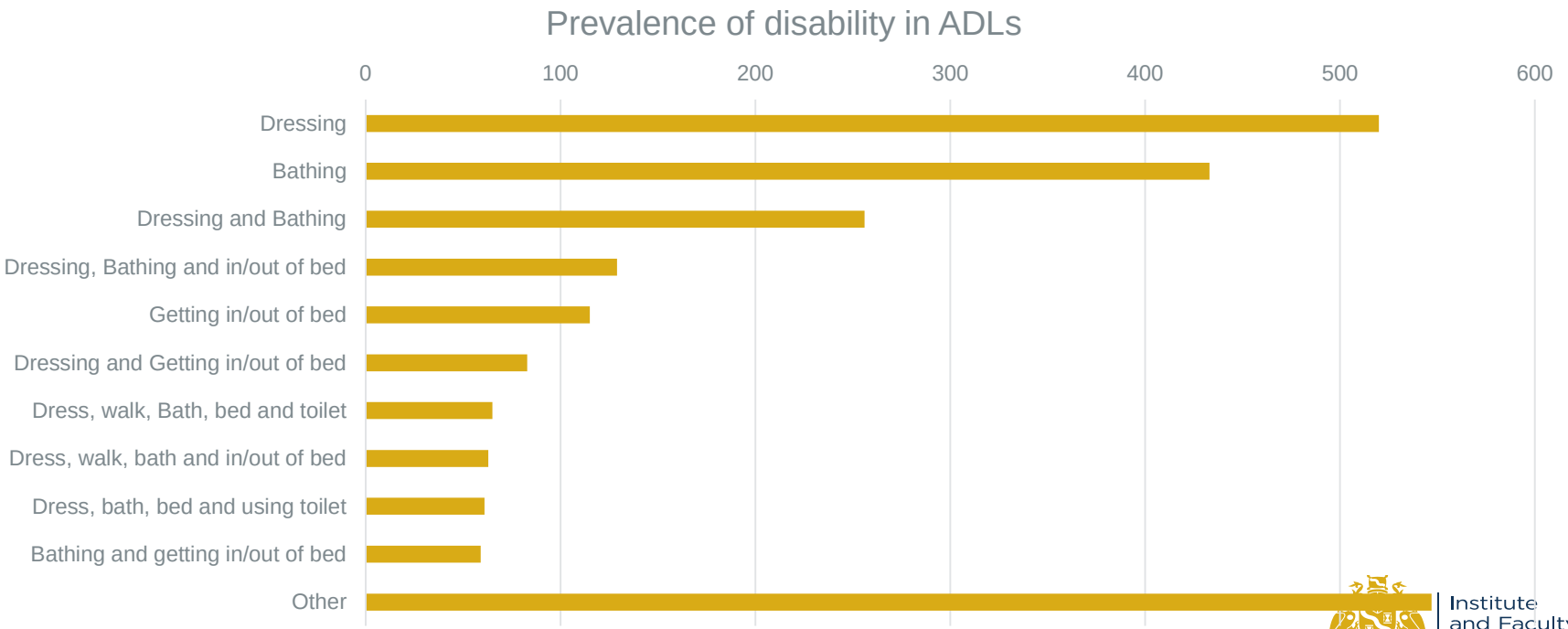
Prevalence of disability among ELSA respondents



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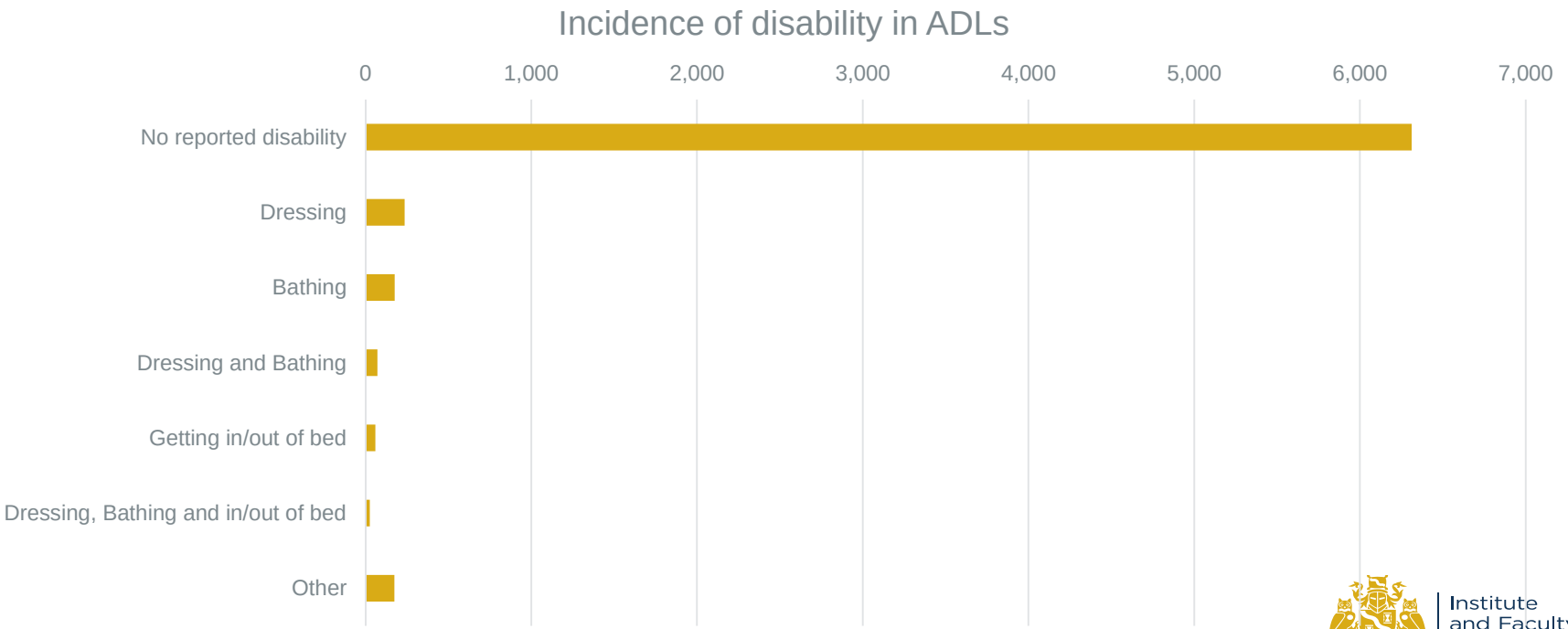
Incidence of disability among ELSA respondents



