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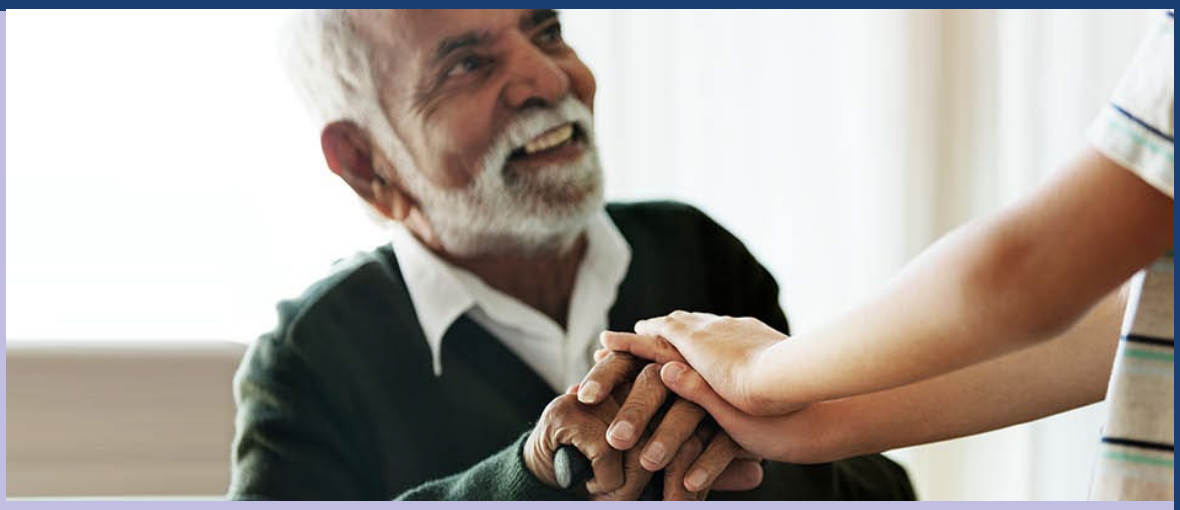

Trends in healthy and disability-free life expectancy in the UK and other high-income countries: a systematic review

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Final Report

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Contents

1. Objective

To update previous work on this topic,[1,2] a literature review was conducted to summarise evidence about UK trends in life expectancy (LE)[i], healthy life expectancy (HLE)[ii], disability-free life expectancy (DFLE)[iii], and active life expectancy (ALE)[iv], and the factors that influence these trends.

2. Methods

Standard review methods were used, and are summarised below.

2.1 Search strategy

Electronic searches were carried out in Medline, Embase, Scopus and Health Management Consortium, in October 2019 (see Appendix A for the strategy applied to Medline). Searches were limited to English language studies published after 2016. The Office for National Statistics (ONS) website was also hand searched (November 2019) for reports published since 2016.

2.2 Review criteria

Review criteria are summarised in table 1. Studies were included if they examined trends in healthy life expectancy, active life expectancy or disability-free life expectancy in the UK or another Organisation for Economic Co-operation and Development (OECD) high-income country. High-income countries are those determined by the OECD 2019 classification, which is based on trends in gross national income per capita. OECD high-income countries were selected for this review for comparability. Studies reporting trends in life expectancy *only* (i.e. without also reporting trends in healthy life expectancy, active life expectancy and disability-free life expectancy) were ineligible. As this review updates a previous review, studies published from 2016 were included. For ONS reports, the most up-to-date analyses were included. Reports of trends from the ONS were excluded if they were superseded by a more recently published analysis of the same data.

2.3 Study selection

Titles and abstracts of all records were screened by one researcher. Full texts of eligible studies were examined against the review criteria.

2.4 Quality and bias assessment

Study quality and bias were assessed using an adapted version of previously published criteria.[3] This approach assesses 'threats to the validity of comparisons over time' (Freedman et al., p. 3140) in studies reporting trends. Criteria were rated as *good*, *fair* or *poor*, according to the parameters summarised in table 2. The assessment of study quality used information provided in the study publication and supplementary materials. Where study publications did not report the required information to assess quality, methods reports

[i] Life expectancy is an estimate of how many years a person might be expected to live

[ii] Healthy life expectancy is an estimate of how many years a person might be expected to live in a 'healthy' state (usually based on self-reported or self-perceived health)

[iii] Disability-free life expectancy is an estimate of how many years a person might be expected to live without disability

[iv] Active life expectancy is a disability-free life expectancy based on the ability to perform activities of daily living

and associated published papers for the datasets used were consulted (details are provided in Appendix B). If the required information was not available from either of these sources, the criterion was assessed as *unclear*.

Using the assessments (good, fair, poor or unclear) for each criterion, studies were given a summary rating of quality. The previously published rating system gave a summary rating of good for studies with at least 5 items rated good and none rated poor; poor for studies with ≥2 out of 10 items rated poor, and all others rated fair. We could not use this approach since: a) we gave emphasis to the quality of the outcome measure which was judged to be most important for assessing study quality; b) we had two fewer criteria since we excluded judgements of width of time frame and frequency of measurement; c) we also excluded the criteria *proportion lost to follow up, proportion of proxy interviews* and *proportion of missing data* since this information was not reported for most studies.

Our approach was thus amended to consider only the first four criteria, using the following summary judgements:

- GOOD: studies with three out of four (one to include the quality of the outcome measure) criteria rated *good* and no criteria rated *poor* or *unclear*.
- FAIR: studies with two or more criteria rated *fair*, with no criteria rated *poor* or *unclear*.
- POOR: studies with any criteria rated *poor*.
- UNCLEAR: studies with any criteria rated *unclear*.

Where studies used multiple outcomes and were given different judgements for each, a separate summary judgement for each was applied. The full quality assessment is detailed in Appendix B.

2.5 Data extraction and synthesis

Key study details (author, publication date, country, study design), and trend estimates were extracted onto an Excel spreadsheet. A narrative synthesis was used to summarise evidence on trends. Data were synthesised first by country (UK, other OECD high-income country), and then by outcome.

Table 1. Review criteria

Population	Studies must examine life expectancy, active life expectancy, healthy life expectancy or disability-free life expectancy trends, with a focus on trends from birth, 65 years and 85 years. Studies reporting trends from other ages were also reviewed where evidence was available. Studies must examine these outcomes in whole populations. Studies reporting trends in population sub-groups only (i.e. those with heart failure) were ineligible.
Exposure	As this review reports evidence on life expectancy, active life expectancy, healthy life expectancy or disability-free life expectancy trends, an exposure variable was not required. However, this review also examined evidence about factors influencing life expectancy trends. Thus, both studies reporting trends and studies reporting factors that influenced these trends were eligible.
Comparator	Not applicable.
Outcome(s)	Life expectancy, active life expectancy, healthy life expectancy or disability-free life expectancy where examined alongside the former. Studies reporting *only* life expectancy trends were ineligible. Measures based on dependency and care needs were eligible. Studies must examine changes in these outcomes over time (i.e. include more than one time point). Studies that report projections/forecasts of life expectancy outcomes were also eligible.
Study design	Studies must use an observational design and be carried out in an OECD high-income country. The review focused on evidence from the UK with comparison to evidence from other OECD high-income countries where possible. Studies published from 2016 were eligible. ONS reports were excluded if they were not the latest release, or reported trends for a period contained within a more recent ONS publication using the same data.

Table 2. Quality assessment criteria

Criteria	Parameters
Study design	Good: Independent repeat cross section Fair: Panel design with aged in cohorts Poor: Other
Population coverage	Good: National including institutionalised[a] Fair: National but excluding those in institutions *No criteria for poor*
Comparability of interview methods between time points	Good: Identical Fair: Change in mode Poor: Change in disability, functioning or health outcomes
Quality of outcome measure	Good: Detailed multiple item measure Fair: Single item global measure *No criteria for poor*
Loss to follow up	Good: NA or <5% Fair: 5-10% Poor: >10% Note: This only applies to longitudinal study designs (i.e. not independent repeat cross sections)
Proportion of proxy interviews	Good: <5% Fair: 10-20% Poor: >20%
Proportion of missing data	Good: <5% Fair: 5-10% Poor: >10%

[a]Taken here to mean those in care homes, although 'institutionalised' was not always defined in studies

3. Findings

Twenty-eight studies met the review criteria (figure 1 and table 3). Eleven studies reported trends in the UK[4-14] (England,[8-11] England & Wales,[6,12,13] each of the four devolved countries and the UK as a whole[4,5,7,14]). Two of these eleven UK studies were ONS reports.[13,14] The remaining studies reported trends in Belgium,[12,15,16] Canada,[17] Denmark,[18] France,[19] Japan,[20,21] the Netherlands,[22,23] Norway,[24] Republic of Korea,[25] Sweden,[26,27] Switzerland,[28] and the US.[29-31] Three also report trends across multiple countries.[4,5,7]

Across these studies, evidence was reported about trends in LE,[4,5,7-9,12-25,27-29] DFLE,[6,8,9,11,15,16,18,20,24,26,27,29-31] HLE,[4,5,7,8,12-14,17,19,21-25,28] the proportion of life spent without disability,[8,9,11,20,30] the proportion of life spent healthy,[8,22] and disability prevalence.[6,8-11,26,30,31]

The assessment of study quality and bias is detailed in Appendix B. Four studies were rated good,[9-11,16] seven were rated fair,[6,13-15,18,29,30] one was rated good *and* fair (because it used two outcome measures that each received a different quality rating),[8] and three were rated poor.[24,26,28] Thirteen studies were rated unclear due to a lack of information required to assess quality.[4,5,7,12,17,19-23,25,27,31] As the majority of studies received a summary rating of unclear, the synthesis below does not prioritise evidence with a higher quality rating. Instead, the summary judgement is provided in table 3 for the reader's reference.

In the following sections, evidence on these trends are summarised, focusing first on UK and then other OECD high-income countries in Europe, Asia and North America.

Figure 1. PRISMA diagram

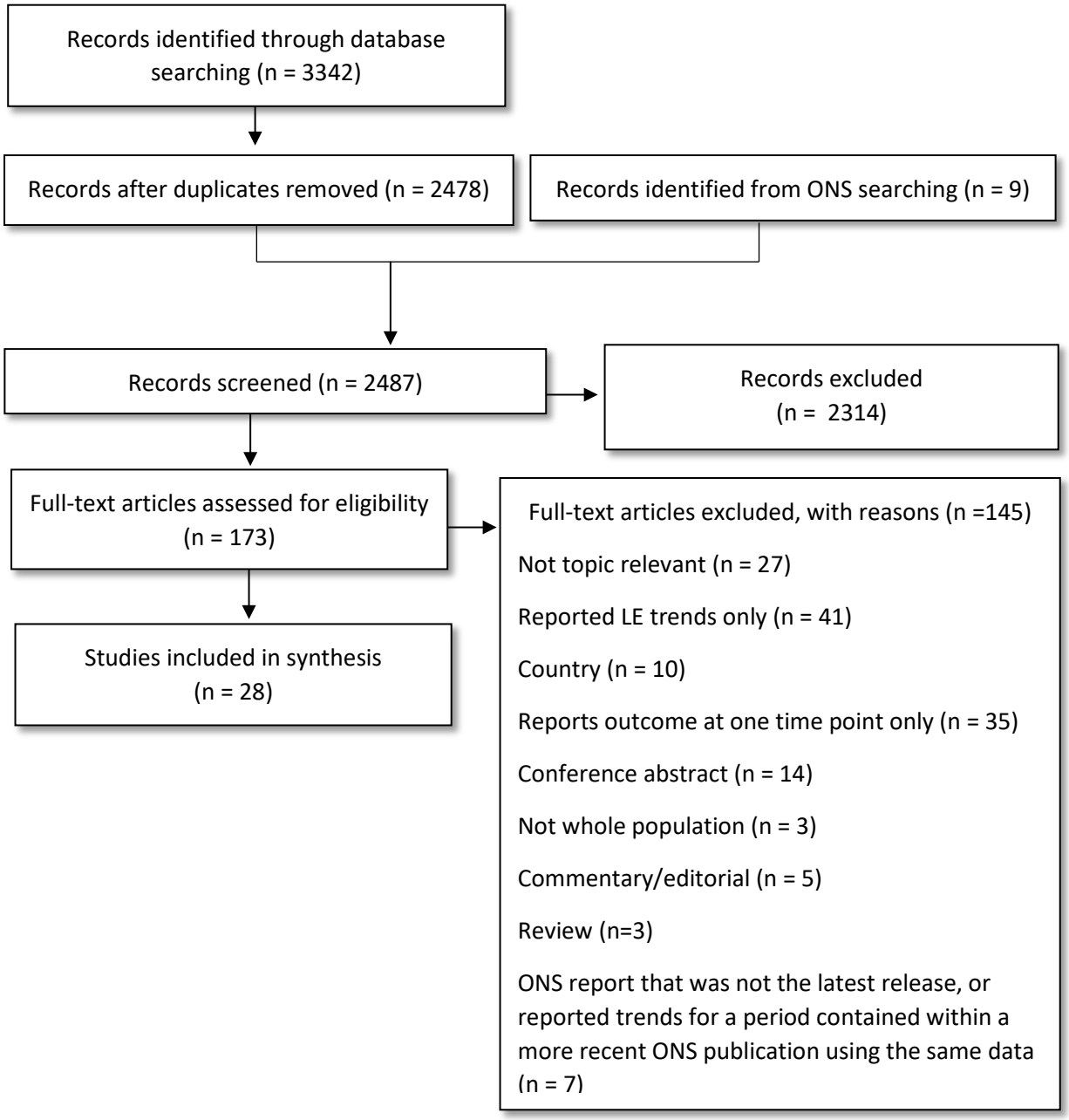


Table 3. Summary of included studies

Study	Country	Data source	Trend years	Trends reported	Disability/health measured from a global (single) item or multiple items?	Stratification	At age	Reports evidence about factors associated with trends?	Quality rating
Studies with UK samples									
Jagger 2016	England	CFAS I and II	1991, 2011	LE, HLE, DFLE, LE without cognitive impairment, % of LE without disability, % of LE without cognitive impairment, % of life spent healthy, disability prevalence	HLE: global CI free LE: multiple DFLE: multiple	Sex	65	No	GOOD (disability outcome) FAIR (health outcome)
Kingston 2017	England	CFAS I and II	1991, 2011, and 2015, 2025, 2035 (projection)	LE, DFLE, % of LE without disability, disability prevalence	Multiple	Sex	65	No	GOOD
Kingston 2018a	England	CFAS II, ELSA, Understanding Society	2015, 2025, 2035 (projection)	LE, DFLE, % of LE without disability, disability prevalence	Multiple	Sex, age	65-74, 75-84, 85	No	GOOD
Kingston 2018b	England	CFAS II, ELSA	2015, 2025, 2035 (projection)	LE, disability prevalence	Multiple	Sex, age	65-74, 75-84, 85	No	GOOD
Guzman-Castillo 2017	England, Wales	ELSA	2015, 2025 (projection)	LE, DFLE, disability prevalence	Multiple	None	65	No	FAIR
Global Burden of Disease study 2016 [b]	Multiple, including UK	Global Burden of Disease Study	2005, 2015	LE, HLE	Multiple	Sex	0	No[c]	UNCLEAR

Global Burden of Disease study 2017 [b]	Multiple, including UK	Global Burden of Disease Study	1990, 2016	LE, HLE	Multiple	Sex	0, 65	No[c]	UNCLEAR
Global Burden of Disease study 2018 [b]	Multiple, including UK	Global Burden of Disease Study	1990, 2017	LE, HLE	Multiple	Sex	0	No[c]	UNCLEAR
Reus-Pons 2017	England & Wales	Census, national death registries, Permanent Survey on the Living Situation (POLS), Health Survey	2001, 2011	LE, HLE	Global	Sex, migrant/non-migrant	50	No	UNCLEAR
ONS 2019	England & Wales	UK Census, Annual Population Survey, Indices of Multiple Deprivation 2015, Welsh Index of Multiple Deprivation 2014	2012/14 – 2015/17	LE, HLE	Global	Sex, deprivation decile[d]	0, 65	No	FAIR
ONS 2018	UK, England, Wales, Northern Ireland, Scotland	UK Census, Annual Population Survey	2009/11 – 2015/17	LE, HLE	Global	Sex	0	No	FAIR
Studies with samples from OECD high-income countries in Europe									
Bronnum-Hansen 2017a	Denmark	Danish Surveys of Health, Ageing and Retirement in Europe	2006/07, 2010/11,2013/14	LE, DFLE,	Global	Sex, education	65	No	FAIR
Deeg 2018	Netherlands	Longitudinal Aging Study Amsterdam	1993, 2016	LE, HLE, % of life spent healthy	Multiple	Sex	65	No	UNCLEAR
Gheorghe 2016	Netherlands	Dutch Labour force Survey and National Mortality Registry	2001, 2011	LE, HLE (as quality adjusted life expectancy),	Multiple	Sex, education	25, 65	No	UNCLEAR

Grasset 2019	France	PAQUID and Three City cohort studies	1988/1989, 1999/2000	LE, DFLE (as dementia-free life expectancy),	Multiple	Sex	65	No	UNCLEAR
Lagergren 2017	Sweden	National mortality statistics, Nationwide Swedish Surveys of Living Conditions	1980/1985, 1994/95, 2006/2011	LE, DFLE, disability prevalence	Multiple	Sex	65	No	POOR
Remund 2019	Switzerland	Swiss National Cohort, Swiss Health Interview Survey	1990, 2014	LE, HLE,	Global	Sex, education	30	No	POOR
Renard 2019	Belgium	Census, National Registry	2001, 2011	LE, DFLE,	Global	Sex, education	25	No	FAIR
Reus-Pons 2017	Netherlands	Census, national death registries, Permanent Survey on the Living Situation (POLS) and Health Survey	2001, 2011	LE, HLE,	Global	Sex	50	No	UNCLEAR
Storeng 2018	Norway	HUNT Study, Norwegian Education Database	1984/86, 1995/97, 2006/08	LE, HLE, DFLE,	HLE & DFLE: Global	Sex, education	30	No	POOR
Sundburg 2016	Sweden	National mortality statistics, Swedish Panel Study of Living Conditions of the Oldest Old (SWEOLD), Survey of Health, Ageing and Retirement in Europe (SHARE)	1992, 2002, 2004, 2011	LE, DFLE,	Multiple	Sex	77	No	UNCLEAR
Yokota 2019	Belgium	Health Interview Survey, National Statistics	2001, 2004, 2008	LE, DFLE,	Multiple	Sex	15	No	GOOD
Studies with samples from OECD high-income countries in Asia									
Jo 2019	R. Korea	Korean Statistical Information Service, Korea National Health and Nutrition Examination Survey	2005, 2013	LE, HLE,	Multiple	Sex	0	No	UNCLEAR

Sugawara 2016	Japan	Census, Comprehensive Survey of Living Conditions of the People on Health and Welfare	2000, 2010	LE, DFLE, % life without disability	Multiple	None	0	No	UNCLEAR
Tokudome 2016	Japan	Global Burden of Disease Study 2013	1990, 2013	LE, HLE,	Multiple	Sex	0	No	UNCLEAR
Studies with samples from OECD high-income countries in North America									
Cao 2016	US	Human Mortality Database, US National Health Interview Survey (NHIS)	1982, 2010, 2040 (projection)	LE, DFLE,	Global	Sex	55-85	Yes	FAIR
Crimmins 2016	US	Census, US National Vital Statistics, National Health Interview	1970, 1980, 1990, 2000, 2010	LE, DFLE, % life without disability, disability prevalence	Global	Sex	0, 20-64, 65, 85	No	FAIR
Freedman 2016	US	National Long-Term Care Survey, National Health and Aging Trends Study	1982, 2004, 2011	LE, DFLE, prevalence	Multiple	Sex	65, 85	No	UNCLEAR
Steensma 2017	Canada	Statistics Canada, National Population Health Survey, Canadian Community Health Survey	1994, 2010	LE, HLE	Multiple	Sex	0, 20, 65	No	UNCLEAR

[a]Global item measures include self-rated health, the Global Limitation Activity Indicator, or other single item measures about having a limitation; [b]Disability adjusted life years reported as global estimates (i.e. not country specific) and were thus not included here; [c]Disease contributions were not reported for individual countries; [d]healthy life expectancy trends are not reported by deprivation deciles, but as a slope index of inequality between the most and least deprived decile

3.1 Trends in the UK

Tables 4a-4f summarise data on the trends reported in UK studies.

