

1 The Impact of Life Events on Later Life: A Latent Class Analysis of the
2 English Longitudinal Study of Ageing
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1 Abstract:

2 Objectives:

3 Inequalities in life events can lead to inequalities in older age. This research aimed to explore
4 associations between life events reported by older people and quality of life (QoL) and functional
5 ability.

6 Study Design:

7 A latent class analysis (LCA) of the English Longitudinal Study of Ageing wave 3.

8 Methods:

9 Participants were grouped according to eight life events: parental closeness, educational
10 opportunities in childhood, financial hardship, loss of an unborn child, bereavement due to war,
11 involvement in conflict, violence, and experiencing a natural disaster. Linear and logistic regression
12 were used to explore associations between these groups and the main outcomes of functional ability
13 and QoL.

14 Results:

15 7,555 participants were allocated to four LCA groups: "Few life events" (n=6,250), "Emotionally cold
16 mother" (n=724), "Violence in combat" (n=274) and "Many life events" (n=307). Reduced QoL was
17 reported in the "many life events" (coefficient -5.33, 95%CI -6.61 to -4.05), "emotionally cold
18 mother" (-1.89, -2.62 to 1.15) and "violence in combat" (-1.95, -3.08 to -0.82) groups, compared to
19 the "few life events" group. The "many life events" group also reported more difficulty with
20 activities of daily living.

21 Conclusions:

22 Policies aimed at reducing inequalities in older age should consider events across the life course.

1 Background

2 Within society each individual lives a unique life shaped by events, experiences and their
3 environment. Inequalities in exposures to different events over a lifetime are associated with
4 inequalities in health trajectories¹⁻³. This 'life course' perspective provides a dynamic holistic
5 framework for considering the impact of events over or an individual's lifetime⁴. Several life course
6 models have been proposed to explain how life events affect health, such as critical sensitive periods
7 of emotional and physical growth during childhood altering disease risk⁵ or life events having a
8 cumulative effect overtime⁶. These distinct theories are often difficult to distinguish due to the
9 multifaceted nature of exposures, such as socioeconomic status⁷. The Marmot review highlighted
10 critical periods during childhood, such as school education, and proposed strategies to reduce these
11 health inequalities, such as focusing social determinants of health interventions proportionally
12 across the gradient of socio-economic disadvantage⁸. Adverse childhood events, such as
13 bereavement or exposure to violence are likely to negatively affect these critical periods of
14 childhood.

15 Research has identified the importance of positive interactions between a child and their primary
16 caregiver during these formative years⁹. This theory of attachment described by Bowlby has been
17 further associated with the development of diseases¹⁰. Moreover, secure attachment has been
18 associated with the tendency to implement positive emotional adaption to chronic disease¹¹.

19 Violence has been shown to affect mental and physical health and thus subsequently an individual's
20 social network at home¹².

21 A recent literature review on healthy ageing and improving health inequity highlighted causes such
22 as adverse prenatal and early childhood events, accumulation of disadvantage, life course
23 trajectories and the intergenerational transmission of health inequalities¹³. The results are in
24 keeping with Grundy and colleagues who found that many life events have a negative effect, but
25 adds that specific negative life events in isolation can also have an impact, such as an emotionally

1 cold mother¹⁴. The authors also argue that data collection should be carried out across a life course
2 to better understand the broader determinants of healthy ageing¹³.

3 Sutin AR. *et al*, showed that stressful life events are associated with changes in self-rated health
4 across a ten-year time span¹⁵. In particular, negative turning points in the participants' lives were
5 associated with worse outcomes in self-rated health changes when compared to more positively
6 perceived life events¹⁵.

7 To understand the effect of events over a life course, it is important to identify common events in
8 older individuals and investigate the association with health or disease. Whilst many studies have
9 looked at the impact of life events on later life, few have sought to identify common groups or
10 patterns of life events. This is important because multiple life events often occur together. Sadana
11 and colleagues recommended several areas for future research of which this article has addressed
12 two: first, to strengthen evidence available to support the design of policies and interventions in a
13 diverse context; and second, to learn when to intervene at critical points across a life course¹³. This
14 study aimed to identify latent groups of older people with similar life events and explore
15 associations between these groups and their physical, mental and social health in later life. The main
16 outcomes were quality of life (QoL) and functional ability, because they are clinically important and
17 objectively measurable.

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1 Methods:

2 Data Source and Participants

3 The English Longitudinal study of Ageing (ELSA) is a longitudinal study of adults over 50 living in
4 England¹⁶. This study contains information on health, functioning, social participation, and economic
5 position^{16,17}. ELSA aimed to be representative of the general population, and eight waves of data are
6 currently available¹⁶. 12,099 participants were recruited from the Health Survey for England and
7 completed the main questionnaire for wave 1. Refreshment samples consisting of people aged 50-
8 52 were added prior to the wave 3 (2006) questionnaire (n=9,771) to replenish the younger group
9 of study participants¹⁷. Wave 3 was used as a cross-sectional data source as it was the only wave in
10 which life course data was collected¹⁷.