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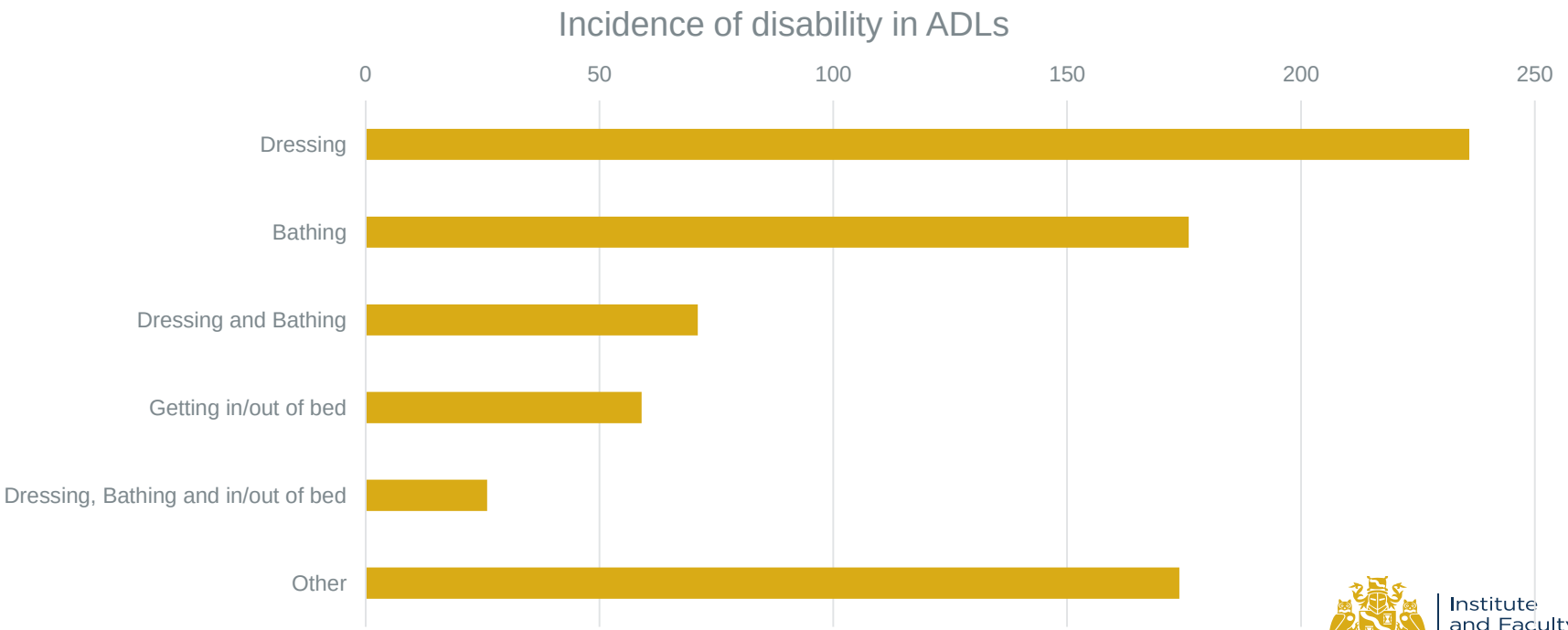
Incidence of disability among ELSA respiondents