Life expectancy trends

Eight studies estimate life expectancy trends in the UK: at birth,[4,5,7,13,14] 50,[12] and 65 years.[7-9,14] Trends indicate that whilst women were living longer than men, gains in life expectancy over time were greater for men. The most recent estimates (2017) for life expectancy *at birth* in the UK indicate that men can expect to live 79.2 years, an increase of 6.3 years from 72.9 years since 1990.[4] Women's life expectancy also show an increase during this period, but not as much as that of men (4.2 years, from 78.5 years in 1990 to 82.7 years in 2017). Drawing upon the most recent estimates from the Global Burden of Disease study, life expectancy at *age 65* in 2016 was 18.6 (men) and 20.9 years (women). This represents an increase of 4.4 and 3.0 years for men and women respectively, since 1990.[7] These patterns are mirrored in forecasted trends between 2015 and 2035, where gains over time remain greater for men (3.5 years) than women (3 years).[9]

Healthy life expectancy

Trends in healthy life expectancy follow a similar pattern to that of life expectancy. Six studies estimate these trends at birth and age 65. All but one of these studies demonstrate increasing healthy life expectancy for both men and women.[4,5,7,8] However, gains are greater for men. For example, the most recent (i.e. 2017) estimates of healthy life expectancy *at birth* suggest that men can expect to live 68.5 years in good health, and women 70.0 years.[4] This is a gain of 4.4 and 2.7 years for men and women respectively between 1990 and 2017. Estimates of healthy life expectancy *at age 65* in 2017 are 14.0 years for men and 15.7 for women.[7] These are slightly higher than estimates reported for 2011 (12.6 years for men and 14.3 years for women).[8] Trends reported in the 2018 ONS release suggest a slightly different picture in that healthy life expectancy at birth increased for men (by 0.4 years), but reduced for women (by 0.2 years) over the more recent period of 2009/12 to 2015/17.[13]

The congruence in estimates between two studies reporting gains in healthy life expectancy *at age 65* may reflect the similar trend periods examined (1990-2016 and 1991-2011).[4,8] Where studies report healthy life expectancy for each of the four devolved UK nations, trends and estimates were similar across each.[4,5,7] Contrasting trends were observed in one study, which reported healthy life expectancy at age 50.[12] Here, healthy life expectancy increased for men but decreased for women between 2001 and 2011. This anomalous finding may reflect the different age (50) at which life expectancy was estimated, or the slightly shorter trend period examined (ten years).

Typically, gains in healthy life expectancy are smaller than gains for total life expectancy. This indicates that whilst people in the UK are living longer, such gains are not necessarily spent in good health.

The change from 2012/14 to 2015/7 in inequalities in healthy life expectancy between those living in the most and least deprived areas of England and Wales have been reported,[14] with the gap in healthy life expectancy measured by the slope index of inequality[v]. For the

[v] The Slope Index of Inequality (SII) is the difference in life expectancy (or HLE or DFLE) between the most and least deprived areas. It is the gradient of the least squares regression line of the life expectancy (or HLE or DFLE) against the deprivation rank.

population in England, this analysis demonstrates widening inequalities in healthy life expectancy at birth and age 65 for men, but a narrowing gap for women. The narrowing gap between women living in the least and most deprived areas is reportedly due to a fall in healthy life expectancy at birth in the two least deprived deciles (9 and 10). In Wales, a similar pattern is observed: inequalities in healthy life expectancy at birth have widened for men but reduced for women. However, at age 65, inequalities in healthy life expectancy have narrowed for both men *and* women.

At the most recent time point (2015-2017), the slope index of inequality indicates that the gap in healthy life expectancy at birth is around twice that of the gap for life expectancy, in both England and Wales.

Disability-free and independent life expectancy

Two UK studies report trends in disability-free or independent life expectancy *at age 65* between 1991 and 2011,[8,11] with similar estimated gains over time. In both studies, greater gains are observed for men. Independent life expectancy *at age 65* are estimated at 11.2 and 9.7 years for men and women respectively, in 2011. This is a gain of 1.7 (men) and 0.2 years (women) from 1991. During the period, the proportion of life spent independent has reduced, but more for women than men.[8,11]

Two forecasts (2015 - 2025 and 2035) suggest that gains in independent life expectancy *at age 65* will persist.[6,9] By 2035, at age 65, men and women can expect to live 15.2 and 11.6 years independent, [9] a gain of 4.2 (men) and 0.9 (women) years from 2015. The same forecast also suggests that the proportion of life expectancy spent independent will increase for men but decrease for women.[9]

Similar to trends in healthy life expectancy, gains in disability-free life expectancy are smaller than those for total life expectancy, the only exception being for forecasted trends in independent life expectancy for men aged 65, which would exceed gains in life expectancy.[9]

Prevalence of disability and care needs

Trends in the prevalence of disability, dependency, self-reported health and cognitive impairment in the UK are reported in five studies.[6,8-11] Studies based on observed trends between 1991 and 2011 demonstrate an increase in the prevalence of any disability.[8] Over the same period, prevalence of self-perceived poor health and cognitive impairment has fallen.

Forecasts also predict a growth in the prevalence of disability, dependency or multi-morbidity for those aged 65 years and over in the next two decades,[6,9-11] one an increase of 25% in the prevalence of disability by 2025,[6] whilst another an increase of 36% in the prevalence of dependency by 2035.[9] In the three forecasts that predict changes in disability by age group, the largest increase in prevalence is observed for those aged 85 years and over.[6,9,10] The number of care home places required for those with medium and high dependency is also predicted to increase by 89.3% and 84.5% respectively, by 2035.[11] Although these forecasts typically show an increase in disability prevalence across age groups, one predicts a *decrease* in the proportion of those aged 65-74 years with high dependency (2015-2035).[9]

Factors associated with trends

None of the UK studies reported evidence about factors associated with these trends. The three studies reporting evidence from the Global Burden of Disease cohort describe trends by health condition, but not specifically for the UK.

3.2 Summary

In the UK, there has been an increase in life expectancy, including years lived in good health and without disability. However, gains in healthy and disability-free life expectancy do not match those of life expectancy, indicating an expansion of ill-health and disability. This is consistent with the observed growth in disability prevalence, and trends showing that the proportion of life spent *without* disability is reducing. Evidence consistently points to inequalities between men and women in these trends. Women can expect to live longer, but with longer periods of disability. Gains in years lived in good health and without disability for men are greater than those for women. Thus, the growth in healthy and disability-free life expectancy in the UK is not equivalent between men and women, with women at a particular disadvantage. There are also widening inequalities in healthy life expectancy between those living in the most and least deprived areas for some parts of the population.

Table 4a. Summary of life expectancy trends data for UK studies and studies with UK samples (years)[a]

Study author and date	At age	Time points	T1		T2		T3		Change between first and last time point
			Male	Female	Male	Female	Male	Female	
Reus-Pons 2017[12]	50	T1: 2001 T2: 2011	28.54 Immigrant: 27.52 Non-immigrant: 28.66	32.32 Immigrant: 31.82 Non-immigrant: 32.39	31.29 Immigrant: 31.01 Non-immigrant: 31.32	34.5 Immigrant: 34.84 Non-immigrant: 34.47			Men: 2.8[b] Women: 2.2[b]
Jagger 2016[8]	65	T1: 1991 T2: 2011	13·0	16·7	17·5	20·3			Men: 4·5 Women: 3·6
Kingston 2018a[9]	65	T1: 2015 T2: 2025 T3: 2035	18·7 (18·3 to 19·0)	21·1 (20·8 to 21·1)	20·7 (20·5 to 21·0)	22·7 (22·5 to 23·3)	22·2 (21·7 to 22·4)	24·1 (23·9 to 24·4)	Men: 3·5 (3·1 to 4·1) Women: 3·0 (3·0 to 3·6)
GBD 2016[5]	0	T1: 2005 T2: 2015	76·73 (76·70–76·77)	81·14 (81·11–81·18)	79·03 (78·94–79·13)	82·81 (82·71–82·93)			Men: 2.30[b] Women: 1.67[b]
GBD 2017[7]	0	T1: 1990 T2: 2016	72·85 (72·72–72·98)	78·47 (78·35–78·61)	78·92 (78·71–79·13)	82·86 (82·65–83·07)			Men: 6.07[b] Women: 4.39[b]
	65		14·2 (14·2–14·2)	17·9 (17·9–17·9)	18·6 (18·6–18·7	20·9 (20·8–21·0)			Men: 4.4[b] Women: 3.0[b]
GBD 2018[4]	0	T1: 1990 T2: 2017	72·9 (72·9–73·0)	78·5 (78·4–78·5	79·2 (79·0–79·3)	82·7 (82·6–82·8)			Men: 6.3[b] Women: 4.2[b]

ONS 2018[13]	0	T1: 2009/12 T2: 2015/17	**Not reported**	UK Men: 0.8 Women: 0.4
				England Men: 0.8 Women: 0.4
				Northern Ireland Men: 1.0 Women:0.5
				Scotland Men: 0.8 Women: 0.5
				Wales Men: 0.5 Women: 0.2

[a]95% confidence intervals in brackets where reported; [b]Change estimate not reported in publication, and calculated by us (T^2-T^1);

Table 4b. Summary of healthy life expectancy trends data for UK studies and studies with UK samples[a]

Study	Trend	At age	Time points	T1		T2		Change between first and last time point
				Male	Female	Male	Female	
Reus-Pons 2017[12]	HLE (years)	50	T1: 2001 T2: 2011	18.47 (18.46-18.48)	19.82 (19.81-19.83)	18.71 (18.70-18.72)	19.67 (19.66-, 19.68)	Men: 0.25 Women: -0.15
Jagger 2016[8]	HLE (years)	65	T1: 1991 T2: 2011	8·8 (8·6-9·1)	11·2 (11·0 - 11·5)	12·6 (12·4-12·9)	14·3 (14·0 - 14·6)	Men: 3·8 (3·5 to 4·1) Women: 3·1 (2·7 to 3·4)
	Proportion (%) of life spent healthy			68·2% (66·5 - 69·9)	67·3% (65·9 - 68·7)	72·4% (70·9 - 73·9)	70·3% (68·8 - 71·7)	Men: 4·2% (2·0 to 6·5) Women: 3·0% (1·0 to 4·9)
GBD 2016[5]	HLE (years) - UK	0	T1: 2005 T2: 2015	67·86 (65·24–70·12)	70·63 (67·46–73·34)	69·86 (67·26–72·19)	72·09 (68·88–74·81)	Men: 2.00[b] Women: 1.46[b]
	HLE (years) - England			68·20 (65·59–70·47)	70·91 (67·74–73·60)	70·19 (67·61–72·53)	72·37 (69·18–75·11)	Men: 1.99[b] Women: 1.46[b]
	HLE (years) - Northern Ireland			67·11 (64·54–69·40	70·40 (67·34–73·09)	68·98 (66·37–71·31)	71·74 (68·69–74·38)	Men: 1.87[b] Women: 1.34[b]
	HLE (years) - Scotland			65·43 (62·83–67·70)	68·60 (65·44–71·42)	67·83 (65·20–70·28)	70·03 (66·77–72·90)	Men: 2.40[b] Women: 1.43[b]
	HLE (years) - Wales			66·91 (64·19–69·30)	69·95 (66·78–72·73)	68·39 (65·59–70·88)	71·20 (67·94–74·08)	Men: 1.48[b] Women: 1.25[b]
GBD 2017[7]	HLE (years) - UK	0	T1: 1990 T2: 2016	64·24 (61·72–66·47)	67·45 (64·27–70·31)	69·11 (66·28–71·60)	70·97 (67·58–74·07)	Men: 4.87[b] Women: 3.52[b]
	HLE (years) - England			64·43 (61·91–66·67)	67·57 (64·37–70·43)	69·35 (66·49–71·87)	71·12 (67·68–74·16)	Men: 4.92[b] Women: 3.55[b]
	HLE (years) - Northern Ireland			63·72 (61·27–65·96)	67·25 (64·19–70·16)	68·48 (65·52–71·38)	70·89 (67·48–74·17)	Men: 4.76[b] Women: 3.64[b]
	HLE (years) - Scotland			62·73 (60·22–65·05)	66·36 (63·34–69·05)	67·50 (64·51–70·41)	69·85 (66·62–73·15)	Men: 4.77[b] Women: 3.49[b]

	HLE (years) - Wales			64·21 (61·67–66·48)	67·60 (64·53–70·42)	68·50 (65·45–71·32)	70·78 (67·46–73·99)	Men: 4.29[b] Women: 3.18[b]
	HLE (years) - UK	65		10·69 (9·78–11·49)	13·43 (12·25–14·50)	14·00 (12·83–15·05)	15·77 (14·37–17·07)	Men: 3.31[b] Women: 2.34[b]
	HLE (years) - England			10·78 (9·86–11·60)	13·51 (12·31–14·61)	14·11 (12·91–15·18)	15·87 (14·44–17·17)	Men: 3.33[b] Women: 2.36[b]
	HLE (years) - Northern Ireland			10·41 (9·47–11·31)	13·25 (12·04–14·43)	13·68 (12·32–15·06)	15·71 (14·13–17·25)	Men: 3.27[b] Women: 2.46[b]
	HLE (years) - Scotland			10·02 (9·10–10·89)	12·77 (11·63–13·89)	13·24 (11·94–14·55)	15·02 (13·60–16·58)	Men: 3.22[b] Women: 2.25[b]
	HLE (years) - Wales			10·51 (9·55–11·40)	13·40 (12·18–14·59)	13·65 (12·32–14·97)	15·58 (14·14–17·10)	Men: 3.14[b] Women: 2.18[b]
GBD 2018[13]	HLE (years) - UK	0	T1: 1990 T2: 2017	64·1 (61·6–66·3)	67·3 (64·0–70·0)	68·5 (65·5–71·1)	70·0 (66·5–73·1)	Men: 4.4[b] Women: 2.7[b]
	HLE (years) - England			64·4 (61·8–66·5)	67·4 (64·2–70·2)	68·7 (65·6–71·3)	70·1 (66·5–73·2)	Men: 4.3[b] Women: 2.7[b]
	HLE (years) - Northern Ireland			63·1 (60·6–65·2)	66·4 (63·3–69·0)	68·5 (65·5–71·3)	70·3 (67·0–73·5)	Men: 5.4[b] Women: 3.9[b]
	HLE (years) - Scotland			62·5 (60·0–64·6)	65·8 (62·7–68·5)	66·8 (64·0–69·5)	69·3 (66·0–72·2)	Men: 4.3[b] Women: 3.5[b]
	HLE (years) - Wales			64·1 (61·5–66·3)	67·3 (64·1–70·1)	68·1 (65·1–70·7)	70·4 (66·9–73·6)	Men: 4.0[b] Women: 3.1[b]
ONS 2018[13]	HLE (years) - UK	0	T1: 2009/11 T2: 2015/17	62.7	63.8	63.1	63.6	Men: 0.4 [b] Women: -0.2 [b]

[a]95% confidence intervals in brackets where reported; [b]Change estimate not reported in publication, and calculated by us (T^2-T^1);

Table 4c. Summary of disability-free life expectancy trends data for UK studies and studies with UK samples[a]