11 Computer-assisted personal face-to-face interviews and a self-completed questionnaire are
12 undertaken with participants every two years. Respondents in wave 3 were invited to answer a self-
13 completion life history-based questionnaire in addition to the main face-to-face questionnaire. The
14 study flow is shown in Figure 1.

15 Latent Class Analysis

16 Responses to eight specific questions as shown in Figure 2 were chosen to represent broad topics in
17 life-history including: a mother figure who was emotionally cold towards me; a father figure who
18 was emotionally cold towards me; experiencing a major fire, flood, earthquake or other natural
19 disaster; being a victim of serious physical attack or assault; having fired a weapon in combat or
20 been fired upon; losing a very close friend or relative in a war or military service; experiencing severe
21 financial hardship; and the estimated number of books in their home at 10 years old.

22 Latent class analysis (LCA) was used to identify groups, or patterns, of life events. Within the LCA a
23 combination of binary and categorical variables was used. Groups were generated according to the
24 eight life-history questions above. We explored the LCA which generated two to six groups. Bayesian

1 Information Criterion (BIC), Akaike Information Criterion (AIC) and discussion within the research
2 team were used to determine the most informative number of groups. Through the LCA each
3 participant was allocated membership to specific groups of highest probability. The LCA was
4 undertaken in Stata 15 using the LCA plug-in¹⁸. Baseline characteristics of each group were described
5 and descriptors for each group were determined through discussion with the research team.

6 Multivariate Regression Models

7 Linear and logistic regression were used to explore associations between these groups and pre-
8 specified health and wellbeing factors. The analysis was weighted by LCA probability to give greater
9 weight to those individuals with higher probability of group membership. This regression was
10 adjusted for age, sex, ethnicity and socioeconomic status.

11 Sex was defined as male or female and ethnicity was defined as white or non-white. Age was self-
12 recorded based on the age of the participant on their last birthday prior to answering the
13 questionnaire. Socioeconomic status was based on National Statistics Socio-Economic Classification
14 (NS-SEC) which categorises participants by 1 being managerial and professional occupations, 2 being
15 in intermediate occupations, and 3 being routine and manual occupations.

16 The main outcomes of this research were functional ability and QoL. Functional ability was the
17 number of difficulties performing activities of daily living (ADLs). ADLs were measured based on the
18 independent ability to carry out each of 6 activities: dressing, walking across a room, bathing or
19 showering, eating, getting in or out of bed, using the toilet¹⁹. ADL scores ranged from 0 being
20 independent to 6 being completely dependent¹⁹. Instrumental ADLs (iADLs) included seven activities:
21 using a map to get to a strange place, preparing a hot meal, grocery shopping, making phone calls,
22 taking medications, doing work around the house or garden and money management²⁰. IADL scores
23 were based on a scale of 0-7²⁰. QoL was measured through CASP-19, which uses the 4 domains of
24 control, autonomy, self-realisation and pleasure for a 19-item measurement scale which was put
25 into percentiles²¹.

1 Secondary outcomes were analysed including self-reported diagnosis of psychiatric problems such as
2 anxiety, depression or manic depression which were recorded based on whether or not the patient
3 mentioned these conditions in the questionnaire. Then those who mention anxiety, hallucinations,
4 emotional problems, schizophrenia, psychosis, mood swings, manic depression or any other
5 psychiatric problems were grouped together for a variable relating to experiencing any psychiatric
6 problem variable.

7 Participants reported information regarding long-standing illness, social network participation,
8 friendships, long-term illness, general health, life-threatening illness, social club membership and
9 experiencing the long-term effect of injury which was recorded as either yes or no. General health
10 status was self-reported as very good, good, fair, bad or very bad.

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1 Results:

2 Latent Class Analysis

3 7,855 of the 9,771 who responded to the main questionnaire also completed the life-history
4 questionnaire (Figure 1). A total of 7,555 answered at least one of the eight questions chosen to
5 carry out the Latent class analysis (LCA). Comparison of model fit and discussion within the research
6 team indicated that four groups with common life events offered the most meaningful
7 interpretation. Table 1 shows the pattern of respondents within the four groups. The 6,250
8 members of group A were labelled 'few/no life events' due to the absence of many chosen life
9 events. The 724 members of group B were labelled 'emotionally cold mother' because maternal
10 coldness was the distinctive feature. The 274 members of group C were labelled 'violence in combat'
11 because members were more likely to have lost someone in war or military service and had fired a
12 weapon in combat or been fired upon. The 307 members of group D were labelled 'many life events'
13 because those belonging to this group had several life events.