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Progression of disability in ADLs over time

- From those who had prevalent disability in getting dressed only
  - 88 (16.92%) were lost to follow-up, and 22 (4.23%) were dead
  - 206 (39.62%) recovered total independence
  - 109 (20.96%) reported continuing disability in dressing
  - 42 (8.08%) reported disabilities in Dressing, Bathing and moving in/out of bed
  - 53 (10.19%) reported other disability patterns

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Progression of disability in ADLs

- From those who had prevalent disability in bathing only
  - 76 (17.55%) were lost to follow-up, 6 (1.39%) were institutionalised and 48 (11.09%) died
  - 120 (27.71%) recovered total independence
  - 89 (20.55%) reported continuing disability in bathing
  - 40 (9.23%) reported disabilities in Dressing, Bathing and moving in/out of bed
  - 54 (12.47%) reported other disability patterns

Progression of disability in ADLs

- From those who had prevalent disability in Moving in/out of bed only
  - 25 (21.74%) were lost to follow-up, and 9 (7.83%) were dead
  - 48 (41.74%) recovered total independence
  - 7 (6.09%) reported continuing disability in moving in/out of bed
  - 12 (10.43%) reported disabilities in Dressing and moving in/out of bed
  - 6 (5.22%) reported disabilities in bathing and moving in/out of bed
  - 8 (6.96%) reported other disability patterns

Progression of disability in ADLs

- From those with prevalent disability in getting dressed and bathing
  - 43 (16.80%) were lost to follow-up, 1 (0.39%) were institutionalised and 32 (12.50%) died
  - 51 (19.92%) recovered total independence
  - 36 (14.06%) recovered ability in one ADL (13 recovered dressing, 23 recovered bathing)
  - 36 (14.06%) reported continuing disability in both ADLs
  - 28 (10.94%) reported disabilities in Dressing, Bathing and moving in/out of bed
  - 29 (11.33%) reported other disability patterns

Progression of disability in ADLs

- From those with disability in dressing and moving in/out of bed
  - 16 (19.27%) were lost to follow-up, 1 (1.20%) institutionalised and 4 (4.82%) were dead
  - 23 (27.71%) recovered total independence
  - 10 (12.05%) reported continuing disability in getting dressed only
  - 9 (10.84%) reported continuing disabilities in getting dressed and moving in/out of bed
  - 10 (12.05%) reported disabilities in Dressing, Bathing and moving in/out of bed
  - 10 (10.05%) reported other disability patterns

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Progression of disability in ADLs

- From those who reported disability in getting dressed, bathing and moving in/out of bed
  - 21 (16.28%) were lost to follow-up, 2 (1.55%) institutionalised and 3 (2.33%) were dead, 15 (11.63%) recovered total independence
  - 15 (11.63%) reported continuing disability in dressing and bathing only
  - 17 (13.18%) reported continuing disabilities in bathing and moving in/out of bed
  - 18 (13.95%) reported disabilities in dressing, bathing and moving in/out of bed
  - 17 (13.18%) reported disabilities in dressing, bathing, moving in/out of bed, walking and using toilet
  - 21 (16.28%) reported other disability patterns

Maintaining independence after recovery

- Among those who recovered total independence after 2 years
  - 283 (61%) maintained total independence for 4 years,
  - 156 (33.62%) maintained independence for 6 years, and
  - 116 (25%) maintained independence for 8 years
  - After 4, 6 and 8 years recovered respondent reported recurrent disabilities in getting dressed, bathing and moving in/out of bed with average percentages of 10%, 7% and 3% of those who recovered.
- Out of the 8,888 who had reported no disability at baseline (2002/03 interviews) there were 3,305 (37.19%) who maintained total independence for 8 years.