Study	Trend	At age	Time points	T1		T2		T3		Change between first and last time point
				Male	Female	Male	Female	Male	Female	
Jagger 2016[8]	DFLE (years)	65	T1: 1991 T2: 2011	10.3 (10.2-10.5)	11.0 (10.8-11.2)	12.9 (12.7-13.2)	11.5 (11.3-11.8)			Men: 2.6 (2.3, 2.9) Women: 0.5 (0.2, 0.9)
	% of life disability-free			79.7 (78.3-81.0)	66.1 (64.9-67.4)	74.4 (73.0-75.8)	56.8 (55.5-58.2)			Men: -5.3 (-7.2, -3.4) Women: -9.3 (-11.1, -7.5)
	Cognitive impairment free LE (years)		T1: 1991 T2: 2011	9·4 (9·2 - 9·6)	10·1 (9·8 - 10·4)	13·6 (13·4 - 13·9)	14·5 (14·1 - 14·8)			Men: 4·2 (4·2 to 4·3) Women: 4·4 (4·3 to 4·5)
	% life expectancy free of cognitive impairment			72·4 (70·6 - 74·3)	60·5 (58·6 - 62·3)	78·2 (76·6 - 79·8)	71·2 (69·5 - 72·9)			Men: 5·8 (3·3 to 8·2) Women: 10·7 (8·2 to 13·2)
Kingston 2017[11]	DFLE (years)	65	T1: 1991 T2: 2011	9.5 (9.3-9.7)	9.5 (9.2-9.8)	11.2 (10.8-11.5)	9.7 (9.3-10.2)			Men: 1.7 (1.2, 2.1) Women: 0.2 (-0.4, 0.7)
	% of life disability-free			73.6 (71.8-75.4)	58.0 (56.2-59.9)	63.5 (61.4-65.6)	47.3 (45.0-49.5)			Men: -10.1 (-12.9, -7.3) Women: -10.7 (-13.6, -7.8)
Kingston 2018a[9]	DFLE (years)	65	T1: 2015 T2: 2025 T3: 2035	11.1 (10.9-11.3)	10.7 (10.5-10.7)	14.5 (14.4-14.6)	11.4 (11.3-11.5)	15.2 (15.1-15.2)	11.6 (11.6-11.8)	Men: 4.2 (3.9, 4.2) Women: 0.9 (0.9, 1.2)
	% of life disability-free			59.3 (59.3-60.2)	50.6 (50.1-50.7)	70.2 (69.7-70.4)	49.9 (49.4-50.3)	68.7 (67.9-69.5)	48.0 (48.0-48.6)	Men: 9.4 (8.0, 9.7) Women: -2.6%
Guzman-Castillo 2017[6]	DFLE (years)	65	T1: 2015 T2: 2025	14.9 (14.7-15.1)	15.8 (15.7-15.9)	15.4 (15.3-15.5)	16.5 (15.4-17.6)	16.4 (15.1-17.1)	16.4 (15.5-17.3)	Men: 1.6 (0.5, 2.7) Women: 0.6 (-0.7, 1.9)

[a]95% confidence intervals in brackets where reported;

Table 4d. Summary of disability prevalence trends data for UK studies and studies with UK samples[a,b]

Study	Trend	Time points	Change between first and last time point
Jagger 2016[8]	Odds of any disability at time 2 compared to time 1	T1: 1991 T2: 2011	1.22 (1.14-1.30)
	Odds of moderate-severe disability at time 2 compared to time 1		0.76 (0.70-0.82)
	Odds of fair or poor self-rated health at time 2 compared to time 1		0.83 (0.78–0.88)
	Odds of any cognitive impairment at time 2 compared to time 1		0.53 (0.49–0.56)
	Odds of severe cognitive impairment at time 2 compared to time 1		0.49 (0.43-0.56)
Kingston 2017[11]	% increase in projected number of people with high dependency	T1: 2015 T2: 2025 T3: 2035	61.5
	% increase in projected number of people with medium dependency		66.6
	% increase in projected number of care home places needed for those with high dependency		84.5
	% increase in projected number of care home places needed for those with medium dependency		89.3
Kingston 2018a[9]	Relative change in projected proportion (%) of sample with high dependency (65-74 years)	T1: 2015 T2: 2025 T3: 2035	−15.0 (−20.0 to −13.0)
	Relative change in projected proportion (%) of sample with high dependency (75 - 84 years)		42.0 (36.6- 42.7)
	Relative change in projected proportion (%) of sample with high dependency (85+ years)		91.8 (87.3- 94.1)
	Relative change in projected proportion (%) of sample with high dependency (65+)		36.0 (32.6- 36.0)
Kingston 2018b[10]	Percentage change in projected proportion of those with 2 or more diseases between 2015 and 2035 (65-74)	T1: 2015 T2: 2025 T3: 2035	51.5
	Percentage change in projected proportion of those with 2 or more diseases between 2015 and 2035 (75-84)		85.4
	Percentage change in projected proportion of those with 2 or more diseases between 2015 and 2035 (85+)		181.6
	Percentage change in projected proportion of those with 4 or more diseases between 2015 and 2035 (65-74)		20.9
	Percentage change in projected proportion of those with 4 or more diseases between 2015 and 2035 (75-84)		130.3
	Percentage change in projected proportion of those with 4 or more diseases between 2015 and 2035 (85+)		470.2
Guzman-Castillo 2017[6]	Relative change in projected number of disability cases 2015-2025, 65+	T1: 2015 T2: 2025	25.0 (21.3–28.2)
	Relative change in projected number of disability cases 2015-2025, 65-84		18.9 (16.6–20.9)
	Relative change in projected number of disability cases 2015-2025, 85		43.2 (34.2–52.1)

[a]Estimates for each time point were not extracted here due to volume. Reader is referred to publications and associated supplementary materials; [b]95% confidence intervals in brackets where reported;

Table 4e. Summary of inequalities in life expectancy trends, reported as the slope index of inequality between those living in the most and least deprived decile of area deprivation

Study	Trend	Time points	Change between first and last time point (range)
ONS 2019[14]	Change in SSI in life expectancy at birth, England	T1: 2012/14 T2: 2015/17	Men: 0.3 (0.2) Women: 0.5 (0.5)
	Change in SSI in life expectancy at age 65, England		Men: 0.3 (0.2) Women: 0.5 (0.5)
	Change in SSI in life expectancy at birth, Wales		Men: 0.5 (0.3) Women: 0.6 (0.7)
	Change in SSI in life expectancy at age 65, Wales		Men: 0.3 (0.2) Women: 0.1 (0.3)

Table 4f. Summary of inequalities in healthy life expectancy trends, reported as the slope index of inequality between those living in the most and least deprived decile of area deprivation

Study	Trend	Time points	Change between first and last time point (range)
ONS 2019[14]	Change in SSI in healthy life expectancy at birth, England	T1: 2012/14 T2: 2015/17	Men: 0.2 (0.2) Women: -0.9 (-0.8)
	Change in SSI in healthy life expectancy at age 65, England		Men: 0.4 (0.9) Women: -0.3 (-0.6)
	Change in SSI in healthy life expectancy at birth, Wales		Men: 0.2 (0.9) Women: -1.1 (-0.9)
	Change in SSI in healthy life expectancy at age 65, Wales		Men: -0.6 (0.8) Women: -1.0 (0.2)

3.3 Trends in OECD high-income North American countries

The US and Canada have a long history of estimating healthy and disability-free life expectancy. Comparisons with the US are particularly important given their lower life expectancy than the UK and their considerable socio-economic inequalities. Tables 5a-5d summarise data on the trends reported in studies from the US and Canada.

Life expectancy

Two US studies and one Canadian study report trends in life expectancy, at birth, and at ages 20-64, 65 and 85 years.[17,29,30] Trends show an increase in life expectancy over time, typically with greater gains for men, although a slightly greater gain for women's life expectancy *at age 85* in the US (1.3 compared to 1.1 years for women and men respectively) has been found.[30]

Healthy life expectancy

One study reports increasing trends in healthy life expectancy at birth, 20 and 65 years between 1994 and 2010,[17] a similar pattern to those observed in the UK. Women's healthy life expectancy is higher than men's at each time point, although the average annual increase in healthy life expectancy is greater for men than women at all ages. The largest annual increase in heathy life expectancy is seen at age 65 (1.2% for men and 0.7% for women).

Disability-free life expectancy

Trends in disability-free life expectancy at birth, at ages 20-64, 55-85, 65 and 85, and for those in residential care, are reported in three studies.[29-31] Disability-free life expectancy at birth, and at ages 55-85, 65 and 85, increases for men and women over the study periods, alongside a fall in the proportion of those aged 65 and over with a disability.[30,31] Gains in disability-free life expectancy are also predicted over the next three decades to 2040.[29] However, in contrast to these trends, disability-free life expectancy at age 20-64 *declines* for women in one study.[30] Disability-free life expectancy also declines for those not living in the community.[30] Further, whilst gains in disability-free life expectancy are typically larger for men, one study reports slightly greater gains for women at age 85 (0.8 years compared to 0.5 years for men).[30]

One study also reports trends in the *proportion* of life spent disability-free. [30] At birth and working age, the proportion of life lived free of disability decreases between 1970 and 2010. Conversely, the proportion of life spent disability-free at age 65 and 85 *increases* during this period. Notably, this increase is larger for women at both ages. Even so, at age 85, the proportion of life spent disability-free is still greater for men across time points. In contrast, the proportion of life spent disability-free at age 65 is greater for women over the study period.

Prevalence of disability and care needs

Trends between 1982 and 2011, and 1970 and 2010, demonstrate a decline in the proportion of those aged 65 and over with a disability.[30,31] No studies from North America report trends in the prevalence of dependency or care needs.

Factors associated with trends

The impact of smoking and obesity rates between 1970 and 2010 on disability-free life expectancy have been examined.[29] A fall in smoking rates (this decline occurring earlier for men than women) are thought to underlie the greater gains in disability-free life expectancy

for men. The smaller gains in disability-free life expectancy for women are attributed to an increase in obesity prevalence.

3.4 Trends in OECD high-income European countries

Tables 6a-6d summarise data on the trends reported in European studies; these include countries that have previously experienced a stalling of life expectancy (the Netherlands) as well as countries whose life expectancy exceeds that of the UK (France, Sweden).

Life expectancy

Ten European studies report trends in life expectancy, at birth, age 15, 25, 30, 50, 65, 70, 75, 77, 80, 85 and 90 years. Life expectancy increased over time, with greater gains for men.

Healthy life expectancy

Trends in healthy life expectancy at age 25, 30, 50, 65, 70, 75, 80, 85 and 90 are reported in five studies.[12,22-24,28] No studies report healthy life expectancy at birth. Typically, these studies show an increase in healthy life expectancy, with greater gains for men, although a decrease in physical healthy life expectancy at age 65 over a 23-year period (1993 to 2016) is reported in the Netherlands.[22] In the same study, the proportion of life in good health also declined, with a greater decline for women. Conversely, healthy cognitive life expectancy at age 65 increased over the study period with similar gains for men (4.7 years) and women (4.6 years), as well as an increase in the proportion of life spent in good cognitive health by 15.5% (women) and 8.9% (men).

Where studies report this expectancy by level of educational attainment,[23,24] there is mixed evidence regarding which group observed the greatest gains over time. In one study from the Netherlands, greater gains in quality-adjusted life expectancy are observed for men with medium levels of educational attainment at age 25, and for men with high levels of educational attainment age 65.[23] In another study (Norway), gains in healthy life expectancy over time are greatest for those with secondary education.[24] However, both studies indicate the educational gap in this trend has increased over time.

Disability-free life expectancy

Seven studies report trends in disability-free life expectancy at age 15, 25, 30, 65, and 77.[15,16,18,19,24,26,27] Evidence indicates a mixed picture about the nature of these trends. For example, in four studies, disability-free life expectancy increases over time for both men and women, and in one study that did not stratify by sex.[18,19,24,26,27] In all but one study gains are greater for men, the exception showing greater gains were observed for women.[27] In Belgium disability-free life expectancy at age 15 increases between 2001 and 2008 only for men (by 0.7 years), but decreases for women (0.7 years).[16] Similarly, in another study, disability-free life expectancy at age 25 in Belgium increases only for men (all levels of education), and for women with high levels of education.[15] A fall in disability-free life expectancy at age 30 (in Norway) is observed for men and women with primary or tertiary education.[24] Evidence is also mixed about changes in the educational gap in this trend. That is, the educational gap in disability-free life expectancy has narrowed in one study (Denmark)[18] but widened in studies from Belgium[15] and Norway.[24]

Prevalence of disability and care needs

The proportion of those reporting limitations with activities of daily living and mobility problems has declined in one study (Sweden), between 1980/86 and 2006/11.[26]

Factors associated with trends
No studies reported factors associated with trends.

3.5 Trends in OECD high-income Asian countries

Tables 7a-7c summarise data on the trends reported in studies from Japan and Korea. Trends in Japan are particularly important as this country currently has the highest life expectancy at birth for women.

Life expectancy
Similar to UK trends, a longer life expectancy at birth is observed for women across time, but gains are greater for men in two out of three studies.[21,25,27]

Healthy life expectancy
Quality adjusted life expectancy at birth in Korea increases over time, and gains are greater for men. [25] Increases in healthy life expectancy at birth are slightly larger for women in one study from Japan.[21]

Disability-free life expectancy
Disability-free life expectancy, and the proportion of life spent without disability, is reported in just one study (Japan).[20] Trends show that between 2001 and 2011, disability-free life expectancy *at birth* increased by one year and 0.4 years for men and women respectively. Even though women have a longer disability-free life expectancy than men across this period, they also spend a smaller portion of their life free of disability. The proportion of life spent disability-free has reduced over time, but more for women.

Prevalence of disability and care needs
No studies reporting prevalence of disability and care needs were identified.

Factors associated with trends
No studies were identified that reported evidence about factors associated with these trends.

3.6 Summary

In OECD high-income countries, trends typically indicate that healthy life expectancy is increasing. The picture is more complex for disability-free life expectancy, where evidence is less consistent across European studies. Further, although gains in these health expectancies are typically greater for men, there are exceptions. Where studies report trends by level of educational attainment, there is no consistent pattern in educational inequalities. Differences between studies (e.g. trend periods, measures of educational attainment, health and disability) may account for this mixed picture in educational inequalities. However, the overall quantity of evidence is too small to ascertain this.

3.7 Comparison of trends between the UK and other OECD high-income countries

This section compares trends in UK and non-UK studies. It specifically considers how the gains in healthy life expectancy and disability-free life expectancy relate to gains in life expectancy, i.e. whether these indicate an expansion or compression of morbidity/disability, as well as the overall direction of trends, and observed inequalities in healthy life expectancy and disability-free life expectancy.

Expansion or compression of disability?

Table 8 and Figures 2a-j summarise the change in each life expectancy, healthy life expectancy and disability-free life expectancy across trend periods for each study[vi]. In UK samples, there is evidence from observed (i.e. not forecasted) trends that gains in healthy and disability-free life expectancy are smaller than gains in life expectancy, with a reduced proportion of life spent without disability. Where it was possible to compare health expectancies, similar patterns are demonstrated in studies from: France,[19] Switzerland (men only),[28] Norway,[24] Sweden (men only),[27] Belgium,[16] Japan,[20,21] and the US.[30] By contrast, greater gains in disability-free or healthy life expectancy compared to life expectancy are observed in two studies; one study from the Republic of Korea[25] and one from Sweden (women only).[27] Gains in life expectancy and healthy life expectancy are also similar for women in a study from Switzerland.[28] Two studies from the Netherlands offer contrasting findings in this respect.[12,23] Overall findings suggest a compression of disability in the Republic of Korea, for women in Sweden, and potentially women in Switzerland.

Direction of trends in expectancies

The *direction* of healthy life expectancy trends is largely similar between UK and non-UK studies. That is, healthy life expectancy typically increased over study periods, although in the Netherlands physical healthy life expectancy declined over the twenty-three year study period.[22] Similarly, one UK study reports an increase in the *proportion* of life spent in good health,[8] the Netherlands saw a decline in this trend.[22]

The direction of disability-free life expectancy trends is less consistent between the UK and other high-income countries. In the UK, trends indicate a rise in disability-free life expectancy. Whilst this is reflected in the majority of studies from other high-income countries, there is also evidence that suggests a different picture for some groups. For example, declines in disability-free life expectancy are observed for women aged 20-64 in the US,[30] those with primary and tertiary education in Norway,[24] and women with lower levels of education in Belgium.[15,16] Trends in the *proportion* of life spent disability-free also differ between UK studies and some non-UK studies. For example, the proportion of life spent free of disability at age 65 and 85 increased over four decades in a US study,[30] contrasting with the UK trends where the proportion of life spent disability-free at age 65 fell over a ten year period in two studies.[8,11]

Finally, trends in the prevalence of disability and care needs differ between UK studies and three non-UK studies. In the UK, studies report an increase in disability prevalence. However, declines in this outcome were demonstrated in two US studies[30,31] and one Swedish study.[26]

Inequalities in expectancies

Inequalities between men and women are observed for trends in both healthy, and disability-free, life expectancy, across UK and non-UK studies (see figures 3a-c). Typically, gains over time were greater for men, a finding consistent across UK studies and largely mirrored in non-UK studies. However, there are exceptions: gains were slightly greater for women at age 85 in one US study,[30] women at birth in a study from Japan,[21] and for women at age 77

[vi] Figures 2a-j do not include studies where: the metric of change was not comparable for each health expectancy (Steensma et al. 2017); health expectancies are reported by area deprivation or education level only (ONS 2019, Bronnum-Hansen et al., 2017,Gheorghe et al., 2016); only forecasts are reported (Kingston et al., 2018,a,b, Guzman-Castillo et al., 2017, Cao et al., 2016); or where total life expectancy is not reported (Kingston et al., 2017, Lagergren et al., 2017).

in a Swedish study.[27] Socioeconomic inequalities in trends are reported in UK and non-UK studies. However, comparison is limited since inequality is measured using area deprivation in the UK (an ecological measure), and educational attainment in non-UK studies (an individual measure).