14 Those with many life events were characterised as having the lowest average age at 60 years and
15 QoL whilst experiencing the highest iADL scores (Table 2). Those characterised by having
16 experienced violence in combat had the highest mean age at 73 years, higher ADL and iADL
17 interquartile ranges of 0 to 1 (Table 2). All groups had a similar mean socioeconomic status of 2
18 being intermediate occupations (Table 2).

19 The majority of those categorised by violence in combat were white males, with males making up
20 91.6% of the group (Table 2). Other groups had a female majority. Females comprised 70.0% of
21 those within the 'emotionally cold mother' group, 56.9% of those with 'few life events' and 58.5% of
22 those with 'many life events' (Table 2). Compared to other groups those individuals characterised
23 into having many life events or an emotionally cold mother had a greater proportion of individuals
24 reporting any psychiatric problem (18.2% and 12.1% respectively) (Table 2). Compared to other

1 groups a higher proportion of those in the ‘many life events group’ were likely to be detached from a
2 social network at 40.4% (Table 2).

3 Regression Analysis

4 The main outcomes analysed were QoL and functional ability. Adjusted regression showed that,
5 compared to the “few life events” group, those in the “emotionally cold mother” (coefficient -1.89,
6 95%CI -2.62 to -1.15) and “violence in combat” groups (coefficient -1.94, 95%CI -3.08 to -0.82) were
7 significantly less likely to experience a good QoL (Table 3).

8 Those in the “many life events” group were 5.3 times more likely to experience a lower QoL (95%CI -
9 6.61 to -4.05) and also worse functional ability, with higher ADL (coefficient 0.35, 95%CI 0.20 to 0.50)
10 and iADL (coefficient 0.41, 95%CI 0.27 to 0.56) scores (Table 3).

11 Analysis of secondary outcomes showed that, compared to the “few life events” group, the
12 “violence in combat” group were more likely to have had a life-threatening illness/accident (OR 1.98,
13 95%CI 1.52 to 2.59) (Table 3). Adjusted regression analysis indicated that the “emotionally cold
14 mother” group were more likely to report any psychiatric problems (OR 1.73, 95%CI 1.34 to 2.23),
15 and to be detached from social networks (OR 2.60, 95%CI 1.68 to 4.04) compared to the “few life
16 events” group (Table 3).

17 The “many life events” group experienced the highest increased risk from the factors analysed.

18 Those with many life events were associated with 3-times increased risk of self-reporting any
19 psychiatric problems (95%CI 2.18 to 4.17), a 2.6 times increased risk of being detached from social
20 networks (95%CI 1.36 to 4.97) and were 2.22 times more likely to have self-reported long-standing
21 illness (95%CI 1.72 to 2.87) (Table 3).

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1 Discussion:

2 Main Findings

3 We identified four groups of individuals all aged over 50 based on their experience similar of life
4 events. The four groups include: few life events, an emotionally cold mother, experience of violence
5 in combat and many life events. Those who formed the Violence in combat group had the highest
6 mean age of 73 years old. This group may be likely to have fought in the second world war which
7 was in 1939-1945 and during their younger years. All groups were significantly less likely to have a
8 good QoL when compared with those with few life events. Only those with many life events were
9 significantly more likely to have a reduced functional ability and to report the presence of a long-
10 standing illness.

11 When we analysed other outcomes, those with an emotionally cold mother and those with many life
12 events were significantly more likely to experience anxiety, psychiatric problems, and social
13 detachment. Those who experienced violence in combat were more likely to have ever experienced
14 a life-threatening illness or accident.

15 Current Knowledge

16 The results of this study are in keeping with the cross-sectional analysis by Archea C *et al*, which
17 analysed 189 participants and found that negative life events in asthma patients were associated
18 with a lower QoL especially in those with a lower income²². Whilst our study looked at significant
19 events over the individual's life course, Archea C *et al* analysed the effect of events occurring over
20 the last 12 months. QoL measurements were based on asthma-specific QoL and the study may be
21 limited by possible overestimation due to the direct effect of life events on asthma exacerbations.

22 An Irish cohort study of 6,910 individuals using similar QoL measurements with CASP-19 for people
23 aged 50 and older found that past stressful events had a significant negative association with QoL²³.

1 Further analysis found that childhood experiences had similar effects on QoL to those occurring in
2 adulthood²³.

3 Krsteska and colleagues found poor socioeconomic conditions and poverty during childhood was
4 linked to later life depression and reduced well-being²⁴. Corroborating our study findings, Krsteska
5 and colleagues also found a 3-fold increase in depression in those who had experienced emotional
6 neglect and that negative maternal characteristics were associated with an increase in depression in
7 later life²⁴. However, it did not specify the type of negative characteristics and further the sample
8 size was too small to claim significance²⁴.