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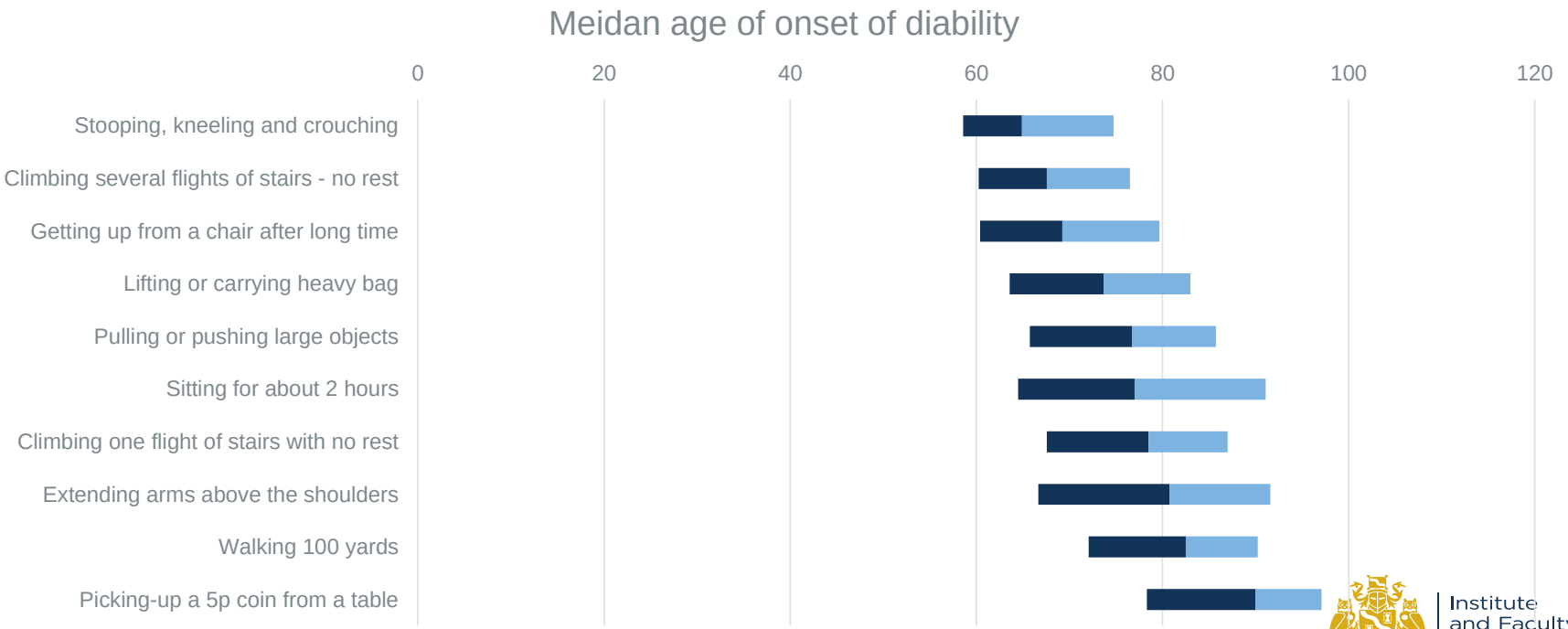
Median age at onset of disability in Motor skills



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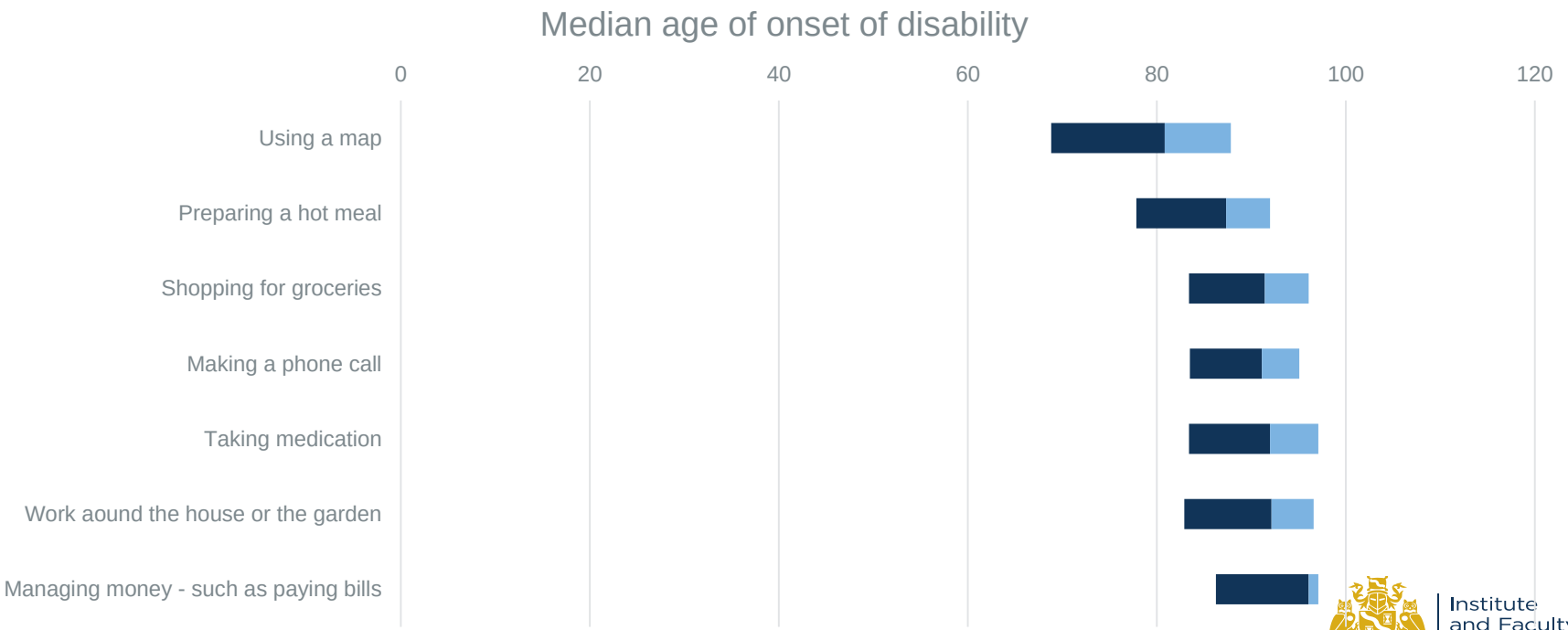
Median age at onset of disability in IADLs