A note on comparability of studies

Although we have been able to make some broad comparisons between UK and non-UK studies, a more detailed comparison is not possible. This is due to the high degree of heterogeneity between studies in: the age at which the health expectancy is estimated, trend periods (years and time frame), the measures used, and the stratification factors used. There is greater variation observed in studies from Europe and North America that not only prevents a more meaningful comparison of health expectancy trends, but also limits the extent to which we can explain differences in these trends between studies.

4. Conclusion

This review summarises evidence about trends in healthy and disability-free life expectancy, and disability prevalence. In the UK, increases in healthy and disability-free life expectancy are observed alongside increasing prevalence of disability and care needs. These gains in healthy and disability-free life do not match the gains in life expectancy, indicating an expansion of morbidity and disability. Women can also expect to live longer than men, but men will live a larger portion of their life in good health or without disability. Similar trends in healthy life expectancy are observed in the majority of other OECD high-income countries. However, a more nuanced picture emerges with respect to disability-free life expectancy, particularly in European studies. There is also some evidence suggesting a compression of disability in the Republic of Korea and for women in Sweden. Differences in how health expectancy was investigated (e.g. trend periods, stratification), limits a detailed comparison of trends between studies.

Table 5a. Summary of life expectancy trends data for studies from the US and Canada (years)[a]

Study	At age	Time points	T1		T2		T3		T4		T5		T6		T7		Change between first and last time point
			M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Cao 2016[29]	55-85	T1: 1982 T2: 1990 T3: 2000 T4: 2010 T5: 2020 T6: 2030 T7: 2040	19.96	23.40	20.70	23.64	21.75	23.92	22.82	24.69	23.83 (23.5 - 24.05)	25.11 (24.9 - 25.24)	24.63 (24.2 - 24.98)	25.49 (25.2 - 25.69)	25.24 (24.7 - 25.67)	25.74 (25.4 - 26.00)	Men: 5.28[b] Women: 2.34[b]
Crimmins 2016[30]	0	T1: 1970 T2: 1980 T3: 1990 T4: 2000 T5: 2010	67.0	74.6	70.1	77.6	71.8	78.8	74.1	79.5	76.2	81.0					Men: 9.2 Women: 6.4
	20-64		40.8	42.8	41.6	43.3	41.8	43.5	42.4	43.6	42.6	43.7					Men: 1.8 Women: 0.9
	65		13.0	16.8	14.2	18.4	15.1	19.0	16.1	19.1	17.7	20.3					Men: 4.7 Women: 3.5
	85		4.7	5.6	5.1	6.4	5.3	6.7	5.5	6.6	5.8	6.9					Men: 1.1 Women: 1.3
Steensma 2017[17]	0	T1: 1994/95 T2: 96/97 T3: 98/99 T4: 00/01 T5: 03 T6: 05 T7: 09/10	75.2	81.3	75.7	81.5	76.2	81.8	77.2	82.5	77.7	82.8	78.3	83.2	79.6	84.1	Men: 4.4[b] Women: 2.8[b]
	20		55.7	61.7	56.2	61.8	56.7	62.1	57.7	62.8	58.1	63.0	58.7	63.4	59.9	64.4	Men: 4.2[b] Women: 2.7[b]
	65		15.8	19.9	15.9	19.9	16.2	20.2	17.0	20.7	17.4	20.9	19.9	21.3	18.9	22.1	Men: 3.1[b] Women: 2.2[b]

[a]95% confidence intervals in brackets where reported; [b]Change estimate not reported, and thus calculated by us (T^2-T^1)

Table 5b. Summary of healthy life expectancy trends data for studies from the US and Canada (years)[a]

Study	At age	Time points	T1		T2		T3		T4		T5		T6		T7		Average annual change (%)
			M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Steensma 2017[17]	0	T1: 1994/95 T2: 96/97 T3: 98/99 T4: 00/01 T5: 03 T6: 05 T7: 09/10	66.4 (66.0 -66.8)	70.0 (69.5 -70.4)	69.0 (68.7 -69.2)	72.9 (72.5 -73.2)	68.9 (68.6 -69.3)	72.1 (71.7 -72.5)	68.5 (68.3 -68.7)	71.5 (71.3 -71.7)	69.5 (69.1 -69.8)	71.7 (71.3 -72.1)	69.3 (69.0 -69.7)	72.3 (71.9 -72.6)	70.7 (70.5 - 70.9)	73.3 (73.1 - 73.5)	Men: 0.3 Women: 0.2
	20		48.0 (47.6 -48.3)	51.4 (51.0 -51.9)	50.1 (49.8 -50.3)	54.0 (53.7 -54.3)	50.1 (49.7 -50.4)	53.1 (52.7 -53.5)	49.8 (49.6 -50.0)	52.7 (52.5 -52.9)	50.9 (50.5 -51.2)	53.1 (52.7 -53.5)	50.8 (50.4 -51.2)	55.3 (53.1 -53.9)	50.2 (51.8 -52.2)	54.5 (54.3 - 54.8)	Men: 0.4 Women: 0.2
	65		12.3 (12.0 -12.6)	14.8 (14.4 -15.1)	12.8 (12.6 -13.1)	15.6 (15.3 -15.9)	12.8 (12.5 -13.1)	15.3 (15.0 -15.7)	13.1 (13.0 -13.3)	15.4 (15.2 -15.6)	14.0 (13.7 -14.3)	15.7 (15.4 -16.1)	14.2 (13.9 -14.5)	16.0 (15.6 -16.3)	14.9 (14.7 -15.1)	16.8 (16.7 - 17.0)	Men: 1.2 Women: 0.7

[a]95% confidence intervals in brackets where reported;

Table 5c. Summary of disability-free life expectancy trends data for studies from the US and Canada[a]

Study	Trend	At age	Time points	T1		T2		T3		T4		T5		Change between first and last time point
				Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
Crimmins (2016)[30]	DFLE (years)	0	T1: 1970 T2: 1980 T3: 1990 T4: 2000 T5: 2010	56.5 (56.4 - 56.6)	62.7 (62.6 - 62.8)	56.5 (56.4 - 56.6)	62.8 (62.6 - 63.0)	58.8 (58.6 - 58.9)	63.9 (63.8 - 64.0)	60.0 (59.9 - 60.2)	64.6 (64.4 - 64.7)	61.0 (60.9 - 61.2)	65.4 (65.3 - 65.6)	Men: 4.5 Women: 2.7
		20-64		34.9 (34.8 - 35.0)	37.4 (37.3 - 37.5)	34.7 (34.6 - 34.8)	36.7 (36.6 - 36.8)	35.3 (35.2 - 35.4)	37.0 (36.9 - 37.1)	35.6 (35.5 - 35.7)	36.9 (36.8 - 37.0)	35.8 (35.7 - 35.9)	36.8 (36.7 - 37.0)	Men: 0.9 Women: -0.6
		65		6.6 (6.6 - 6.8)	9.1 (9.0 - 9.2)	6.8 (6.7 - 6.9)	9.3 (9.2 - 9.4)	7.4 (7.3 - 7.5)	9.9 (9.8 - 10.0)	8.2 (8.0 - 8.3)	10.5 (10.3 - 10.6)	9.3 (9.1 - 9.4)	11.5 (11.4 - 11.6)	Men: 2.7 Women: 2.4
		85		1.4 (1.3 - 1.6)	1.4 (1.3 - 1.6)	1.5 (1.3 - 1.7)	1.7 (1.5 - 1.8)	1.6 (1.5 - 1.8)	1.7 (1.6 - 1.8)	1.8 (1.6 - 1.9)	1.9 (1.8 - 2.0)	1.9 (1.8 - 2.1)	2.2 (2.1 - 2.4)	Men: 0.5 Women: 0.8
	% of life spent disability-free	0		84.2	84.0	81.6	80.9	81.8	81.1	81.0	81.3	80.1	80.7	Men: -4.1 Women: -3.3
		20-64		85.5	87.4	83.4	84.8	84.4	85.0	84.0	84.6	84.0	84.2	Men: -1.5 Women: -3.2
		65		51.2	54.2	47.8	50.5	49.1	52	50.9	55	52.5	56.7	Men: 1.3 Women: 2.5
		85		30.4	25.2	29	26	30.8	25.5	32.7	28.8	32.8	31.9	Men: 2.4 Women: 6.7
	LE for those in an institution	0		0.6 (0.6 - 0.6)	1.1 (1.0 - 1.2)	0.6 (0.6 - 0.7)	1.4 (1.3 - 1.5)	0.7 (0.6 - 0.7)	1.5 (1.4 - 1.5)	0.5 (0.5 - 0.6)	1.1 (1.0 - 1.2)	0.4 (0.4 - 0.5)	0.8 (0.8 - 0.9)	Men: -0.2 Women: -0.3
		20-64		0.3 (0.2 - 0.3)	0.2 (0.2 - 0.2)	0.2 (0.2 - 0.2)	0.2 (0.1 - 0.2)	0.2 (0.2 - 0.2)	0.1 (0.1 - 0.1)	0.1 (0.1 - 0.1)	0.1 (0.1 - 0.1)	0.1 (0.1 - 0.1)	0.1 (0.0 - 0.1)	Men: -0.2 Women: -0.1
		65		0.5 (0.5 - 0.5)	1.1 (1.0 - 1.2)	0.6 (0.5 - 0.6)	1.5 (1.4 - 1.6)	0.7 (0.6 - 0.7)	1.6 (1.5 - 1.6)	0.5 (0.5 - 0.6)	1.2 (1.1 - 1.3)	0.4 (0.4 - 0.5)	0.9 (0.8 - 0.9)	Men: -0.1 Women: -0.2

		85		0.6 (0.5 - 0.7)	1.2 (1.1 - 1.3)	0.8 (0.7 - 1.0)	1.7 (1.5 - 1.8)	0.9 (0.8 - 1.0)	1.9 (1.8 - 2.0)	0.7 (0.6 - 0.8)	1.4 (1.3, 1.5 -	0.4 (0.4 - 0.5)	0.9 (0.8 - 1.0)	Men: -0.2 Women: -0.3
Cao 2016[29]	DFLE (years)	55-85	T1: 1982 T2: 1990 T3: 2020 T4: 2030 T5: 2040	12.98	14.9	16.92	17.53	17.86 (17.70 - 18.03)	18.00 (17.89 - 18.13)	18.99 (18.68 - 19.36	18.67 (18.41 - 18.97)	20.10 (19.60 - 20.64)	19.30 (18.88 - 19.77)	Men: 7.12[b] Women: 4.4[b]
Freedman (2016)[31]	DFLE (years)	65	T1: 1982 T2: 2004 T3: 2011	**data only reported in graphs, unable to extract**										Men: 4.5 Women: 1.4
		85		2.5	2.5	4.4	2.6							Men: 1.9 Women: 0.1[b]

[a]95% confidence intervals in brackets where reported; [b]Change estimate not reported, and thus calculated by us (T^2-T^1)

Table 5d. Summary of disability prevalence trends data for studies from the US and Canada[a]

Study	Trend	Time points	Change between first and last time point
Crimmins (2016)[30]	Proportion (%) of individuals with disability in the community (age 65-84)	T1: 1970 T2: 1980 T3: 1990 T4: 2000 T5: 2010	Men: -2.5 Women: -2.2
	Proportion (%) of individuals with disability in the community (age 85+)		Men: -0.5 Women: -5.8
Freedman (2016)[31]	Proportion of those with a severe limitation (limited in 3+ personal care activities or living in a nursing home)	T1: 1982 T2: 2004 T3: 2011	Men: -3.4[b] Women: -3.0[b]

[a]Estimates for each time point were not extracted here due to volume. Reader is referred to publications and associated supplementary materials; [b]Change estimate not reported, and thus calculated by us (T^2-T^1)

Table 6a. Summary of life expectancy trends data for studies from Europe (years)[a]

Study	At age	Time points	T1		T2		T3		T4		T5		T6		T7		T8		Change between first and last time point
			M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Bronnum-Hansen 2017[18]	65	T1: 2006-2007 T2: 2010-2011 T3: 2013-2014	High: 17.9 Med: 16.3 Low: 15.6	High: 20.4 Med: 19.4 Low: 18.5	Med: 16.8 Low: 16.2	High: 21.0 Med: 20.0 Low: 18.9	High: 19.3 Med: 17.5 Low: 16.9	High: 21.7 Med: 20.6 Low: 19.5											Difference in change in LE between high and low education over time: Men: 0.1 Women: 0.3
Deeg 2018[22]	65	T1: 1993 T2: 1996 T3: 1999 T4: 2002 T5: 2006 T6: 2009 T7: 2012 T8: 2016	14.7	19.2	15.1	19.4	15.5	19.5	16	19.7	17.1	20.5	17.8	21.1	18.2	21.2	18.7	21.4	Men: 4.0 Women: 2.2
Gheorghe 2016[b23]	25	T1: 2001 T2: 2011	High: 53.83 Med: 50.70 Low: 47.85	High: 58.75 Med: 56.82 Low: 53.57	High: 56.71 Med: 53.92 Low: 50.28	High: 60.53 Med: 58.35 Low: 54.72													Men: High: 2.88 Med: 3.22 Low: 2.43 Women: High: 1.78 Med: 1.53 Low: 1.15
	65		High: 16.81 Med: 15.29 Low: 14.08	High: 21.00 Med: 20.08 Low: 18.26	High: 19.29 Med: 17.53 Low: 15.76	High: 22.64 Med: 21.49 Low: 19.38													Men: High: 2.48 Med: 2.24 Low: 1.68 Women: High: 1.64 Med: 1.41 Low: 1.12
Grasset 2019[c19]	70	T1: 1990 T2: 2000	15.6 (14.8–16.2)		18.6 (17.9–19.2)														3.0[d]
	75		12.3 (11.7–12.8)		14.7 (14.0–15.2)														2.4[d]
	80		9.4 (8.9–9.9)		11.2 (10.6–11.6)														1.8[d]
	85		7.1 (6.5–7.6)		8.4 (7.8–9.0)														1.3[d]
	90		5.2 (4.6–5.8)		6.0 (5.5–6.4)														0.8[d]
Remund 2019[28]	30	T1: 1990/94 T2: 1995/99 T3: 2000/04 T4: 2005/09	**data only reported in graphs, unable to extract**																Men: 5.02 Women: 3.09

		T5: 2010/14																	
Renard 2019[b15]	25	T1: 2001 T2: 2011	High: 55.82 Med: 53.18 Low: 50.63	High: 60.90 Med: 59.14 Low: 57.14	High: 57.81 Med: 54.73 Low: 51.74	High: 61.90 Med: 60.09 Low: 57.32													Men: Low: 1.11 Med: 1.55 High: 1.99 WOMEN: Low: 0.18 Med: 0.95 High: 1.00
Reus-Pons 2017[12]	50	T1: 2001 T2: 2011	28.05	32.47	30.87	34.31													Men: 2.82 [d] Women: 1.84 [d]
Storeng 2018[24]	30	T1: 1984/86 T2: 1995/97 T3: 2006/08	45.1 (44.6–45.5)	50.4 (49.9–50.8)	48.3 (47.8–48.7)	52.9 (52.5–53.4)	52.1 (51.5–52.6)	57.1 (56.6–57.6)											Men: 6.99 (5.27–8.72) Women: 6.75 (5.16–8.34)
			Primary: 47.0 (46.5–47.5) Secondary: 47.9 (47.4–48.5) Tertiary: 51.2 (49.6–52.7)		Primary: 49.7 (49.1–50.2) Secondary: 50.9 (50.4–51.4) Tertiary: 52.0 (50.9–53.1)		Primary: 52.2 (51.0–53.4) Secondary: 54.9 (54.3–55.4) Tertiary: 55.2 (53.1–57.4)											Primary: 5.19 (3.52–6.85) Secondary: 6.95 (5.87–8.02) Tertiary: 3.23 (–0.04–6.51)
Sundburg 2016[27]	77	SWEOLD T1: 1992 T2: 2002 T3: 2004 T4: 2011	8.2	10.7	8.9	10.8	9.3	11.4	9.9	11.8									Men: 1.7 [d] Women: 1.1 [d]
		SHARE: T1: 2004 T2: 2011	9.3	11.4	9.9	11.8													Men: 0.6 [d] Women: 0.4 [d]
Yokota 2016[16]	15	T1: 2001 T2: 2004 T3: 2008	60.5	66.4	61.4	67	62.1	67.4											Men: 1.6 [d] Women: 1.0[d]

[a]95% confidence intervals in brackets where reported; [b] Trends reported by high, medium and low education; [c]Trends not reported by sex; [d]Change estimate not reported, and thus calculated by us (T^2-T^1)

Table 6b. Summary of healthy life expectancy trends data for studies from Europe[a]