9 Bowlby discussed the influence of secure attachment development between the child and their care
10 giver⁹. Bowlby's attachment theory has been associated with a critical time period during the first
11 few years of life and studies associate the disruption of such an emotional and physical bond to the
12 subsequent disarray of emotional development¹⁰. A 13-year longitudinal study associated early
13 maternal depression and offspring anxiety disorders²⁵. Furthermore, a meta-analytical review
14 exploring maternal depression showed its association with hostility towards the child and its
15 subsequent negative impact on behavioural and emotional functioning²⁶. They also found that
16 maternal effects were more likely to be internalised in girls than boys²⁶. This may explain the higher
17 proportion of females grouped to have a characteristically emotionally cold mother in the LCA.
18 These findings support the need for interventions supporting maternal-offspring relationships and
19 the relationship of the wider family.

20 PTSD has been linked not only to mental ill health but also physical ill health^{27, 28}. Husarewycz and
21 colleagues identified that, in the analysis of a cohort of adults >20 years, those with combat-related
22 trauma did not have an increased likelihood of physical health problems compared with other adults
23 who had not taken part in combat²⁸. This is contrary to our findings which identified increased odds
24 of experiencing a life-threatening illness or accident. An explanation for this could be the difference
25 in recruitment of the military in the UK and US. Husarewycz and colleagues discussed the selection

1 bias for this cohort whereby their health status is by nature preferable, as those in the US with
2 physical health problems were withheld from deployment^{27,28}.

3 Implications for policy and research

4 This research has highlighted inequalities in exposure to life events which may affect physical and
5 mental well-being in later life. Clinicians working with older people should consider the impact of life
6 events and be aware of the life course perspective regarding older people's health and wellbeing as
7 part of a patient-centred approach. Policy makers should take a long-term perspective when
8 considering inequalities in health in later life and target life events which are amenable to change.
9 For example, teaching and improving parenting skills may strengthen relationships in order prevent
10 emotionally negative experiences. Gun and knife crime can be targeted through initiatives such as
11 the Violence reduction unit introduced in 2005 by police in Glasgow which reduced morbidity²⁹. The
12 impact of adverse childhood events for children in health and social care is recognised, however
13 adverse life events are rarely discussed for older people. Education around communicating the
14 impact of life events to older people during consultations, particularly in people with a poor QoL or
15 mental health diagnoses should be considered. If health inequalities in older age are going to be
16 addressed, a life course perspective including adverse childhood events should be considered.

17 Strengths and limitations

18 ELSA is a dynamic longitudinal study designed to be directly comparable to the US Health and
19 Retirement Study and the Survey of Health, Ageing and Retirement in Europe. The life course data
20 was collected in wave 3 of ELSA. Data about past events were not collected at the time of the past
21 event, and so there may be an element of recall bias. The conversion of continuous variables to
22 categorical variables to measure latent class analysis may have skewed results. There is ongoing
23 discussion on how to deal with membership grouping in the LCA³⁰⁻³². To reduce the effect of this,
24 error regression was weighted based on probability of being in a group. This was so that those with a
25 higher probability of association with these life events had a greater weight to the regression

1 analysis. While the data was collected in 2006, the importance of the findings are not likely to have
2 changed.

3 Conclusion

4 This study shows the association of life course events with long-term health outcomes. Experiencing
5 many life events, maternal coldness or violence in combat was associated with reduced quality of
6 life. Policies aimed at reducing inequalities in older age should consider events across the life course.

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1 Acknowledgements:

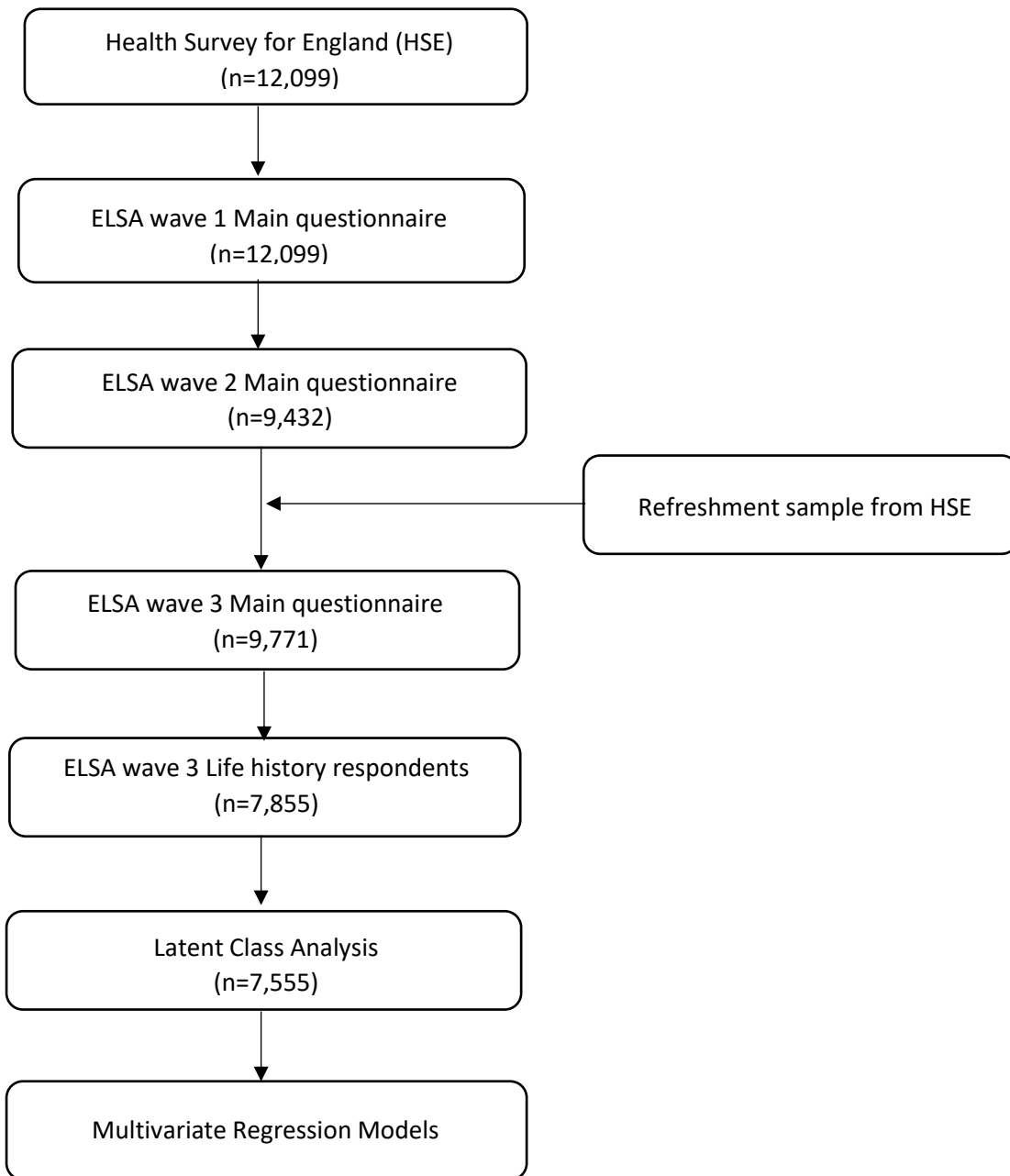
2 ELSA is funded by the National Institute on Aging, Economic and Social Research Council (ESRC),
3 Department for Health and Social Care; Department for Transport; Department for Work and
4 Pensions, which is coordinated by the National Institute for Health Research (NIHR).

5 ELSA data are available from the UK Data Service at
6 <http://discover.ukdataservice.ac.uk/catalogue?sn=5050> (11 Dec 2019, date last accessed).

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1 Figure 1: Process for participants¹⁷.

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1 Figure 2: Eight questions from ELSA contributing to latent class analysis

- 2 1. Mother or mother figure: She seemed emotionally cold to me (Strongly agree, agree,
3 disagree, strongly disagree)
- 4 2. Father or father figure: He seemed emotionally cold to me (Strongly agree, agree, disagree,
5 strongly disagree)
- 6 3. Have you ever lost a very close friend in war or military service? (Yes, No)
- 7 4. Have you ever been a victim of a serious physical attack or assault? (Yes, No)
- 8 5. Have you ever fired a weapon in combat or been fired upon? (Yes, No)
- 9 6. Have you ever experienced a major fire, flood, earthquake or other natural disaster? (Yes,
10 No)
- 11 7. Have you ever experienced severe financial hardship? (Yes, No)
- 12 8. About how many books were there in the place you lived in when you were 10? ((None or
13 very few (0-10 books), Enough to fill one shelf (11-25 books), Enough to fill one bookcase
14 (26-100 books), Enough to fill two bookcases (101-200 books), Enough to fill three or more
15 bookcases (more than 200 books))

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1 Table 1: Patterns of respondents across the four groups (Total=7,555)

Variable		Group A (n=6,250) “Few Life events” (n, (%))	Group B (n=724) “Emotionally cold mother” (n, (%))	Group C (n=274) Violence in combat (n, (%))	Many life events (total=307) (n, (%))
Mother cold	Agree/Strongly Agree	0 (0.0)	714(100.0)	37(14.5)	116(38.7)
	Disagree/Strongly Disagree	5,042 (100.0)	0(0.00)	218(85.5)	184(61.3)
Dad cold	Agree/Strongly Agree	471(9.6)	294(42.5)	63(24.7)	151(51.0)
	Disagree/Strongly Disagree	4,423(90.4)	398(57.5)	192(75.3)	145(49.0)
Lost someone close in war/military service	Agree/Strongly Agreed	466(9.0)	66(9.2)	190(70.1)	20(6.7)
	Disagree/Strongly Disagree	4,732(91.0)	653(90.8)	81(29.9)	280(93.3)
Victim of serious physical attack	Yes	114(2.2)	0(0.00)	56(20.9)	224(74.2)
	No	5,107(97.8)	721(100.0)	212(79.1)	78(25.8)
Ever fired weapon in combat or been fired upon	Yes	98(1.9)	10(1.4)	262(95.6)	0(0.0)
	No	5,137(98.1)	714(98.6)	12(4.4)	303(100.0)
Experienced a natural disaster	Yes	450(8.6)	49(6.8)	91(34.5)	112(37.1)
	No	4,763(91.3)	671(93.2)	173(65.5)	190(62.9)
	Yes	784(15.1)	177(24.8)	103(37.9)	242(78.8)