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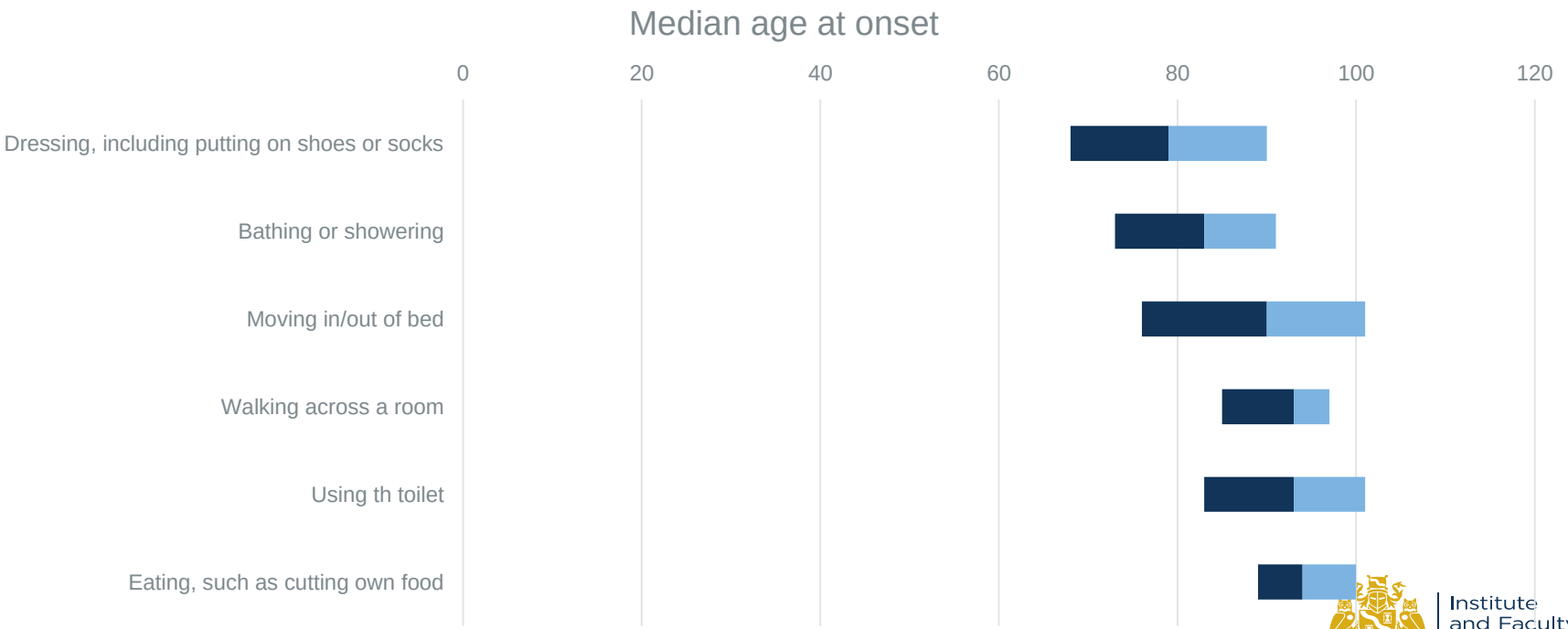
Median age at onset of disability in ADLs