Study	Trend	At age	Time points	T1		T2		T3		T4		T5		T6		T7		T8		Change between first and last time point
				M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Deeg 2018[22]	% life in good physical health	65	T1: 1993 T2: 1996 T3: 1999 T4: 2002 T5: 2006 T6: 2009 T7: 2012 T8: 2016	46.6	28.7	37.6	26.0	33.6	24.5	32.4	22.7	32.7	21.2	30.5	20.2	22.8	14.9	25.0	18.9	Men: -21.6 Women: -9.8
	% life in good cognitive health			74.8	69.9	78.0	73.7	81.5	76.1	83.8	78.2	81.5	78.9	82.8	82.4	85.5	84.4	83.7	84.4	Men: 8.9 Women: 15.5
	HLE: Physical (years)			6.9	5.5													4.7	4.0	Men: -2.2[c] Women: -1.5[c]
	HLE: Cognitive (years)			11.0	13.4													15.7	18.0	Men: 4.7[c] Women: 4.6[c]
Gheorghe 2016[b23]	Quality Adjusted Life Expectancy	25	T1: 2001 T2: 2011	High: 44.08 Med: 40.82 Low: 36.71	High: 45.79 Med: 44.2 Low: 39.51	High:46.93 Med: 43.83 Low: 38.84	High: 48.43 Med: 45.77 Low: 41.31													MEN: High 2.85 Med: 3.01 Low: 2.13 WOMEN: High: 2.64 Med: 1.57 Low: 1.80
		65		High: 13.42 Med: 12.06 Low: 10.73	High: 15.66 Med: 15.12 Low: 13.09	High: 15.59 Med: 13.97 Low: 12.10	High: 17.40 Med: 16.33 Low: 14.23													MEN: High: 2.17 Med: 1.91 Low: 1.37 WOMEN: High: 1.74 Med: 1.21 Low: 1.14
Remund 2019[28]	HLE (years)	30	T1: 1990/94 T2: 1995/99 T3: 2000/04 T4: 2005/09 T5: 2010/14	**data only reported in graphs, unable to extract**																Men: 4.52 Women: 3.09
	HLE (years), educational gap between			7.6	3.3	**not reported**						8.8	5.0							Change in educational gap (between primary and tertiary):

	primary and tertiary attainment																		Men: 1.2[c] Women: 1.7[c]
Reus-Pons 2017[12]	HLE (years)	50	T1: 2001 T2: 2011	18.62 (18.40 - 18.84)	19.43 (19.19 - 19.68)	20.83 (20.55 - 21.10)	20.68 (20.37 - 20.99)												Men: 2.21 Women: 1.25
Storeng 2018[d24]	HLE (years)	30	T1: 1984/86 T2: 1995/97 T3: 2006/08	31.6 (31.2–31.9)	32.6 (32.3–33.0)	34.1 (33.7–34.5)	33.9 (33.6–34.3)	38.5 (38.0–39.0)	38.0 (37.5–38.5)										Men: 6.90 (6.08–7.73) Women: 5.40 (4.56–6.25)
				Primary:29.5 (29.2–29.9) Secondary:34.0 (33.6–34.5) Tertiary: 40.1 (38.8–41.4)		Primary:29.8 (29.4–30.3) Secondary: 35.7 (35.3–36.2) Tertiary: 40.3 (39.3–41.3)		Primary: 31.5 (30.6–32.4) Secondary:38.8 (38.3–39.4) Tertiary: 42.8 (41.9–43.8)											Primary: 1.94 (0.68–3.20) Secondary: 4.80 (3.85–5.75) Tertiary: 2.76 (0.49–5.02) Change in gap between primary and tertiary education: 0.7[c]

[a]95% confidence intervals in brackets where reported; [b]Trends reported by high, medium and low education; [c]Change estimate not reported, and thus calculated by us (T^2-T^1); [d]Trends reported by primary, secondary and tertiary education;

Table 6c. Summary of disability-free life expectancy trends data for studies from Europe (years)[a]

Study	Trend	At age	Time points	T1		T2		T3		T4		Change between first and last time point
				Male	Female	Male	Female	Male	Female	Male	Female	
Bronnum-Hansen 2017[b18]	DFLE	65	T1: 2006-2007 T2: 2010-2011 T3: 2013-2014	High: 10.6 (9.2–12.1) Med: 9.4 (8.3–10.5) Low: 7.4 (5.9–8.9)	High: 12.5 (10.5–14.5) Med: 9.5 (8.1–10.9) Low: 8.8 (7.7–9.9)	High: 10.6 (9.2–12.0) Med: 9.3 (8.2–10.4) Low: 7.0 (5.3–8.8)	High: 13.2 (10.9–15.6) Med: 10.4 (8.9–11.8) Low: 7.9 (6.6–9.3)	High: 10.9 (9.9–12.0) Med: 9.6 (8.8–10.5) Low: 8.0 (6.7–9.3)	High: 12.9 (11.2–14.6) Med: 10.2 (9.0–11.4) Low: 9.5 (8.5–10.5)			Difference in change in DFLE between those with the lowest and highest education Men: -0.3 Women: -0.3
Grasset 2019[c19]	Dementia Free LE	70	T1: 1990 T2: 2000	13.6 (12.9–14.0)		16.3 (15.6–16.7)						2.7[d]
		75		10.2 (9.7–10.6)		12.4 (11.8–12.7)						2.2[d]
		80		7.4 (6.9–7.9)		8.9 (8.5–9.3)						1.5[d]
		85		5.3 (4.8–5.8)		6.4 (6.0–6.9)						1.1[d]
		90		3.8 (3.4–4.3)		4.5 (4.1–5.0)						0.7[d]
Lagergren 2017[26]	Added years of life without ADL limitations	65+	T1: 1980/85 T2: 1994/99 T3: 2006/11	**data not reported**								Men: 4.0 Women: 3.14
	Added years of life without mobility limitations			**data not reported**								Men: 4.21 Women: 3.69
Renard 2019[15]	DFLE	25	T1: 2001 T2: 2011	Low: 36.34 Med: 41.40 High: 42.85	Low: 39.32 Med: 43.37 High: 48.62	Low:37.02 Med: 42.05 High: 47.49	Low:35.54 Med:42.98 High: 48.98					Difference in change in DFLE between levels of education (ref high education)

												change over time Men: Low: 3.96 Med: 3.99 Women: Low: 4.14 Med: 0.76
Storeng 2018[e24]	DFLE	30	T1: 1984/86 T2: 1995/97 T3: 2006/08	25.9 (25.6–26.2)	28.8 (28.6–29.1)	28.5 (28.1–28.8)	29.4 (29.0–29.7)	28.6 (28.2–29.0)	29.2 (28.8–29.6)			Men: 2.71 (2.01–3.42) Women: 0.33 (–0.40–1.06)
				Primary: 25.0 (24.7–25.3) Secondary: 28.8 (28.5–29.2) Tertiary: 33.6 (32.5–34.7)		Primary: 25.3 (24.9–25.7) Secondary: 30.1 (29.7–30.5) Tertiary: 33.0 (32.3–33.8)		Primary: 22.5 (21.7–23.2) Secondary: 29.1 (28.6–29.5) Tertiary: 33.2 (32.4–34.1)				Primary: –2.53 (–3.61–1.45) Secondary: 0.23 (–0.57–1.03) Tertiary: –0.32 (–2.23–1.60)
Sundburg 2016[27]	DFLE	77	SWEOLD T1: 1992 T2: 2002 T3: 2004 T4: 2011	6.7 (6.3–7.1)	6.9 (6.4–7.4)	6.9 (6.4–7.3	7.0 (6.5–7.5)	7.4 (7.0–7.9)	7.9 (7.4–8.4)	7.8 (7.2–8.3)	8.5 (8.0–9.0	Men: 1.1 Women: 1.6
			SHARE: T1: 2004 T2: 2011	7.5 (7.0–8.0	7.9 (7.3–8.6	7.6 (7.0–8.1)	9.2 (8.5–9.8)					Men: 0.1 Women: 1.3
Yokota 2019[16]	DFLE	15	T1: 2001 T2: 2004 T3: 2008	54.1	56.0	54.9	56.2	54.8	55.3			Men: 0.7 Women: -0.7

[a]95% confidence intervals in brackets where reported; [b]Stratified by high, medium and low education; [c]Not stratified by sex; [d]Change estimate not reported, and thus calculated by us (T^2-T^1) [e]Second row stratified by primary, secondary and tertiary education for men and women combined

Table 6d. Summary of disability prevalence trends data for studies from Europe

Study	Trend	Time points	Change between first and last time point[a]
Lagergren 2017[26]	Proportion reporting dependency in activities of daily living, 65-69	T1:1980/85 T2: 1994/95 T3: 2006/11	Men:-1.5 Women:-3.7
	Proportion reporting dependency in activities of daily living, 70-74		Men:-5.6 Women:-3.5
	Proportion reporting dependency in activities of daily living, 75-79		Men:-10.7 Women:-7.1
	Proportion reporting dependency in activities of daily living, 80-84		Men: -11.5 Women: -14.0
	Proportion reporting dependency in activities of daily living, 85+		Men:-20.3 Women: -10.5
	Proportion reporting mobility limitations, 65-69		Men:-6.5 Women: -8.3
	Proportion reporting mobility limitations, 70-74		Men: -10.9 Women: -8.5
	Proportion reporting mobility limitations, 75-79		Men: -15.7 Women: -14.8
	Proportion reporting mobility limitations, 80-84		Men: -15.1 Women: -19.4
	Proportion reporting mobility limitations, 85+		Men: -16.1 Women: -17.5

[a]Change estimate not reported, and thus calculated by us (T^2-T^1)

Table 7a. Summary of life expectancy trends data for studies from Japan and Korea (years)[a]

Study	At age	Time points	T1		T2		T3		T4		T5		T6		T7		T8		Change between first and last time point
			M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Jo 2019[25]	0	T1: 2005 T2: 2007 T3: 2008 T4: 2009 T5: 2010 T6: 2011 T7: 2012	75.13	81.87	76.13	82.71	76.54	83.27	76.99	83.74	77.19	84.04	77.64	84.42	77.94	84.61	78.51	85.02	Men: 3.38[b] Women: 3.15[b]
Sugawara 2016[20]	0	T1: 2000 T2: 2010	77.6	84.7	79.5	86.4													Men: 1.9 Women:1.7
Tokudome 2016[21]	0	T1: 1990 T2: 1995 T3: 2000 T4: 2005 T5: 2010 T6: 2013	76.04 (75.98–76.10	81.96 (81.86–82.05	76.45 (76.14–76.57	82.84 (82.62–82.94	77.55 (77.53–77.58	84.32 (84.29–84.35	78.66 (78.60–78.71	85.48 (85.41–85.54	79.34 (79.31–79.36	85.09 (86.06–86.11	80.05 (79.26–80.84	86.39 (85.74–87.12					Men: 4.01[b] Women: 4.43[b]

[a]95% confidence intervals in brackets where reported; [b]Change estimate not reported, and thus calculated by us (T^2-T^1)

Table 7b. Summary of healthy life expectancy trends data for studies from Japan and Korea (years)[a]

Study	At age	Time points	T1		T2		T3		T4		T5		T6		T7		T8		Change between first and last time point
			M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Jo 2019[25]	0	T1: 2005 T2: 2007 T3: 2008 T4: 2009 T5: 2010 T6: 2011 T7: 2012	70.8	74.7	71.86	73.92	72.62	75.18	73.4	76.65	73.87	77.21	74.33	76.53	74.71	78.3	74.83	78.14	Men: 4.03 Women: 3.44
Tokudome 2016[21]	0	T1: 1990 T2: 1995 T3: 2000 T4: 2005 T5: 2010 T6: 2013	68.09 (65.83–70.11)	72.24 (69.38–74.77)	68.44 (66.07–70.58)	72.92 (70.05–75.49)	69.08 (66.67–71.24)	73.95 (70.94–76.55)	69.89 (67.31–72.12)	74.77 (71.66–77.46)	70.78 (68.20–73.06)	75.41 (72.34–78.23)	71.11 (68.50–73.57))	75.56 (72.46–78.42)					Men: 3.02[b] Women: 3.32[b]

[a]95% confidence intervals in brackets where reported; [b]Change estimate not reported, and thus calculated by us (T^2-T^1)

Table 7c. Summary of disability-free life expectancy trends data for studies from Japan[a]

Study	Trend	At age	Time points	T1		T2		Change between first and last time point
				Male	Female	Male	Female	
Suguwara 2016[20]	DFLE (years)	0	T1: 2000 T2: 2010	68.0	71.7	69.0	72.1	Men: 1.0 Women: 0.4
	% of life disability-free			87.6	84.6	86.8	83.4	Men: -0.8 Women: -1.2

[a]95% confidence intervals in brackets where reported;

Table 8. Change in life expectancy, healthy life expectance and disability-free life expectancy across all studies where reported

Study	Country	Age	Trend period	Change in LE	Change in HLE	Change in DFLE
Global Burden of Disease study 2016[5]	UK	0	2005, 2015	Men: 2.30 Women: 1.67	Men: 2.00 Women: 1.46	-
Global Burden of Disease study 2017[7]	UK	0	1990, 2016	Men: 6.07 Women: 4.39	Men: 4.87 Women: 3.52	-
		65		Men: 4.4 Women: 3.0	Men: 3.31 Women: 2.34	-
Global Burden of Disease study 2018[4]	UK	0	1990, 2017	Men: 6.3 Women: 4.2	Men: 4.4 Women: 2.7	-
Guzman-Castillo 2017[6]	England, Wales	65	2015, 2025 (projection)	-	-	Men: 1.6 (0.5, 2.7) Women: 0.6 (-0.7, 1.9)
Jagger 2016[8]	England	65	1991, 2011	Men: 4·5 Women: 3·6	Men: 3·8 (3·5 to 4·1) Women: 3·1 (2·7 to 3·4)	Men: 2.6 (2.3, 2.9) Women: 0.5 (0.2, 0.9)
Kingston 2017[11]	England	65	1991, 2011, and 2015, 2025, 2035 (projection)	-	-	Men: 1.7 (1.2, 2.1) Women: 0.2 (-0.4, 0.7)
Kingston 2018a[9 a]	England	65	2015, 2025, 2035 (projection)	Men: 3·5 (3·1 to 4·1) Women: 3·0 (3·0 to 3·6)	-	Men: 4.2 (3.9, 4.2) Women: 0.9 (0.9, 1.2)
Kingston 2018b[10]	England	65	2015, 2025, 2035 (projection)	-	-	-
Reus-Pons 2017[12]	England & Wales	50	2001, 2011	Men: 2.8 Women: 2.2	Men: 0.25 Women: -0.15	-
ONS 2019[14b]	England & Wales	0, 65	2012/14 – 2015/17	-	-	-
ONS 2018[13]	UK	0	2009/11 – 2015/17	Men: 0.8 Women: 0.4	Men: 0.4 Women: -0.2	-
	England			Men: 0.8 Women: 0.4	-	-
	Wales			Men: 0.5 Women: 0.2	-	-
	Northern Ireland			Men: 1.0 Women:0.5	-	-
	Scotland			Men: 0.8	-	-

				Women: 0.5		
Studies with samples from Europe						
Bronnum-Hansen 2017[18]	Denmark	65	2006/07, 2010/11,2013/14	Difference in change in LE between high and low education: Men: 0.1 Women: 0.3	-	Difference in change in DFLE between high and low education Men: -0.3 Women: -0.3
Deeg 2018[22]	Netherlands	65	1993, 2016	Men: 4.0 Women: 2.2	Physical Men: -2.2 Women: -1.5 Cognitive Men: 4.7 Women: 4.6	-
Gheorghe 2016[23]	Netherlands	25	2001, 2011	Men: High: 2.88 Med: 3.22 Low: 2.43 Women: High: 1.78 Med: 1.53 Low: 1.15	Men: High 2.85 Med: 3.01 Low: 2.13 Women: High: 2.64 Med: 1.57 Low: 1.80	-
		65		Men: High: 2.48 Med: 2.24 Low: 1.68 Women: High: 1.64 Med: 1.41 Low: 1.12	Men: High: 2.17 Med: 1.91 Low: 1.37 Women: High: 1.74 Med: 1.21 Low: 1.14	-
Grasset 2019[19]	France	70	1988/1989, 1999/2000	3.0	-	2.7
		75		2.4	-	2.2
		80		1.8	-	1.5
		85		1.3	-	1.1
		90		0.8	-	0.7
Lagergren 2017[26]	Sweden	65+	1980/1985, 1994/95, 2006/2011	-	-	Without ADL limitations