Experienced severe financial hardship	No	4,412(84.9)	536(75.2)	169(62.1)	65(21.2)
Number of books in home at 10 years old	0-10	1,581(25.3)	231(33.5)	95(37.9)	95(32.4)
	11-25	1,559 (24.9)	155(22.5)	66(26.3)	65(22.2)
	26-100	1,976 (31.6)	181(26.2)	62(24.7)	67(22.9)
	101-200	582(9.3)	61(8.8)	13(5.2)	45(15.4)
	>200	552 (8.8)	62(9.0)	15(6.0)	21(7.2)

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- 1 Table 2: Baseline characteristics of participants in each group for continuous and
- 2 binary variables

Variable		Few Life events	Emotionally cold mother	Violence in combat	Many life events	Mean of Total
Age (mean (SD)) (mean, sd)		64(10.9)	63(10.1)	73(10.9)	60 (8.9)	64(10.9)
Socioeconomic status (mean (SD))		2(0.9)	2(0.9)	2(0.9)	2(0.9)	2(0.9)
Activities of daily living DL (median, (IQR))		0 (0,0)	0(0, 0)	0 (0, 1)	0 (0, 0)	0 (0,0)
Instrumental activities of daily living (median, (IQR)) ADL		0 (0, 0)	0 (0, 0)	0 (0, 1)	0 (0, 0)	0 (0,0)
Quality of life (mean (SD))		42(8.3)	40(9.0)	39(8.5)	37(10.3)	41(8.5)
Gender (n, (%))	Male	2780 (43.1)	218(30.0)	251 (91.6)	127 (41.5)	3376 (43.5)
	Female	3668 (56.9)	508 (70.0)	23 (8.4)	179 (58.5)	4378 (56.5)
Ethnicity (n, (%))	White	6292 (97.6)	708 (97.7)	271 (98.9)	294 (96.1)	7565 (97.6)
	Non-white	155 (2.4)	17 (2.3)	3 (1.1)	12(3.9)	187 (2.4)
Anxiety (n, (%))	No	6230 (96.3)	679 (93.4)	268 (97.8)	275(89.6)	7452 (95.8)
	Yes	238 (3.7)	48 (6.6)	6 (2.2)	32 (10.4)	324 (4.2)
Depressed or manic depression (n, (%))	No	6139 (94.9)	663 (91.2)	263 (96.0)	263 (85.7)	7328 (94.2)
	Yes	329 (5.1)	64 (8.8)	11 (4.0)	44 (14.3)	448 (5.8)
Any psychiatric problems (n, (%))	No	6018 (93.0)	639 (87.9)	260 (94.9)	251 (81.8)	7168 (92.2)
	Yes	450 (7.0)	88 (12.1)	14 (5.1)	56 (18.2)	608 (7.8)
	No	853 (79.1)	67(61.5)	29(64.4)	31 (59.6)	980 (76.3)

Detached from social network (n, (%))	Yes	225 (20.9)	42 (38.5)	16 (35.6)	21 (40.4)	304 (23.7)
Whether has any friends (n, (%))	No	233 (4.1)	41 (6.1)	23 (9.2)	25 (9.0)	322 (4.7)
	Yes	5437 (95.9)	637 (94.0)	227 (90.8)	254 (91.0)	6555 (95.3)
Self-reported long-term illness (n, (%))	No	3047 (47.3)	344 (47.5)	104 (38.0)	102 (33.3)	3597 (46.4)
	Yes	3399 (52.7)	381 (52.6)	170 (62.0)	204 (66.7)	4154 (53.6)
Self- reported general health (n, (%))	Bad/ very bad	377 (5.9)	46 (6.3)	23 (8.4)	36 (11.8)	482 (6.2)
	Very good/good/fair	6067 (94.2)	680 (93.7)	251 (91.6)	270 (88.2)	7268 (93.8)
Ever had life-threatening illness/accident (n, (%))	No	3945 (75.7)	547 (75.7)	141(53.6)	170 (57.1)	4803 (74.0)
	Yes	1264 (24.3)	176 (24.3)	122 (46.4)	128 (43.0)	1690 (26.0)
Social club member (n, (%))	No	4386 (81.1)	547 (84.2)	183 (76.6)	218 (81.3)	5334 (81.2)
	Yes	1025 (18.9)	103 (15.9)	56 (23.4)	50 (18.7)	1234 (18.8)
Long term effect of injury (n, (%))	Not mentioned	1661 (66.6)	168 (58.1)	86 (64.7)	90 (48.9)	2005 (64.7)
	Mentioned	833 (33.4)	121 (41.9)	47 (35.3)	94(51.1)	1095 (35.3)