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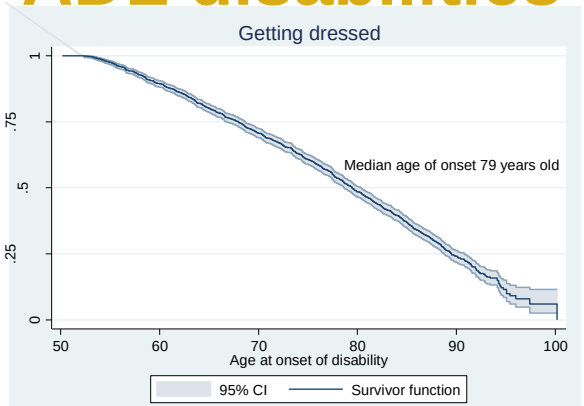
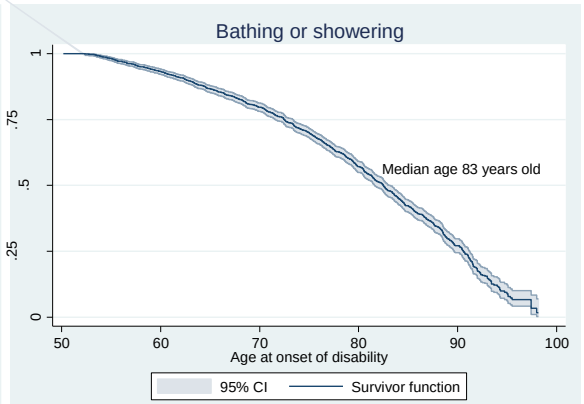
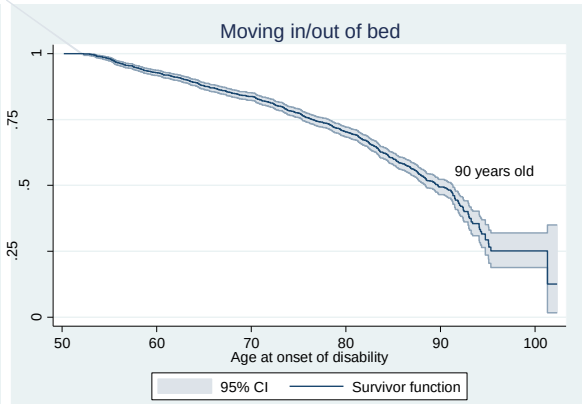
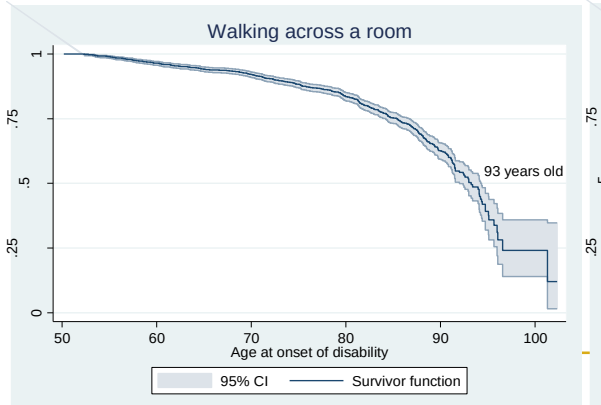
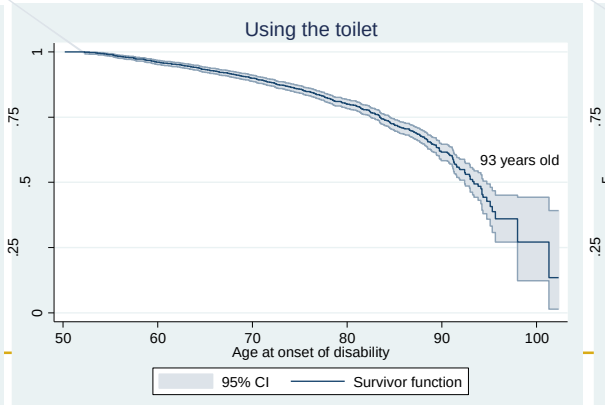
Kaplan-Meier's survival estimates of onset of ADL disabilities

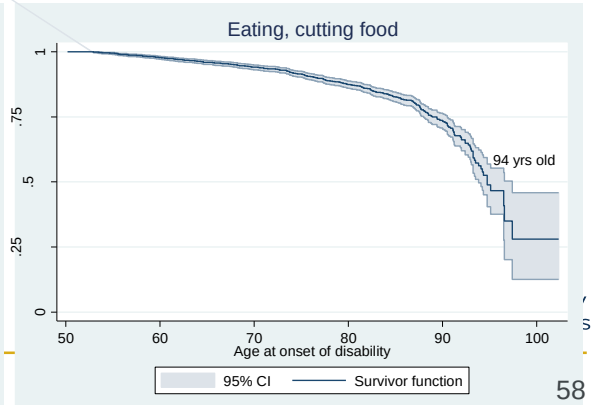












Deterioration and improvements

- The numbers of reported difficulties in motor skills, ADLs or IADLs were used to define the severity of disability.
- The severity variables range from 0 (indicating no difficulties) to 6 (indicating difficulties with all six ADLs).
  - 0 failures in activities indicating no disability (no need for care),
  - 1 or 2 failures in activities indicating mild disability (moderate need for care),
  - And 3 or more failures in activities indicate severe disability (constant need for care).

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Independent predictors of disability dynamics

- Demographic information (age, sex, marital status), socioeconomic status (education and social class), preceding ADLs, preceding motor skills, Cerebra-vascular diseases, chronic illnesses, whether the participant have had joint replacement within two year before the interview and health behaviours (smoking and alcohol intake) were included in the models.
- These factors are sought to be associated with dynamics of disability in older people.

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Models used

- Three panel logistic regression random effects models were tested.
  - In Model 1, investigated previous disability status, age, sex, marital status, education, social class, Cerebra-vascular diseases, chronic illnesses, whether the participant have had joint replacement within two year before the interview, smoking and alcohol intake as predictors of improvements in ADLs.
  - Model 2 excluded joint replacement from the covariates, and
  - Model 3 added respondents who died or institutionalised to the sample.
- All variables chosen a priori for investigation were included in the models. Statistical significance was determined at $P < .05$ to maintain variables in the model.