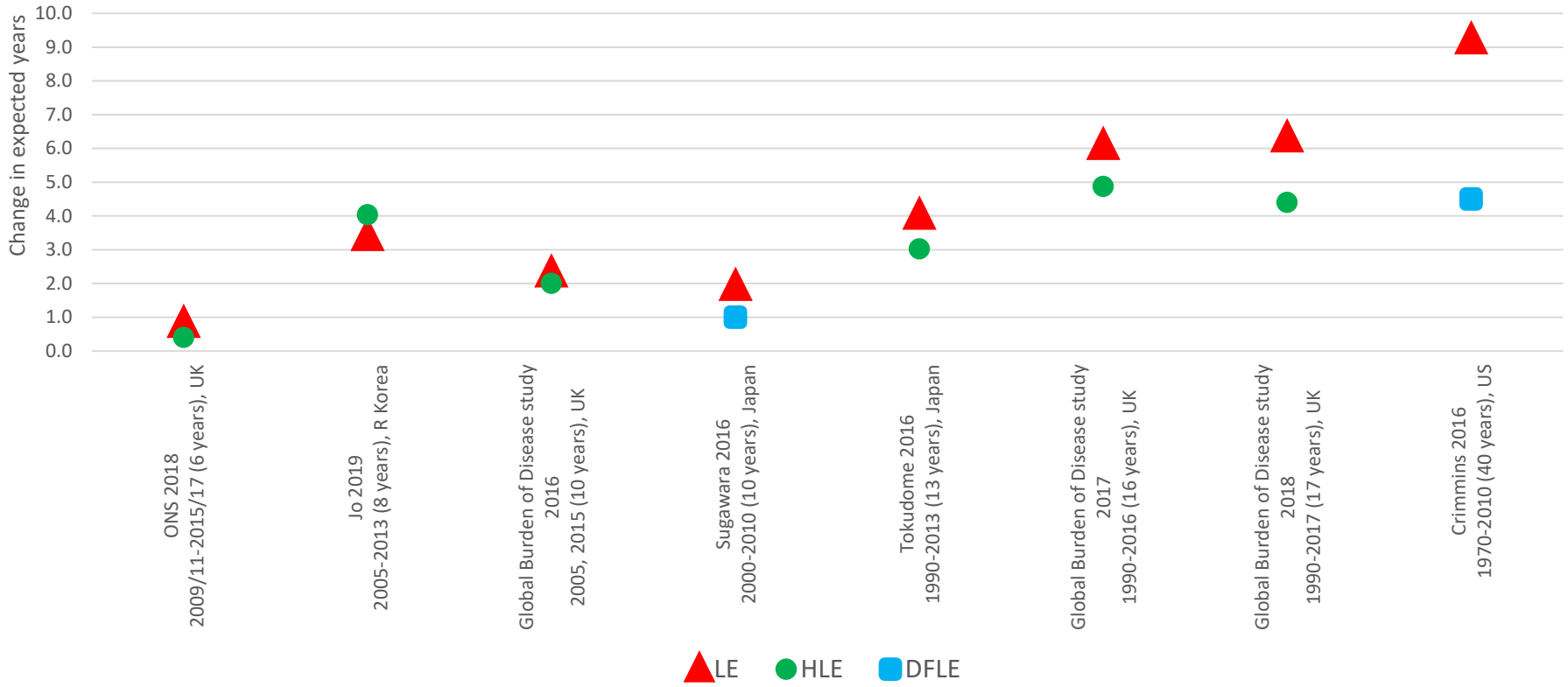
						Men: 4.0 Women: 3.14
				-	-	Without mobility limitations Men: 4.21 Women: 3.69
Remund 2019[28]	Switzerland	30	1990, 2014	Men: 5.02 Women: 3.09	Men: 4.52 Women: 3.09	-
Renard 2019[15c]	Belgium	25	2001, 2011	-	-	-
Reus-Pons 2017[12]	Netherlands	50	2001, 2011	Men: 2.82 Women: 1.84	Men: 2.21 Women: 1.25	-
Storeng 2018[13]	Norway	50	1984/86, 1995/97, 2006/08	Men: 6.99 (5.27–8.72) Women: 6.75 (5.16–8.34)	Men: 6.90 (6.08–7.73) Women: 5.40 (4.56–6.25)	Men: 2.71 (2.01–3.42) Women: 0.33 (–0.40–1.06)
Sundburg 2016[27]	Sweden (SWEOLD)	77	1992, 2002, 2004, 2011	Men: 1.7 Women: 1.1	-	Men: 1.1 Women: 1.6
	Sweden (SHARE)			Men: 0.6 Women: 0.4	-	Men: 0.1 Women: 1.3
Yokota 2019[16]	Belgium	15	2001, 2004, 2008	Men: 1.6 Women: 1.0	-	Men: 0.7 Women: -0.7
Studies with samples from Asia						
Jo 2019[25]	R. Korea	0	2005, 2013	Men: 3.38 Women: 3.15	Men: 4.03 Women: 3.44	-
Sugawara 2016[20]	Japan	0	2000, 2010	Men: 1.9 Women:1.7	-	Men: 1.0 Women: 0.4
Tokudome 2016[21]	Japan	0	1990, 2013	Men: 4.01 Women: 4.43	Men: 3.02 Women: 3.32	-
Studies with sample from North America						
Cao 2016[29]	US	55-85	1982, 2010, 2040 (projection)	Men: 5.28 Women: 2.34	-	Men: 7.12 Women: 4.4
Crimmins 2016[30]	US	0	1970, 1980, 1990, 2000, 2010	Men: 9.2 Women: 6.4	-	Men: 4.5 Women: 2.7
		20-64		Men: 1.8 Women: 0.9	-	Men: 0.9 Women: -0.6
		65		Men: 4.7 Women: 3.5	-	Men: 2.7 Women: 2.4

		85		Men: 1.1 Women: 1.3	-	Men: 0.5 Women: 0.8
Freedman 2016[31]	US	65	1982, 2004, 2011	-	-	Men: 4.5 Women: 1.4
		85		-	-	Men: 1.9 Women: 0.1
Steensma 2017[17d]	Canada	0	1994, 2010	Men: 4.4 Women: 2.8	*% annual change* Men: 0.3 Women: 0.2	-
		20		Men: 4.2 Women: 2.7	*% annual change* Men: 0.4 Women: 0.2	-
		65		Men: 3.1 Women: 2.2	*% annual change* Men: 1.2 Women: 0.7	-

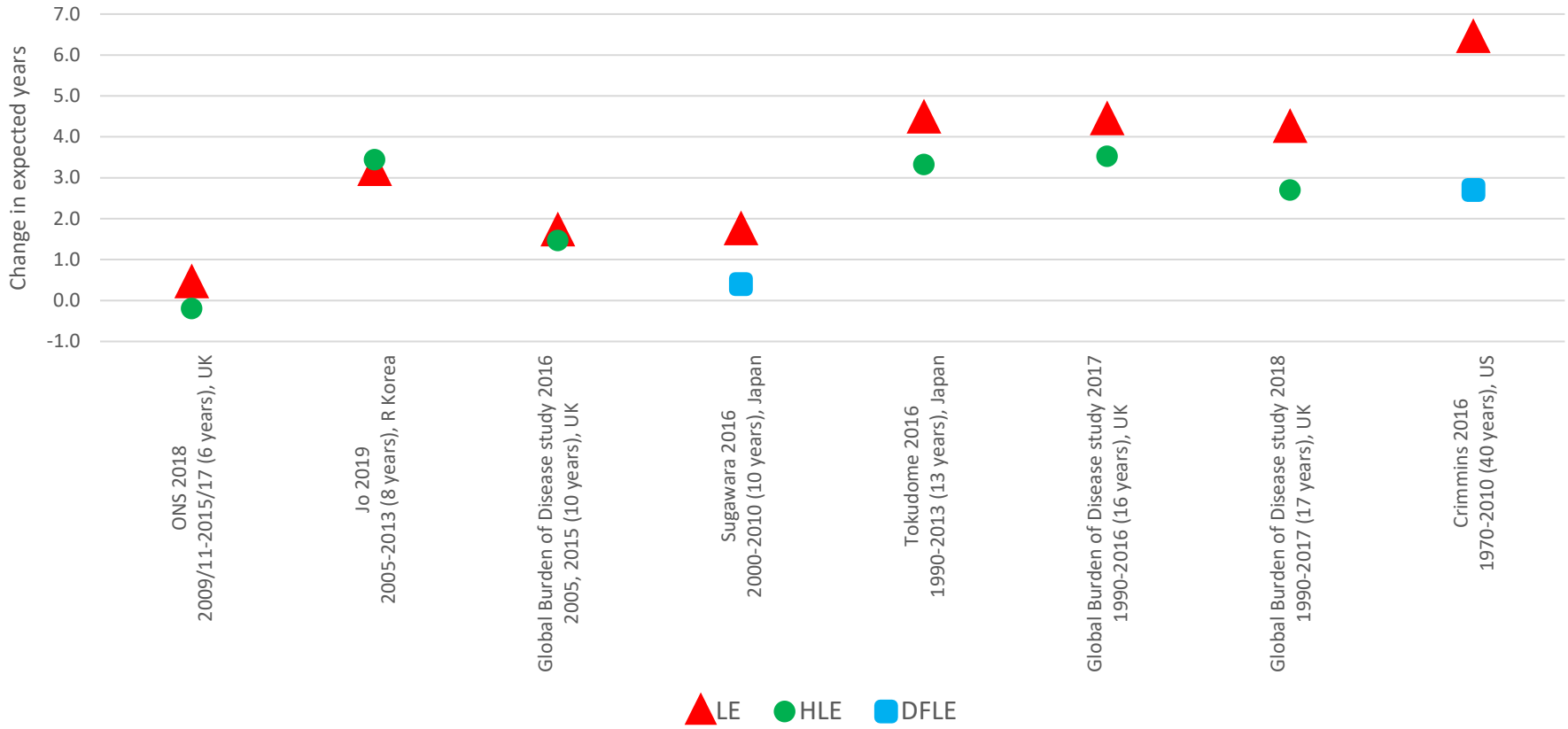
[a]Reports disability prevalence only; [b]Trends reported as slope of index inequality only and not included in this table; [c]Trends reported as difference in change in DFLE between levels of education and not comparable to LE trend, and thus not reported in this table; [d]Metrics to measure change are different for total and healthy life expectancy and thus not comparable

Figures 2a-j. Change (gain/loss) in life expectancy, healthy life expectancy, and disability-free life expectancy, within studies, ordered by duration of study trend period