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- 1 Table 3: Regression coefficients and odds ratios for health and wellbeing factors
- 2 within the 4 groups^a

Variable	Few Life events (Reference Group)	Emotionally cold mother (95% CI)	Violence in combat (95%CI)	Many life events (95% CI)
Activities of Daily living (Coefficient)	0	0.0085 (-0.055- 0.072)	0.056 (-0.063- 0.17)	0.35 (0.20-0.50)
Instrumental Activities of Daily Living (Coefficient)	0	0.048(-0.019- 0.12)	0.047 (-0.061- 0.16)	0.41 (0.27-0.56)
Quality of life (Coefficient)	0	-1.89 (-2.62-- 1.15)	-1.95 (-3.08- - 0.82)	-5.33 (-6.61-- 4.05)
Anxiety (OR)	0	1.77 (1.27-2.47)	0.94 (0.40-2.20)	3.13 (2.08-4.70)
Depression or manic depression (OR)	0	1.68 (1.26-2.25)	1.30 (0.68-2.50)	3.19 (2.24-4.54)
Any psychiatric problems (OR)	0	1.73 (1.34-2.23)	1.3 (0.71-2.25)	3.0 (2.18-4.17)
Whether has any friends (OR)	0	0.59 (0.41-0.84)	0.65 (0.41-1.05)	0.36 (0.23-0.56)
Social club member (OR)	0	0.85 (0.67-1.07)	1.01 (0.73-1.40)	1.09 (0.78-1.51)
Detached from social network (OR)	0	2.60 (1.68-4.04)	1.57 (0.79-3.13)	2.60 (1.36-4.97)

^a Significance was calculated at p<0.05. Figure in bold represent statistically significant results.

Self-reported long-standing illness (OR)	0	1.05 (0.90-1.23)	1.11 (0.85-1.45)	2.22 (1.72-2.87)
Ever had a life-threatening illness/accident	0	1.07 (0.88-1.29)	1.98 (1.52-2.60)	2.77 (2.16-3.57)
Long term effect of injury e.g. ill health, difficult social life (OR)	0	1.42 (1.10-1.84)	1.27 (0.87-1.87)	2.12 (1.54-2.91)

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1 References:

- 2 1. Power C, Graham H, Due P, Hallqvist J, Joung I, Kuh D, et al. The contribution of childhood
3 and adult socioeconomic position to adult obesity and smoking behaviour: an international
4 comparison. *International Journal of Epidemiology*. 2005; 34:335-44.
- 5 2. Ramsay SE, Papachristou E, Watt RG, Lennon LT, Papacosta AO, Whincup PH, et al.
6 Socioeconomic disadvantage across the life-course and oral health in older age: findings
7 from a longitudinal study of older British men. *Journal of Public Health*. 2018; 40:4:e423-
8 e430
- 9 3. Smith GD, Hart C, Blane D, Hole D. Adverse socioeconomic conditions in childhood and cause
10 specific adult mortality: prospective observational study. *BMJ: British Medical Journal*. 1998;
11 316:1631-5.
- 12 4. Kuh D, Ben-Shlomo Y, Lynch J, Hallqvist J, Power C. Life course epidemiology. *Journal of*
13 *Epidemiology and Community Health*. 2003; 57:778-83.
- 14 5. Hertzman C, Power C, Matthews S, Manor O. Using an interactive framework of society and
15 lifecourse to explain self-rated health in early adulthood. *Social science & medicine* (1982).
16 2001; 53:1575-85.
- 17 6. Ben-Shlomo Y, Kuh D. A life course approach to chronic disease epidemiology: conceptual
18 models, empirical challenges and interdisciplinary perspectives. *International Journal of*
19 *Epidemiology*. 2002; 31:285-93.
- 20 7. Hallqvist J, Lynch J, Bartley M, Lang T, Blane D. Can we disentangle life course processes of
21 accumulation, critical period and social mobility? An analysis of disadvantaged socio-
22 economic positions and myocardial infarction in the Stockholm Heart Epidemiology
23 Program. *Social science & medicine* (1982). 2004; 58:1555-62.
- 24 8. Marmot M. The Health Gap: The Challenge of an Unequal World: the argument.
25 *International Journal of Epidemiology*. 2017; 46:1312-8.