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Analysis sample

- There were 8,404 respondents aged 60 and older. 128 were excluded because of lack of information on ADLs, resulting in a sample of 8,276. Out of them 1,589 (19.20%) have been interviewed only once
  - 433 (5.23%) died after first interview;
  - 37 (0.45%) moved to institution after wave 1;
  - 1,067 (12.89%) lost to follow up after first interview and
  - 52 (0.63%) were new sample members at wave 5.

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Analysis sample

- Lost participants had no difference in education, social class, sex or age.
- Those who died were predominantly older males, and those who moved to institution were predominantly older females.
- The sample for preliminary analysis was consisting of 3,913 (47:28%) males and 4,363 (52:72%) females.
- Median age was 69 with inter-quartile range of (64 to 75) years old.

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Results

- Old females, reporting more than 3 difficulties in ADLs, drinking alcohol improve the chances of improvement in ADL status.
- On the other hand a reporting being diagnosed with any chronic condition were associated with decreased improvements in ADLs status.
  - Deterioration in ADLs increases with age.
  - Gender differential on deterioration or improvement were only prominent when death and institutionalisation were included in the model.
  - Sever disability in motor skills increased the chance of deterioration in ADLs to double of those who have no disability.

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Results -continued

- Being diagnosed with neurological conditions doubled the possibility of deterioration and halved the chance of improvements
- Pulmonary disease was associated with reduction in improvements in ADL, but had no association with deterioration in ADLs.
- **Arthritis** had protective effect against deterioration in ADLs, but had no association with improvements.
- Stroke reduced improvement and increased deterioration, its effect was not significant (p-values between 0.05 and 0.15).

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Results – continued 2

- Joint replacement was not associated with improvements or deterioration in ADLs.
- Ex-smokers and current smokers had lower chance of improvement in ADLs, and increased chance of deterioration.
- **Alcohol** had a prominent protective effect against deterioration in ADLs and was strongly associated with increase in improvements. The protective effect of alcohol has been shown in other studies (Lang et al. (2007)).

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Probabilities of improvements in ADLs

- The predicted probabilities have been calculated for persons who have lower than O-level education former smokers who drink moderately. Three scenarios were used:
  - Worst scenario is a male, with no education, reported 1 or 2 failure in ADLs at baseline diagnosed with pulmonary and neurological conditions and had a stroke, a current smoker and a teetotal
  - Best scenario is a female, with some education, reported 3 or more ADLs at baseline, has no diagnosis of chronic conditions, never smoked, and consumes alcohol regularly
  - Average scenario is allocated average values for each factor.

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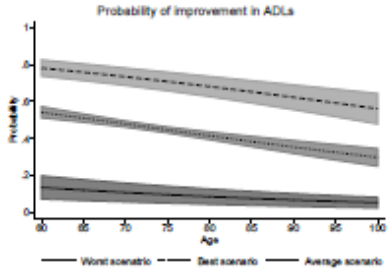
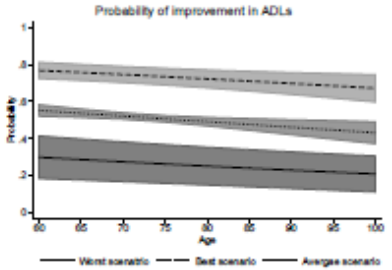
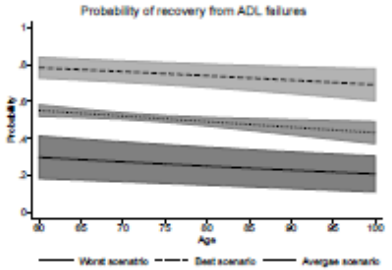
Probabilities of improvements in ADLs



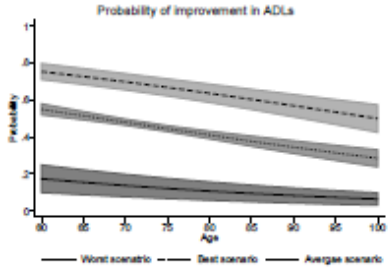
(a) Model 1: respondents aged 60+ with at least 1 ADL at baseline, including deaths and institutions



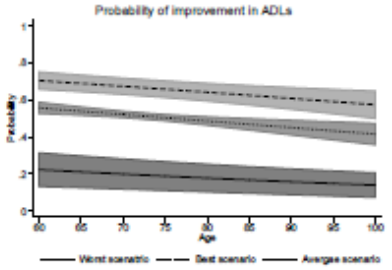
(b) Model 2: respondents aged 60+ with at least 1 ADL at baseline, excluding deaths and institutions



