TRAJECTORIES OF DEPRESSIVE SYMPTOMS AMONG OLDER ADULTS AND IN ADULTS WITH HIP FRACTURE: ANALYSIS FROM THE ENGLISH LONGITUDINAL STUDY OF AGEING

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ABSTRACT

Background

This study aimed to determine trajectories of depressive symptoms among older adults in England, overall and for those with hip fracture. The study aimed to explore the differential characteristics of each trajectory identified.

Methods

Analysis of adults aged 60 years or more (n=7,050), including a hip fracture subgroup (n = 384), from the English Longitudinal Study of Ageing. Latent class growth mixture modelling was completed. Depressive symptom prevalence was estimated at baseline. Chi-squared tests were completed to compare baseline characteristics across trajectories.

Results

Three trajectories of depressive symptoms (no, mild, and moderate-severe) were identified overall and for those with hip fracture. The moderate-severe trajectory comprised 13.7% and 7% of participants for overall and hip fracture populations, respectively. The proportion of participants with depressive symptoms in the moderate-severe trajectory was 65.4% and 85.2% for overall and hip fracture populations, respectively. Depressive symptoms were stable over time, with a weak trend towards increasing severity for the moderate-severe symptom trajectory. Participants in the moderate-severe symptom trajectory were older, more likely to be female, live alone and had worse health measures than other trajectories ($p < 0.001$).

Conclusions

Older adults, and those with hip fracture, follow one of three trajectories of depressive symptoms which are broadly stable over time. Depressive symptoms' prevalence was higher for those with hip fracture and, when present, the symptoms were more severe than the overall population. Results suggest a role of factors including age, gender, and marital status in depressive symptoms trajectories.

KEYWORDS

Depressive symptoms, depression, trajectories, hip fracture

BACKGROUND

'Late life depression' is the term used for depression symptomology experienced by older adults (1). Some studies report a positive, linear relationship between age and presence of depressive symptoms where symptoms continually rise after the age of 60 (2). Yet other studies suggest younger older adults have worse depressive symptoms compared to the oldest older adults (3). These differing findings may be attributed to the influence of other demographic and clinical factors such as sex, race, multimorbidity and life experiences such as spousal bereavement (4). Little is known about the role of these factors on trajectories of depressive symptoms in older adults (4).

Unanticipated healthcare events such as hip fracture may negatively influence trajectories of depressive symptoms in older adults (4). Cristancho and colleagues (5) investigated trajectories of depressive symptoms in the year after hip fracture noting three distinct trajectories. Investigating whether trajectories differ from the overall older adult population without hip fracture or beyond 1-year post-fracture would offer additional understanding of the role of hip fracture in depressive symptoms over time. Further, trajectories of depressive symptoms for older adults with hip fracture may vary between USA and UK populations due to demographic and societal differences leading to disparities in health outcomes (6) as well as differences in access to mental health services after fracture (7).

This study aims to determine the trajectories of depressive symptoms among older adults in England over a 17-year period and whether these trajectories vary for those with hip fracture. This study will also explore the differential characteristics of each trajectory identified.

METHODS

ELSA Sample

Participant data for this study were obtained from the English Longitudinal Study of Ageing (ELSA) dataset, a nationally representative longitudinal study of community dwelling adults aged 50 years and older

(8). Data on family, work, economic status, physical and mental health, and social, psychological, and biological factors are collected at each wave (9). Participants are followed-up every two years with the first wave of data collected in 2002 and 2003. The latest wave, Wave 9, was collected between 2018 and 2019. Ethical approval for ELSA was given by the London Multi-Centre Research Ethics Service (MREC/01/2/91) and written informed consent obtained from all participants. Anonymised unlinked data for this study were provided by the UK Data Service.

Participants

The analysis cohort for this study (ELSA Wave 1 to Wave 9) were over the age of 60 years in the year they entered the ELSA sample, with recorded 8-item Centre for Epidemiological Studies-Depression (CES-D) data in at least two waves (10), and CES-D scores reported on their exit wave. From all waves, including the refreshment samples, 7,050 people were included for data analysis.