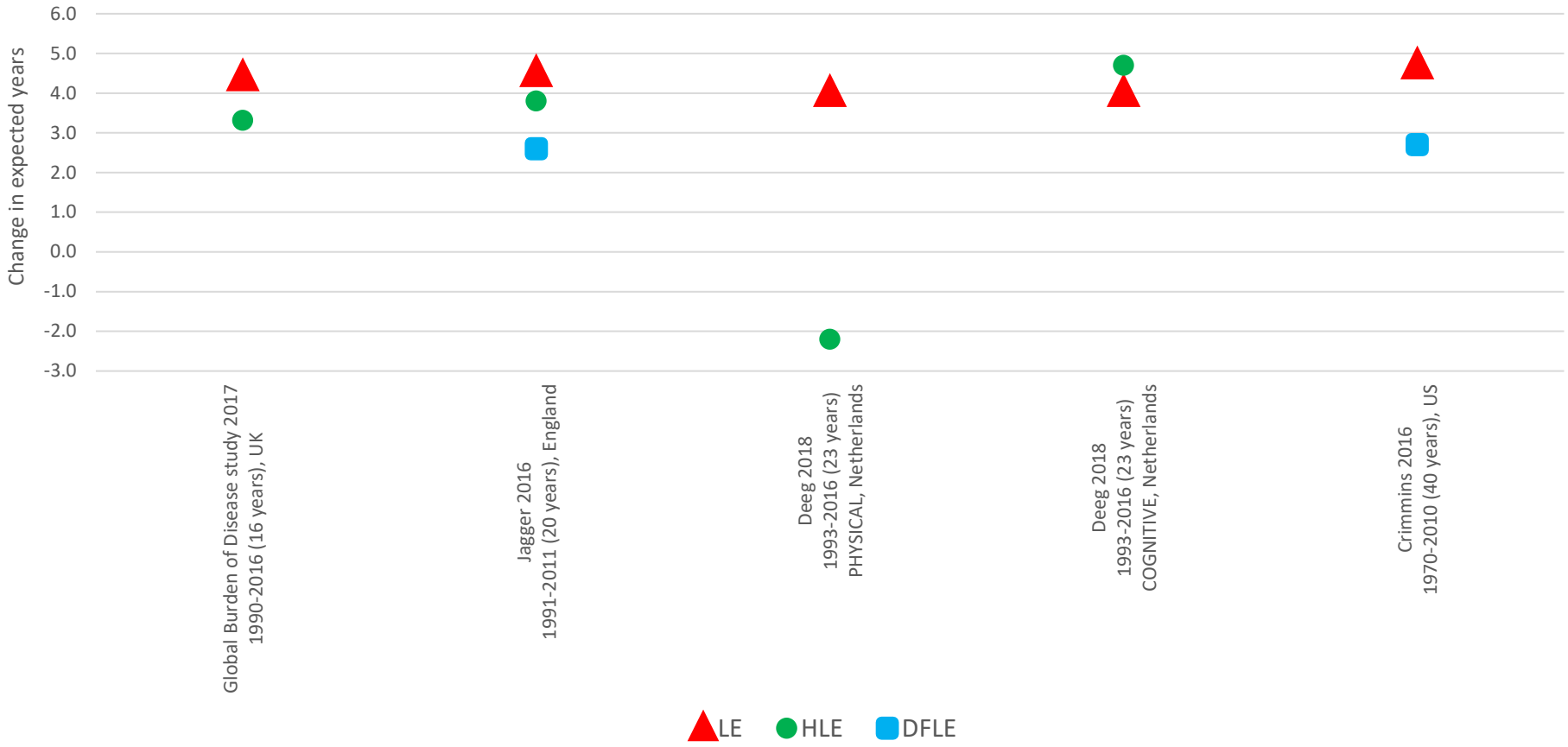
a. Males, at birth



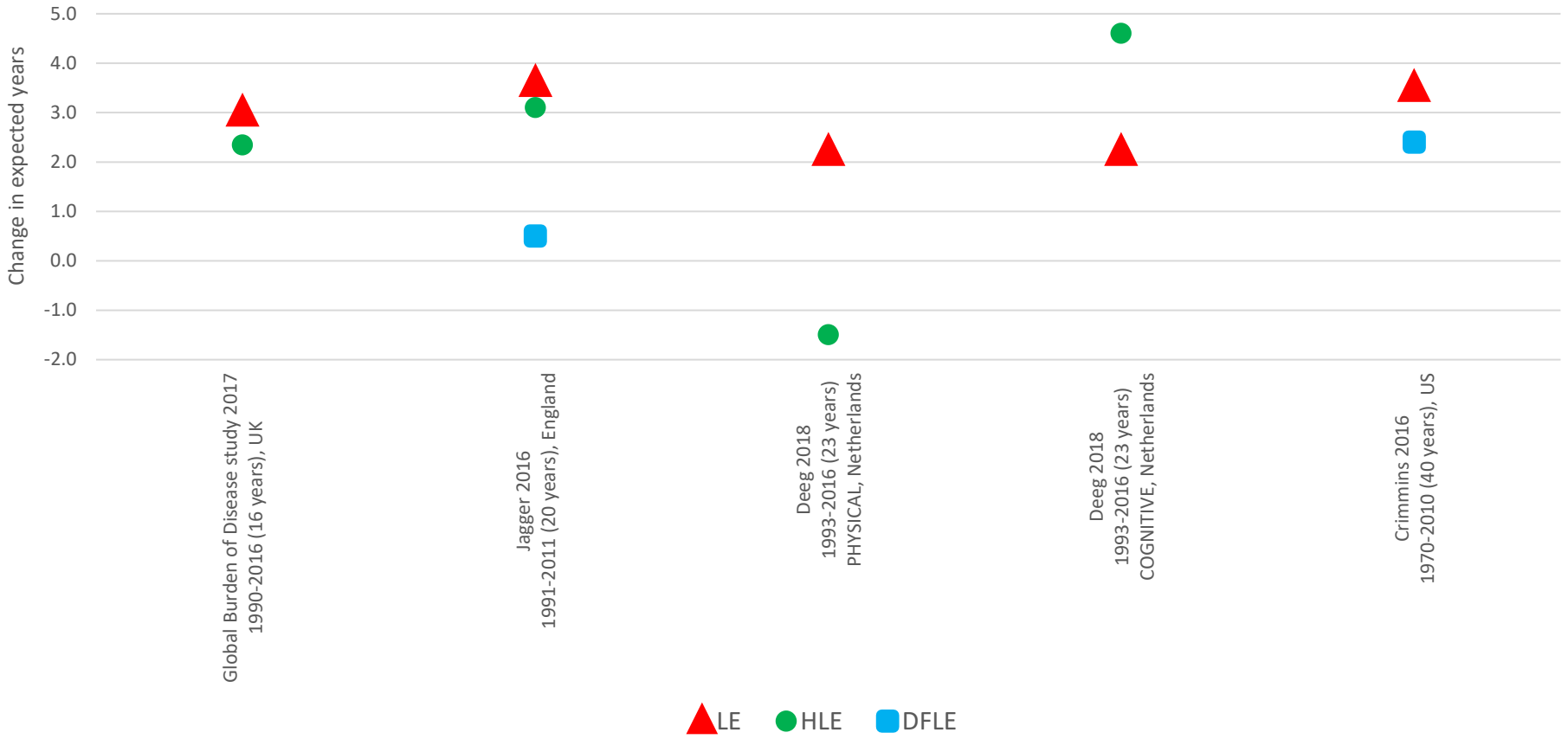
b. Females, at birth



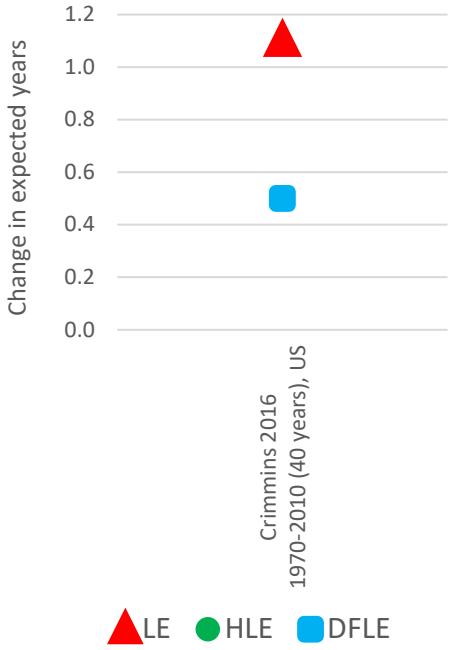
c. Males, at age 65



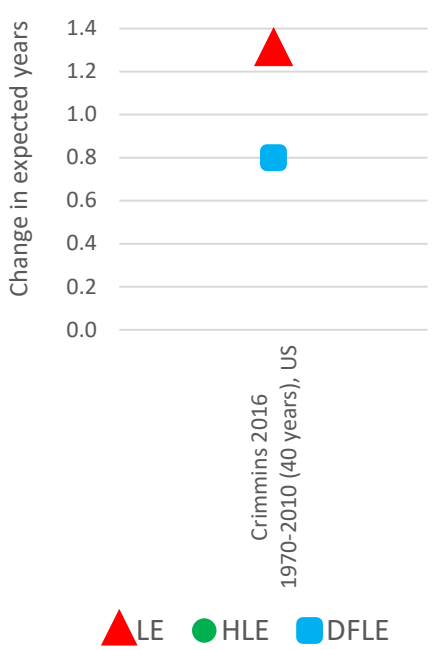
d. Females, at age 65



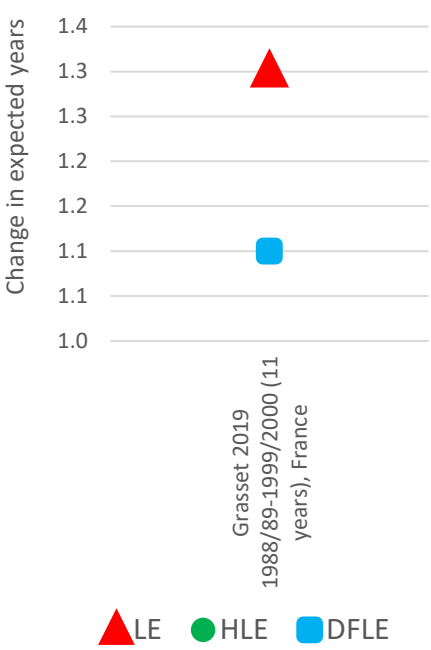
e. Males, at age 85



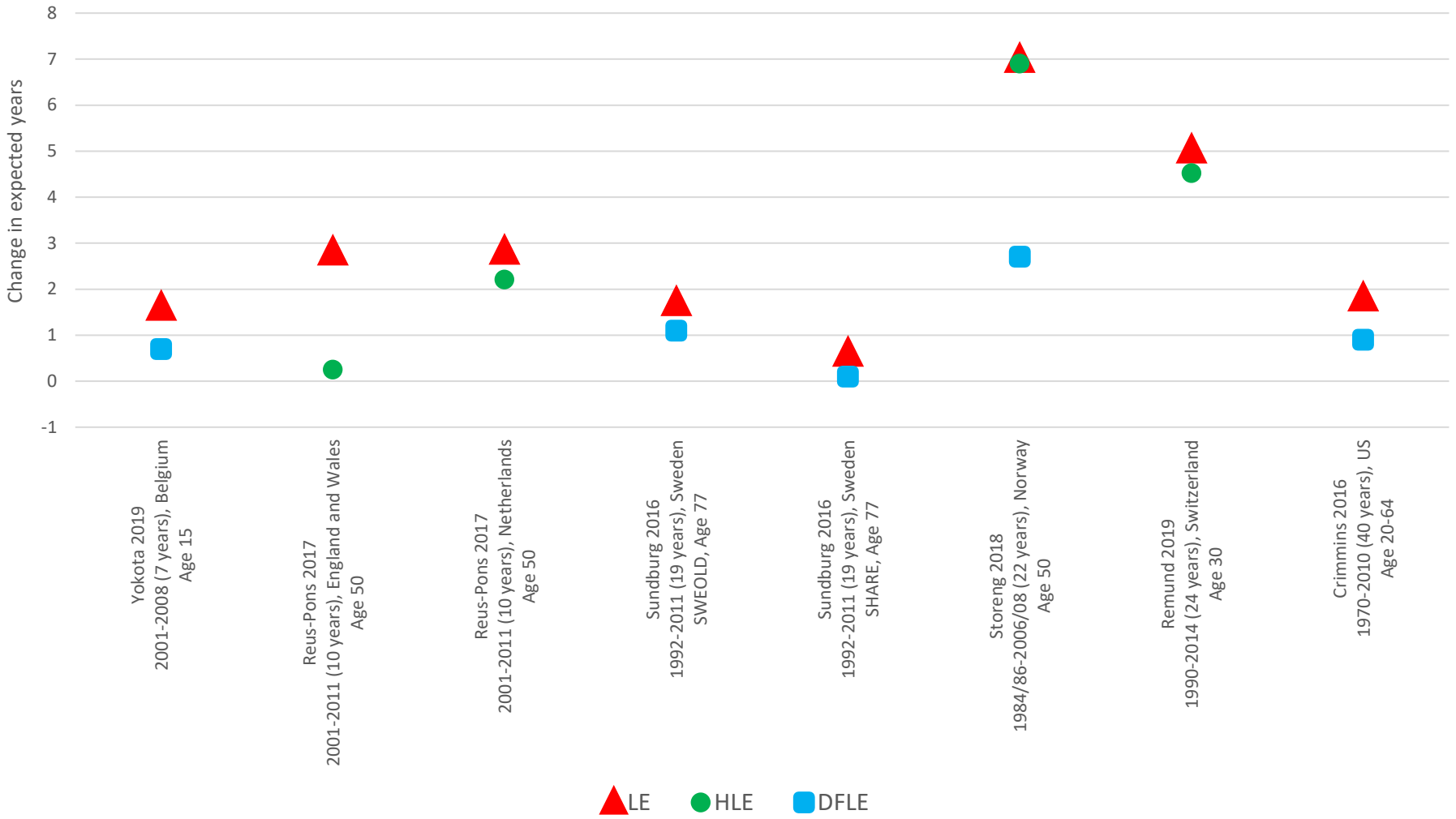
f. Females, at age 85



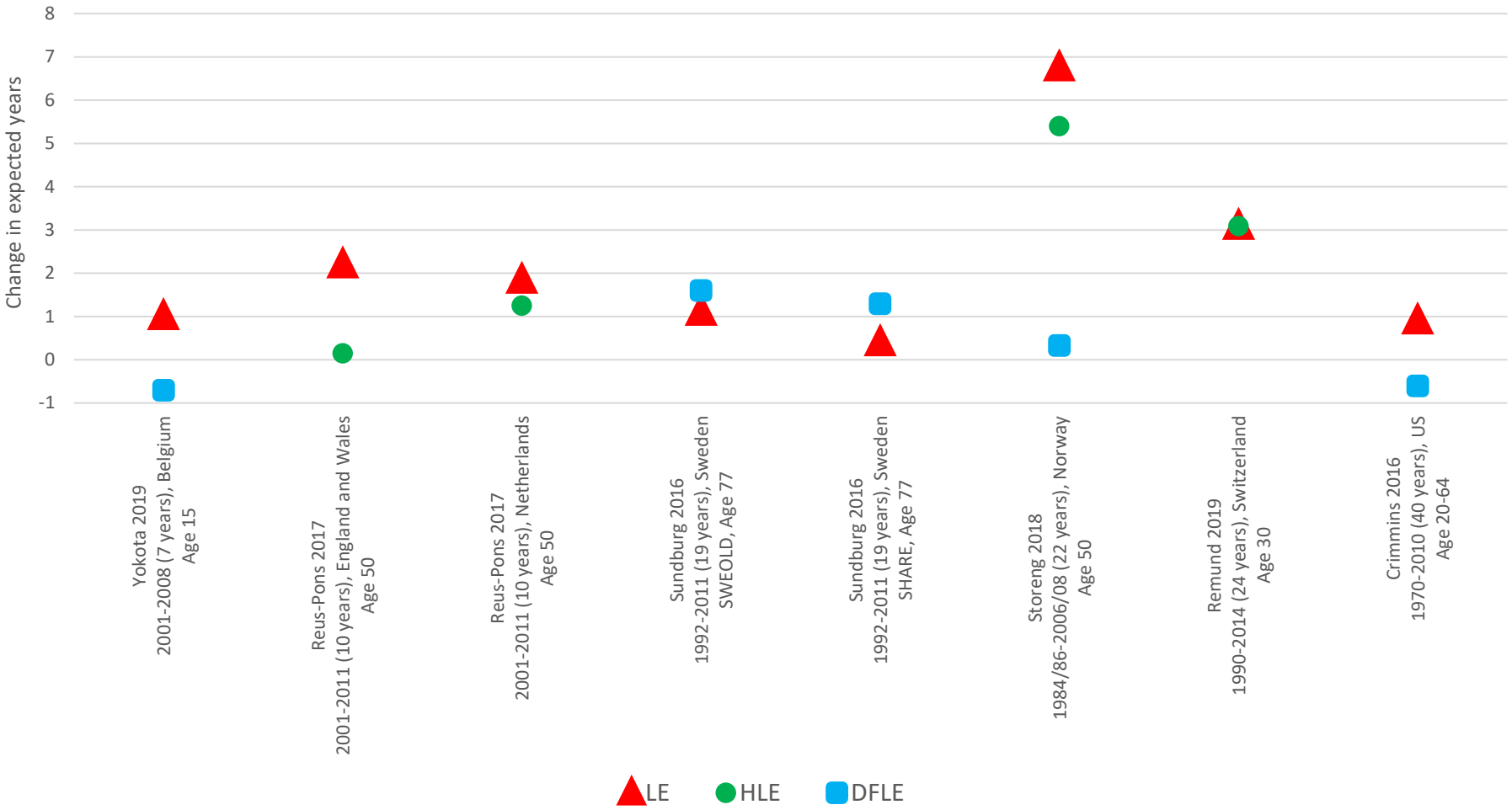
g. All, at age 85



h. Males, at other ages



i. Females, at other ages



j. All, at other ages

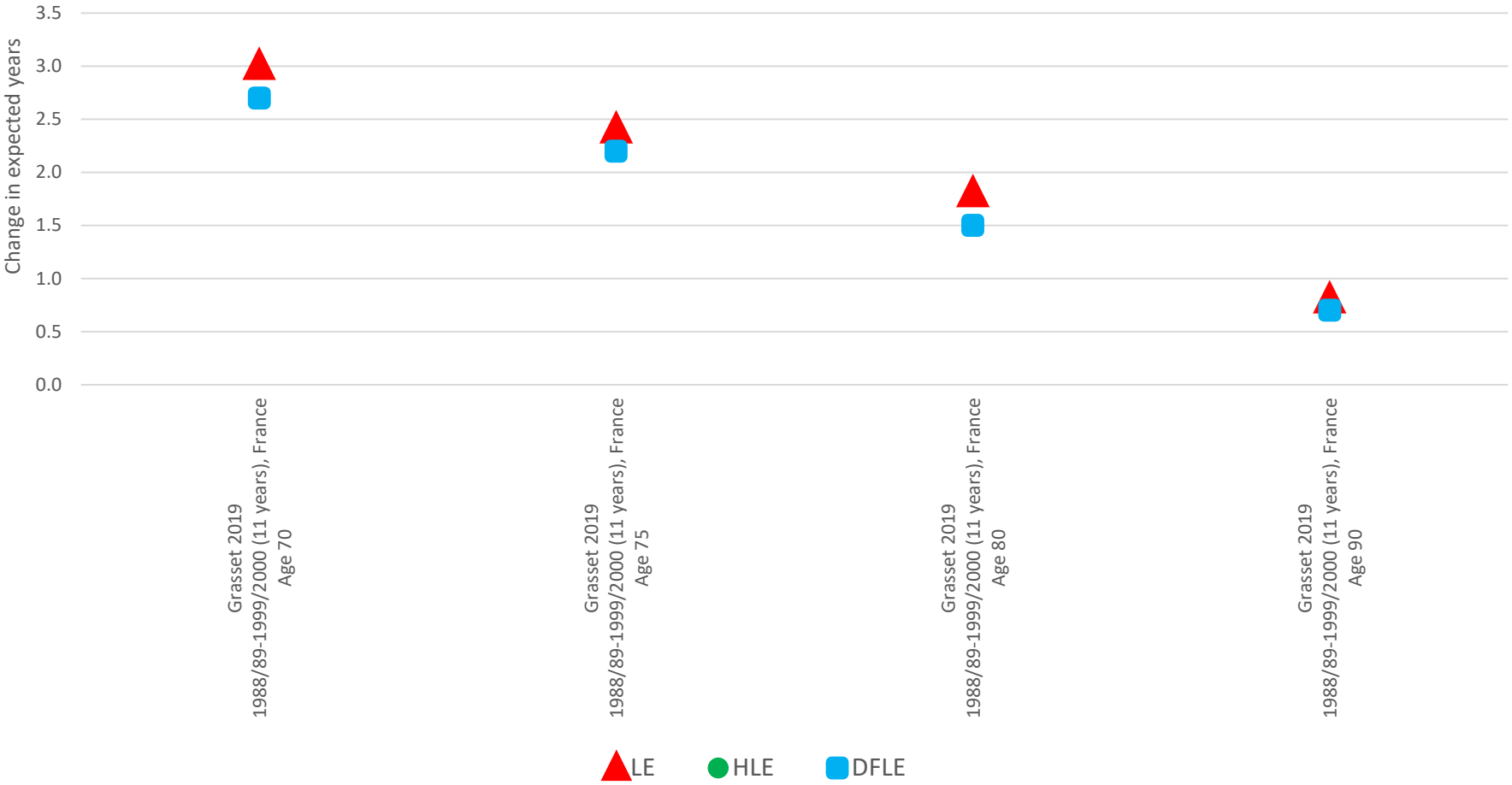
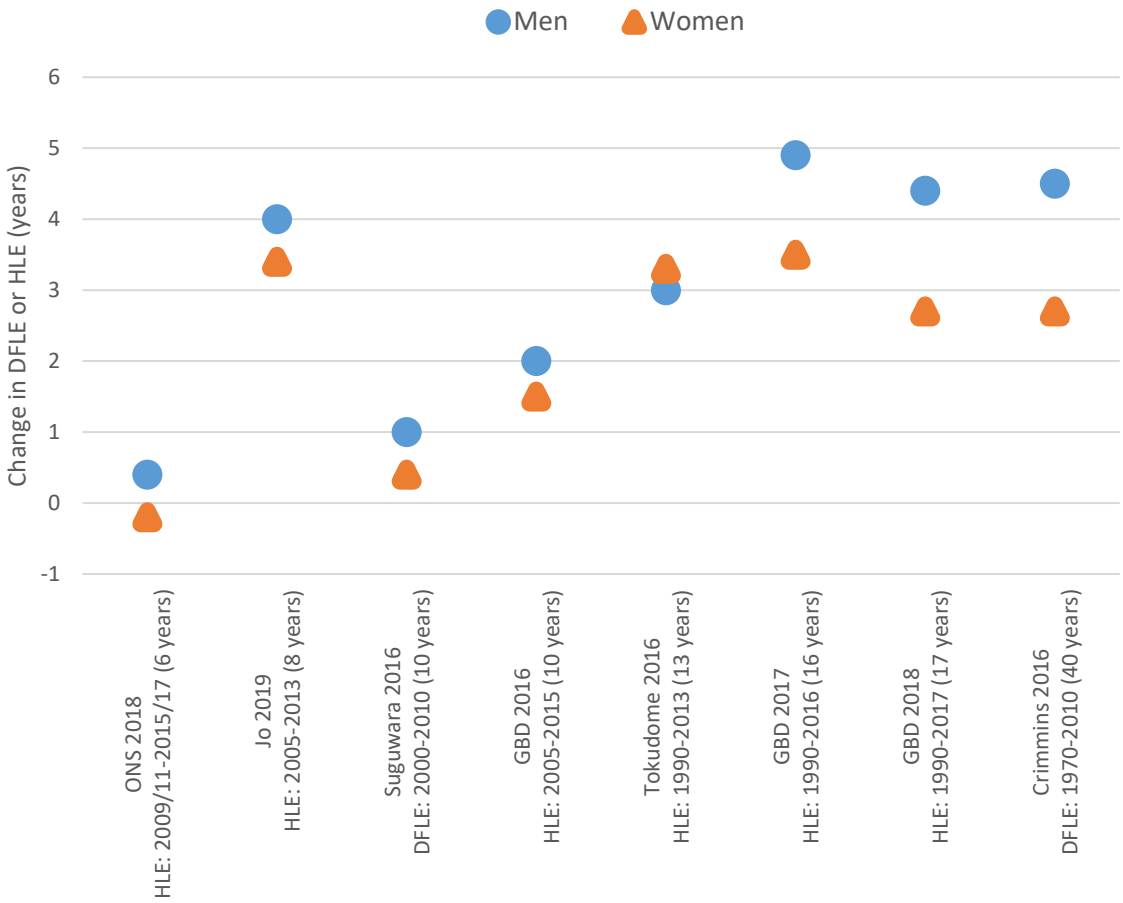
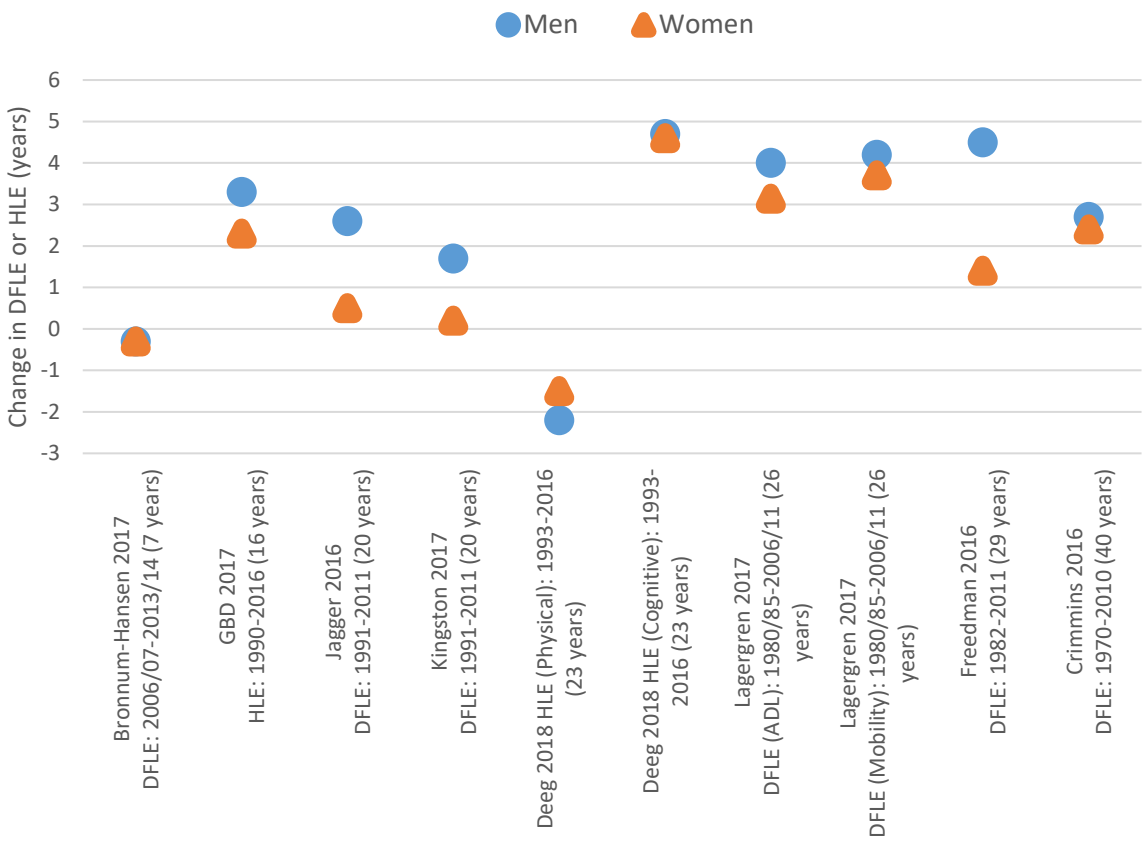