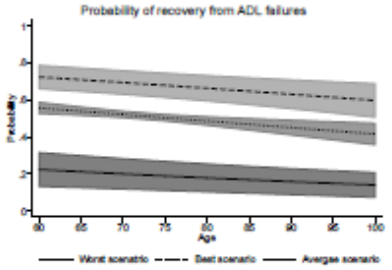
(c) Model 3: respondents aged 60+ with at least 1 ADL at baseline, modeling joint replacement between interviews



(d) Sensitivity[4] Model 1



(e) Sensitivity Model 2



(f) Sensitivity Model 3

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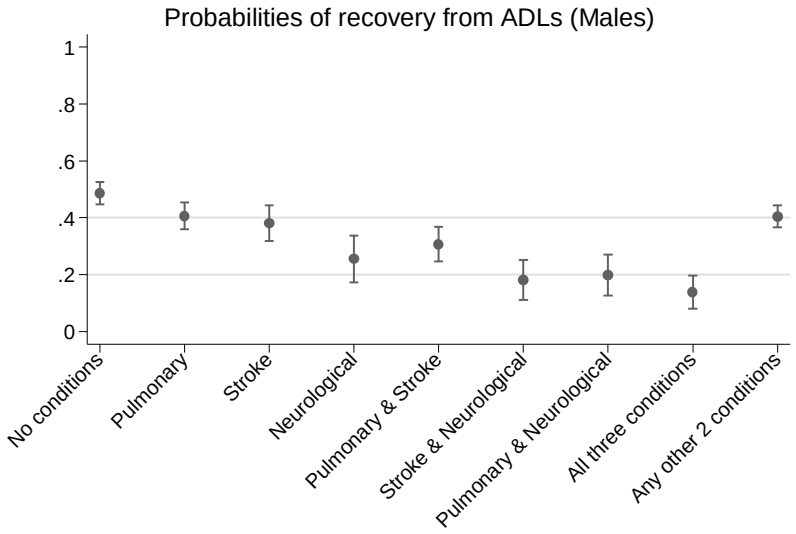
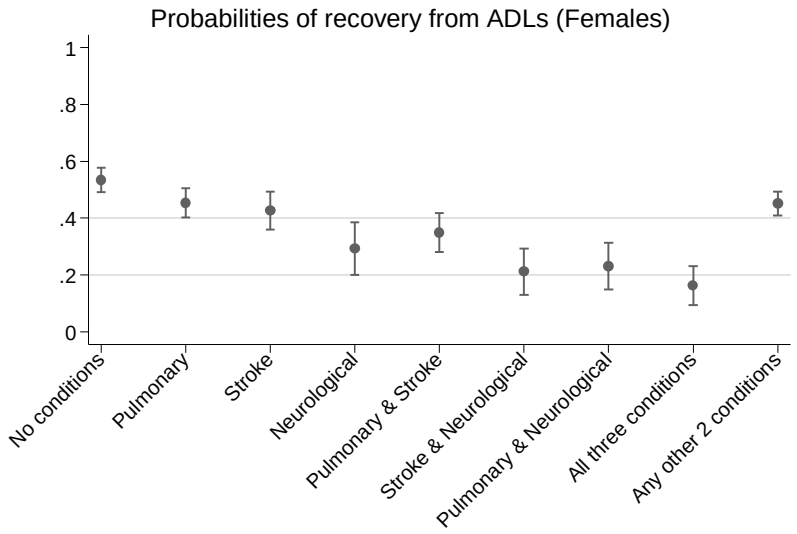
Interaction between comorbidities





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Discussion

- Physical disability in the elderly should not be treated as a static condition, but should be seen as a dynamic process.
- Viewing disability as a static condition ignores the fact that, depending on the basic underlying causes (i.e. factors and events leading to disability), disability may begin abruptly, progress slowly, remain stable, and may even diminish over time.
- The observed recoveries in ADLs in survey datasets might suggest that a insurance companies might benefit from reassessment of their claimants ADLs, and this will have an impact on LTC insurance premium.

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Discussion - continued

- The reported improvement seems very high, and this could be for different reasons.
  - This can be due to adaptation to the difficulty in performing the activity, or
  - the reported difficulty at particular wave was temporary.
  - The chance of false reporting shouldn't be ignored in trying to understand these numbers.
- Education, and social class shown no significance as predictors of future deterioration or improvements in ADLs. Similar findings in previous longitudinal studies (see Beckett et al. (1996); Rudberg et al. (1996); Manton (1988)).

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Discussion – continued 2

- Women on average both are at greater risk of developing disability than men and live longer than men, but higher levels of disability (i.e. deterioration in ADLs) could be sought to increased risk of death among older persons.
- Cardiovascular disease group was shown to produce a relatively fast pace of functional decline followed by death.
- Arthritis was associated with slower functional status declines than non-arthritic illnesses over the study period. This reflects the medical nature of arthritis being with moderate impact.
- Alcohol showed protective effect which corresponds with the protective effect of alcohol on health (Mukamal et al. (2003); Gaziano et al. (1996); White et al. (2002)).

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Questions

Comments

Thank you

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.

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