Measurements

Depressive symptoms were measured using the 8-item CES-D scale (10). The scale has been validated in the older adult population and is a reliable (Cronbach's alpha coefficient=0.72) and valid tool, with satisfactory model fit (adjusted Chi-square test=0.054, root mean square error of approximation (RMSEA)=0.01 and weighted root mean square residual (WRMR)=0.63) (11). Each question has a binary response of 'yes' or 'no', with a total score of four considered the threshold for the presence of depressive symptoms (12).

Alcohol consumption, social networks, Control Autonomy Self-realisation Pleasure-19 (CASP-19)(13), and the Life Satisfaction Scale were collected by questionnaire. Age, sex, marital status, health and illness impact, self-rated general health, mobility, comorbidities, Activities of Daily Living (ADL), Instrumental Activities of Daily Living (IADL), falls, hip fracture status, overall pain, smoking history, and physical activity were collected during face-to-face interviews. Comorbidities were classified according to seven ICD comorbidity classifications (14); diseases of the circulatory system (coronary heart disease, angina

diagnosis, heart attack, congestive heart failure, other heart disease or High Blood Pressure (BP)), diseases of the respiratory system (chronic lung disease or asthma), diseases of the nervous system (stroke, Parkinson's disease, or Alzheimer's disease), diseases of the musculoskeletal system or connective tissue (osteoarthritis. rheumatoid arthritis, other kind of arthritis, osteoporosis), metabolic diseases (diabetes), mental, behavioural, or neurodevelopmental disorders (dementia) and neoplasms (cancer).

Statistical Analysis

Analyses were completed for the entire population, and for the subgroup of older adults reporting a hip fracture at any wave. This approach was taken due to the potential of an unexpected healthcare event such as a hip fracture leading to different trajectories of depressive symptoms over time (15). Baseline characteristics stratified by the presence of depressive symptoms were reported as frequencies and percentages.

Group-based trajectory modelling (GBTM), a type of latent class growth mixture modelling application, groups individuals by estimating latent trajectories in a population (16). GBTM was conducted to assess unobserved groups of participants following distinct trajectories of depressing symptoms (16, 17) using the Stata 'traj' and 'trajplot' plugins with a censored normal distribution (cnorm) specification (18). 'Year of interview' was the time variable and total CES-D scores the variable of interest to identify groups with distinctive patterns of progression.

We tested a series of models using either 2-, 3-, 4- or 5- groups and combined different polynomial shapes; 0=intercept, 1=linear, 2=quadratic, 3=cubic. To determine the model of best fit and the optimal number of trajectories, we adopted several model fit indices; the Bayesian Information Criteria (BIC) (19), entropy (20), the posterior probabilities (21), ensuring a meaningful composition of each trajectory and trajectory membership included at least 5% of data (21). Across all combinations analysed, we identified the group with the lowest BIC value, the closest entropy value to one, and particularly values over 0.8 which indicate the groups are highly discriminating (19). We also assessed the posterior probabilities of classification in

each group. Models in which the average probability of a person being assigned to their assigned group were above 0.8 were more desirable (21). The BIC, entropy, and posterior probabilities for selected models are available in Appendix 1 (Tables S1-S6).

For the overall sample, data were used from the individual's entry wave. For the hip fracture subgroup, data were used from the wave which included the first reported hip fracture (fracture wave). The proportion of patients with depressive symptoms (numerator as the number of participants whose CES-D≥4 and denominator as the number of participants in each group) at baseline (entry wave) was calculated overall and for each trajectory. Differences between trajectory characteristics were assessed with the Chi-squared test (22). Chi-squared testing was chosen a priori to assess whether there were differences in characteristics between the trajectories identified. We decided against further post hoc comparisons to identify where the differences lay between each trajectory due to the risk of spurious associations with multiple testing (23). To further limit this risk, we calculated the Bonferroni adjustment which yielded an alpha level of significance of 0.0015 (Appendix 1) (23).

The trajectory analysis method employed automatically imputes missing data for individuals with depressive symptoms measured at least twice. Tables S7-S8 (Appendix 1) display the summaries and patterns of missingness in the data. To assess the sensitivity of findings to missing data, we replicated the analysis excluding cases with missing data and applied the final trajectory model obtained to the first five follow up time points, where the number of missing data was comparatively much lower than the nine time points used in the main analysis (Figures S1- S4 in Appendix 2). Stata 16.1 was used for all analyses (24).