- 1 9. Bowlby, J. Attachment and loss 1973. Available from:
2 <https://wvdz41tbd01.storage.googleapis.com/QjAwMDZXM1ZTQQ==01.pdf>.
- 3 10. Maunder RG., Hunter JJ. Attachment and Psychosomatic Medicine: Developmental
4 Contributions to Stress and Disease. Psychosomatic Medicine. 2001. 63: 556-567
- 5 11. Schmidt. S, Nachtigall. C, Wuethrich-Martone. O, Strauss. B. Attachment and coping with
6 chronic disease. Journal of psychosomatic research. 2002. 53;763-773
- 7 12. Levy BS, Sidel VW. Health effects of combat: a life-course perspective. Annual review of
8 public Health. 2009; 30:123-136
- 9 13. Sadana R, Blas E, Budhwani S, Koller T, Paraje G. Healthy Ageing: Raising Awareness of
10 Inequalities, Determinants, and What Could Be Done to Improve Health Equity. The
11 Gerontologist. 2016; 56:S178-S93.
- 12 14. Grundy E, van Campen C, Deeg D, Dourgnon P, Huisman M, Ploubidis G, Tsimbos C. Health
13 inequalities and the health divide among older people in the WHO European Region: The
14 European review on the social determinants of health and the health divide. World Health
15 Organisation: WHO 2013.
- 16
17 15. Sutin AR., Costa, Jr PT, Wethington E. and Eaton W. Perceptions of stressful life events as
18 turning points are associated with self-rated health and psychological distress. Anxiety Stress
19 Coping. 2010. 23:5, 479-492
- 20 16. A S. English Longitudinal Study of Ageing. UCL [29/08/2018]; Available from:
21 <https://www.elsa-project.ac.uk/>.
- 22 17. Steptoe, A., Breeze, E., Banks, J. and Nazroo. J. Cohort Profile: The English Longitudinal Study
23 of Ageing. International Journal of Epidemiology. 2013. 42:6: 1640-8
- 24 18. Plugon LS. 1.2 ed: University Park: The Methodology Center, Penn State; 2015.

- 1 19. Zaninotto P, Falaschetti E. Comparison of methods for modelling a count outcome with
2 excess zeros: application to Activities of Daily Living (ADL-s). *Journal of Epidemiology and*
3 *Community Health*. 2011; 65:205-10.
- 4 20. Torres J, Lima-Costa MF, Marmot M and Oliveira C. Wealth and Disability in Later Life: The
5 English Longitudinal Study of Ageing (ELSA). 2016; 11:11
- 6 21. Jim J, Bartlam B and Bernard M. The CASP-19 as a measure of quality of life in old age:
7 evaluation of its use in a retirement community. *Ageing and mental health*. 2011; 20: 7: 997-
8 1004
- 9 22. Archea C, Yen LH, Chen H, Disney MD, Katz PP, Masharani U, Yelin EH, Earnest G and Blanc
10 PD. Negative life events and quality of life in adults with asthma. *Thorax*. 2006; 62:2:139-
11 146
- 12 23. Layte R, Sexton E and Savva G. Quality of Life in Older Age: Evidence from an Irish Cohort
13 Study. 2013; 61:S2:S299-305
- 14 24. Krsteska R, Pejaska VG. The association of poor economic condition and family relations in
15 childhood with late-life depression. *Psychiatria Danubina*. 2013; 25:241-7.
- 16 25. Halligan SL, Murray L, Martins C, Cooper PJ. Maternal depression and psychiatric outcomes
17 in adolescent offspring: A 13-year longitudinal study. *Journal of Affective Disorders*. 2007;
18 97:145-54.
- 19 26. Goodman SH, Rouse MH, Connell AM, Broth MR, Hall CM, Heyward D. Maternal Depression
20 and Child Psychopathology: A Meta-Analytic Review. *Clinical Child and Family Psychology*
21 *Review*. 2011; 14:1-27.
- 22 27. Kessler RC, Sonnega A, Bromet E, Hughes M, Nelson CB. Posttraumatic stress disorder in the
23 National Comorbidity Survey. *Archives of general psychiatry*. 1995; 52:1048-60.
- 24 28. Husarewycz MN, El-Gabalawy R, Logsetty S, Sareen J. The association between number and
25 type of traumatic life experiences and physical conditions in a nationally representative
26 sample. *General Hospital Psychiatry*. 2014; 36:26-32.

- 1 29. Rainey SR, Simpson J, Page S, Crowley M, Evas J, Sheridan M, Ireland AJ. The impact of
2 violence reduction initiatives on emergency department attendance. *Scottish Medical*
3 *Journal*. 2015; 60:2:90-94
- 4 30. Bray BC, Lanza ST, Tan X. Eliminating Bias in Classify-Analyze Approaches for Latent Class
5 Analysis. *Structural equation modelling: a multidisciplinary journal*. 2015; 22:1-11.
- 6 31. Bakk Z, Oberski DL, Vermunt JK. Relating Latent Class Assignments to External Variables:
7 Standard Errors for Correct Inference. *Political Analysis*. 2017; 22:520-40.
- 8 32. Goodman LA. 1. On the Assignment of Individuals to Latent Classes. *Sociological*
9 *Methodology*. 2007; 37:1-22.

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