Figure 3: Change in DFLE and HLE (years) for men and women, ordered by length of study trend period

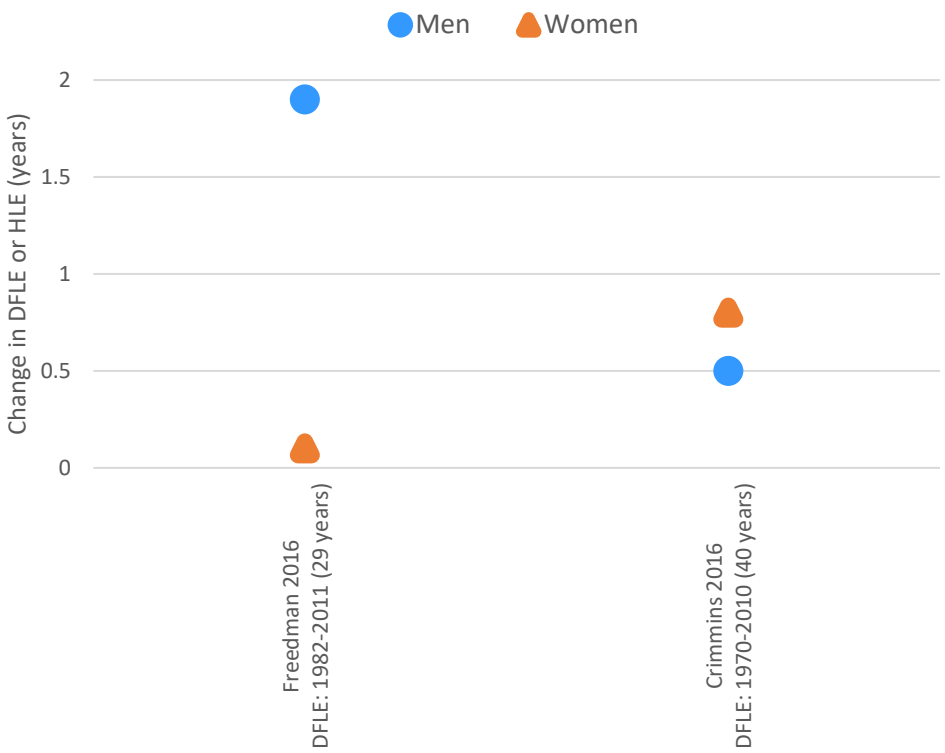
a. At birth:



b. At age 65:


Men
Women
Change in DFLE or HLE (years)
6
5
4
3
2
1
0
-1
-2
-3
Bronnum-Hansen 2017 DFLE: 2006/07-2013/14 (7 years)
GBD 2017 HLE: 1990-2016 (16 years)
Jagger 2016 DFLE: 1991-2011 (20 years)
Kingston 2017 DFLE: 1991-2011 (20 years)
Deeg 2018 HLE (Physical): 1993-2016 (23 years)
Deeg 2018 HLE (Cognitive): 1993-2016 (23 years)
Lagergren 2017 DFLE (ADL): 1980/85-2006/11 (26 years)
Lagergren 2017 DFLE (Mobility): 1980/85-2006/11 (26 years)
Freedman 2016 DFLE: 1982-2011 (29 years)
Crimmins 2016 DFLE: 1970-2010 (40 years)

c. At age 85:


Men
Women
Change in DFLE or HLE (years)
2
1.5
1
0.5
0
Freedman 2016
DFLE: 1982-2011 (29 years)
Crimmins 2016
DFLE: 1970-2010 (40 years)

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6. Appendix A. Search strategy as applied to Medline

#	Searches	Results
1	Life Expectancy/	16905
2	Longevity/	20175
3	Needs assessment/	28940
4	((health expectanc* or life expectanc* or expected years) adj3 (dependen* or disabilit*)).ti,ab.	351
5	((health expectanc* or life expectanc* or care need*) adj3 years).ti,ab.	1825
6	(healthy life years or "years of healthy life" or disability-free).ti,ab,kw.	577
7	or/1-6	65708
8	exp Age Factors/ or Race Factors/ or Sex Factors/ or Epidemiologic Factors/	633121
9	Time Factors/	1160523
10	Longitudinal Studies/	126320
11	exp Forecasting/	82820
12	Life Tables/	6387
13	or/8-12	1915337
14	7 and 13	11574
15	Life Expectancy/td [Trends]	2149
16	Needs Assessment/td [Trends]	250
17	((health expectanc* or life expectanc* or expected years or disability-free or care need*) adj5 (trend? or direction? or factor? or forecast* or predict*)).ti,ab.	1682
18	or/15-17	3885
19	14 or 18	14398
20	limit 19 to (english language and humans and yr="2016 -Current")	1613
21	letter/	1035306
22	Editorial/	498591
23	News/	196871
24	exp Historical Article/	390746
25	Anecdotes as Topic/	4731
26	Comment/	800699
27	(letter or comment$).ti.	138952
28	or/21-27	2367046
29	20 not 28	1491

7. Appendix B. Assessment of study quality and bias

Study	Study design	Population coverage	Comparability of interview methods	Outcome measure	Loss to follow up %	Proxy %	Missing data %	Other publications consulted	SUMMARY JUDGMENT
Bronnum-Hansen 2017	FAIR Danish Surveys of Health, Ageing and Retirement in Europe	FAIR National samples but inclusion of those in institutions varies according to different countries within the study.	FAIR Change in items across waves, but disability question did not change across waves 1-7.	Disability: FAIR (Single item question - Global Activity Limitation Indicator)	UNCLEAR Not reported in publication and unable to find loss to follow up data on SHARE methods documentation	UNCLEAR Not reported	UNCLEAR Not reported.	SHARE methods report: http://www.share-project.org/fileadmin/pdf_documentation/Methodology/Methodology_2005.pdf	FAIR
Cao 2016	GOOD US National Health Interview Survey	FAIR	FAIR Not reported, but in Freedman et al. (2002), the NHIS (which is the survey used in Cao et al.), they note the sampling frame was redesigned in 1995. A change in disability items is reported, but this study used a different set of items to ensure disability is comparable across waves.	Disability: FAIR Although this measure draws upon multiple ADLs, the question is whether the participant has any limitation in any of the ADLs, and so is a single item measure.	GOOD: NA	UNCLEAR Not reported.	UNCLEAR Not reported.	Freedman et al. (2002)	FAIR
Crimmins 2016	GOOD US National Health Interview Survey	FAIR	FAIR Not reported, but in Freedman et al. (2002), the NHIS (which is the survey used in Crimmins et al), they note the sampling frame was redesigned in 1995. A change in	Disability: FAIR Although question draws upon multiple ADLs, the question is whether the participant has any limitation in any of the ADLs, and so is a single item measure.	GOOD: NA	UNCLEAR Not reported.	UNCLEAR Not reported.	Freedman et al. (2002)	FAIR

			disability items is reported, but study uses different set of items to ensure disability is comparable across waves.						
Deeg 2018	FAIR Longitudinal Ageing Study Amsterdam	GOOD	UNCLEAR The methods paper for survey used in this study states that measures have changed, including, among others, cognitive tests, Parkinson' diagnosis, malnutrition, and use of help. However, it is not clear if any of these (such as the cognitive tests) were used as part of the outcome measures in this study.	Disability: GOOD Cognitive: GOOD	UNCLEAR Study reports only average non-mortality attrition: 4.0% for participants in good cognitive health and 7.1% for those in poor cognitive health. No detail on attrition on whole sample (including attrition from death) from wave to wave.	GOOD From publication appendix: "Across the study period, the average use of proxies was 2% for respondents in good physical health, 3% for those in fair physical health, and 8% for those in poor physical health."	UNCLEAR Not reported.	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5010587/	UNCLEAR However, both outcomes (disability and cognition) used multi-item measures.
Freedman 2016	GOOD National Long Term Care Survey and the National Health and Aging Trends Study	GOOD	UNCLEAR Not reported.	Disability: GOOD	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.		UNCLEAR However, the outcome was a multi-item measure.
GBD 2016 DALYs and HALE	GOOD UK estimates based on UK census population data	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.		UNCLEAR

Collaborators									
GBD 2017 DALYs and HALE Collaborators	GOOD UK estimates based on UK census population data	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.		UNCLEAR
GBD 2018 DALYs and HALE Collaborators	GOOD UK estimates based on UK census population data	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.		UNCLEAR
Gheorghe 2016	FAIR Dutch Labour force Survey	FAIR Does not include those in an institution.	UNCLEAR Not reported.	Health: GOOD	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Missing data % not reported and used complete case analysis.		UNCLEAR However, the outcome was a multi-item measure.
Grasset 2019	FAIR PAQUID and Three City Cohorts	FAIR Initial cohort were those living at home, follow ups included those moving into a care home.	UNCLEAR Not reported.	Dementia Free LE: GOOD	POOR Between baseline and final follow up: 65% (PAQUID) and 44% (3C data). (Calculated by us based on follow up data in supplementary materials).	UNCLEAR Not reported.	UNCLEAR Not reported.	See supplementary material for loss to follow up	UNCLEAR However, the outcome was a multi-item measure.
Guzman-Castillo 2017	FAIR English Longitudinal Study of Ageing	FAIR	NA as forecasting from baseline data	Disability: GOOD	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.		FAIR However, the outcome was a multi-item measure.

Jagger 2016	GOOD CFAS I and II	GOOD Not national but includes multiple sites and includes those in care homes.	GOOD	SRH: FAIR Disability: GOOD Cognitive health: GOOD	GOOD: NA	FAIR 20%	GOOD SRH: 2·9% (1991) and 4·2% (2011) Cognitive: 1·8% (1991) and 3·7% (2011) Disability: 1·1% (1991) and 4·2% (2011)	https://www.sciencedirect.com/science/article/pii/S0140673613615706	GOOD: for disability and cognition outcome, but FAIR for self-rated health outcome.
Jo 2019	GOOD Korea National Health and Nutrition Examination Survey	FAIR	UNCLEAR Methods paper states that the surveys changed but does not detail what these changes include, such as whether these changes include the disability questions and measures	QALE: GOOD	GOOD: NA	UNCLEAR Not reported.	UNCLEAR Not reported.	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3937975/	UNCLEAR However, the outcome was a multi-item measure.
Kingston 2017	GOOD CFAS I and II	GOOD Not national but includes multiple sites and includes those in care homes.	GOOD	Disability: GOOD	GOOD: NA	FAIR 20%	GOOD Not reported but assumed to be same as Jagger et al. as uses same data.	https://www.sciencedirect.com/science/article/pii/S0140673613615706	GOOD
Kingston 2018a	GOOD English Longitudinal Study of Aging Wave 5 only, CFAS II, Understanding Society	GOOD	NA as forecasting from baseline data	Disability: GOOD	GOOD: NA	UNCLEAR/FAIR depending on dataset CFAS: Not reported, but assumed to be as reported elsewhere for CFAS (FAIR). No information on % proxy interviews	UNCLEAR Not reported, but missing values imputed.		GOOD

						for ELSA (UNCLEAR).			
Kingston 2018b	GOOD English Longitudinal Study of Aging Wave 5 only, CFAS II, Understanding Society	GOOD	NA as forecasting from baseline data	Disability: GOOD	GOOD: NA	UNCLEAR/FAIR depending on dataset CFAS: Not reported, but assumed to be as reported elsewhere for CFAS (FAIR). No information on % proxy interviews for ELSA (UNCLEAR).	UNCLEAR Not reported, but missing values imputed.		GOOD
Lagergren 2017	GOOD Swedish Survey of Living Conditions	GOOD	POOR "In the years 1996–2000, a filter was introduced into the questionnaire to the effect that only people who were dependent for all instrumental ADL (IADL) were asked the questions about ADL." (p.552) "From 1980 to 2001 there was an upper age limit of 84 years, with the exception of 1988/89." (p.56)	Disability: GOOD	GOOD: NA	FAIR From methods paper on dataset: "The proportion of proxy interviews varies from 2–3% among those aged 65–79 years to 14–16% among individuals aged 80 years and older." (p.56)	UNCLEAR Not reported.	https://journals.sagepub.com/doi/full/10.1177/1403494815605195	POOR However, the outcome was a multi-item measure.
ONS 2018	GOOD UK Census and Annual Population Survey	FAIR Excludes those in communal establishments	GOOD No change in health question/measure,	Health: FAIR	GOOD: NA GOOD: NA	UNCLEAR Not reported.	UNCLEAR Not reported.	https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialc	FAIR

			but items used to measure disability changed from the 2013 APS survey (p.4). However, the ONS analysis does not report trends in DFLE (HLE and LE only).					are/healthandlifeexpectancies/methodologies/healthstatelifeexpectanciesukqmi#_blank	
ONS 2019	GOOD UK Census and Annual Population Survey	FAIR Excludes those in communal establishments	GOOD No change in health question/measure, but items used to measure disability changed from the 2013 APS survey (p.4). However, the ONS analysis does not report trends in DFLE (HLE and LE only).	Health: FAIR	GOOD: NA	UNCLEAR Not reported.	UNCLEAR Not reported.		FAIR
Remund 2019	GOOD Swiss Health Interview Survey	UNCLEAR National, but unclear whether it includes those in institutions.	POOR The phrasing of the SRH question and response items were not identical in each survey wave.	SRH: FAIR	GOOD: NA	UNCLEAR Not reported.	UNCLEAR Not reported.		POOR
Renard 2019	GOOD Belgium Health Interview Survey	GOOD	GOOD Methods paper states no major methodological changes have been implemented between waves, except oversampling from 1997.	Disability: FAIR (Single item question - Global Activity Limitation Indicator)	GOOD: NA	UNCLEAR Not reported.	UNCLEAR Not reported.	https://archpublichealth.biomedcentral.com/articles/10.1186/0778-7367-71-24	FAIR

Reus-Pons 2017	GOOD Permanent Survey on the Living Situation (POLS) and Health Survey (Netherlands) and Census (England & Wales)	UNCLEAR Not reported.	UNCLEAR Not reported.	SRH: FAIR	GOOD: NA	UNCLEAR Not reported.	POOR/UNCLEAR For Belgium sample: data on self-rated health were missing for 'around' 5% of the non-migrant population and 'around' 10% of the migrant population. Exact % not reported, thus could be >10%. Not reported for England and Wales sample.		UNCLEAR
Steensma 2017	GOOD National Population Health Survey and the Canadian Community Health Survey	FAIR	UNCLEAR Different surveys used between 1994-1999 and 2000-2010, although it is not clear if this reflected any change in questions and methods used.	Health: GOOD (multiple item health utilities index)	GOOD: NA	UNCLEAR Not reported.	UNCLEAR Not reported.		UNCLEAR However, outcome was a multi-item measure
Storeng 2018	GOOD HUNT Study	POOR Data are sampled from one county only (i.e. not national, with 18 other counties). Not clear if it includes those in institution or not.	POOR Self-rated health was measured the same at all three HUNT studies. The question for longstanding limiting illness differed between HUNT1 and HUNT 2 and 3 (that is, HUNT 2 and 3 asked about	Health: FAIR Disability: FAIR	GOOD: NA	UNCLEAR Not reported.	GOOD Missing health data < 5%	https://academic.oup.com/ije/article/42/4/968/655743#11331793	POOR

			limiting illness lasting for at least one year, whereas HUNT 1 did not).						
Sugawara 2016	GOOD Comprehensive Survey of Living Conditions of the People on Health and Welfare	FAIR	UNCLEAR Not reported.	UNCLEAR/POOR Disability was measured using the following two survey questions: "Are you currently institutionalized in hospitals, clinics, or long-term care facilities?" and "Do you have any limitations in carrying out normal activities due to health problems?" Those who answered "yes" to **either** question are considered to have disability. However, the authors also state that those institutionalised are excluded, so the first question would, in theory, result in a No. There is no clarification in the paper on this inconsistency. It is possible, therefore, that only the second question (single item) was measuring disability. Without further detail, it is not possible to clarify this.	GOOD: NA	UNCLEAR Not reported.	UNCLEAR Not reported.		UNCLEAR
Sundburg 2016	FAIR Swedish Panel Study of Living	GOOD	UNCLEAR Not reported.	Disability: GOOD	UNCLEAR Not reported.	UNCLEAR/POOR depending on	UNCLEAR Not reported.	https://link.springer.com/article/10.1007%2Fs10433-	UNCLEAR

	Conditions of the Oldest Old and the Survey of Health, Ageing and Retirement in Europe					dataset For SWEOLD: in another paper describing this dataset, it is reported that 13.3 were proxy interviews, and another 7.3% of participants needed proxy help answering questions (POOR). For SHARE, there is no information on this (UNCLEAR).		013-0275-7 and https://academic.oup.com/ije/article/43/3/731/2949546#57616062	
Tokudome 2016	GOOD Global Burden of Disease 2013 study estimates for Japan, which are taken from national registries and population statistics	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.	UNCLEAR Not reported.		UNCLEAR
Yokota 2019	GOOD Belgium Health Interview Survey	GOOD	GOOD Methods paper states no major methodological changes have been implemented between waves, except oversampling from 1997.	Disability: GOOD	GOOD: NA	FAIR Time 1: 4.3%, time 2: 10.2%, time 3: 13%	UNCLEAR Missing data % not reported, and used complete data only (for disability and chronic conditions)		GOOD

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