RESULTS

Patient Characteristics

Overall, 7,050 patients over the age of 60 were included in the ELSA dataset in England between 2002-2019 (Table S9). Of these 1,059 (15.0%) patients experienced depressive symptoms.

Characteristics of the study cohort are detailed in Table S9. Older adults with depressive symptoms were older, female, more likely to be single, separated, divorced, or widowed, or reported worse health and social outcomes than those without depressive symptoms (Table S9).

Trajectory Analysis

A three-group model with the best combination of selection indices was chosen, with the lowest BIC and highest entropy and posterior probability values considered together. Through this, the model with a linear polynomial in the order of 0, 0, 1 was chosen. Tables S1-S3 (Appendix 1) provide detail on the six best-fit models including the final model selected, the posterior probabilities for the assignment of members for the selected model, and the summary of the selected model by each trajectory. Three trajectories were identified from the analysis: 'no' (n=2,726), 'mild' (n=3,357) and 'moderate-severe' (n=967) symptoms trajectories (Figure 1). Depressive symptoms in all trajectories were broadly stable over time, with a weak trend towards increasing symptoms in the moderate-severe trajectory. The median CES-D scores were 0 (Interquartile range (IQR): 0.0-0.0), 1 (IQR: 1.0-2.0) and 4 (IQR: 3.0-6.0) for the no-, mild-, and moderate-severe-symptoms trajectories, respectively. The median CES-D score of the moderate-severe symptoms trajectory met the threshold for depressive symptoms. The proportion of older adults with depressive symptoms (CES-D $\geq$ 4) at baseline in each trajectory were 0.4%, 12.4% and 65.4% for no-, mild-, and moderate-severe-symptoms, respectively (Table S10). The characteristics of each trajectory are detailed in Table S10.

Trajectories Comparison

There were statistically significant differences between the three trajectories for the prevalence of depressive symptoms, age, sex, ethnicity, marital status, activities of daily living, instrumental activities of daily living, total number of comorbidities, total number of mobility limitations, number of times fallen, CASP-19 score, self-rated general health, life satisfaction score, if health limited ability to work, pain, physical activity level, having a long-standing illness, comorbidities of the musculoskeletal, respiratory, circulatory and metabolic systems, falls history, alcohol consumption, social network, smoking status, if

they fractured their hip or had depression or manic depression ($p<0.001$) (Table S12 - Appendix 2). There was no difference between the three trajectories for BMI, diseases of the nervous system, neoplasms, mental disorders, or the management approach for depression ($p>0.01$).

Older adults with hip fracture

In the overall population, the prevalence of depressive symptoms was 15%. This is similar to the prevalence after the removal of participants with a history of hip fracture (14.6%). In the overall population, there were 3.6%, 6.2% and 8.2% of patients with hip fracture in the no-, mild-, and moderate-severe- symptoms trajectories, respectively. Overall, 384 (5.5%) patients in the ELSA dataset suffered a hip fracture between 2002-2019. Of these 87 (22.7%) patients experienced depressive symptoms at the fracture wave. A three-group model in the order of 0, 0, 0 was the most appropriate, when the best values of the model selection criteria were considered together. The summaries of the model selection by model and by the groups in the chosen model as well as the posterior probabilities for the selected model are presented in Tables S4-S6 (Appendix 1). Three trajectories were identified from the analysis: 'no' (n=138), 'mild' (n=219) and 'moderate-severe' (n=27) symptoms (Figure 2). Depressive symptoms in all trajectories were largely stable over time, with a significant positive linear slope in the moderate-severe symptoms trajectory. The 95% confidence intervals (CI) in this trajectory are relatively wide, suggesting a range of scores between approximately 5 and 7, and some fluctuation in scores over time within this range. The median CES-D scores in the trajectories were 0 (IQR: 0.0-1.0), 2 (IQR: 1.0-5.0) and 6.5 (IQR: 6.0-7.5) for the no-, mild-, and moderate-severe- symptoms trajectories, respectively. The median CES-D score of the moderate-severe symptoms trajectories met the threshold for depressive symptoms. In each trajectory, the proportion of older adults with depressive symptoms was 0.7%, 28.8%, and 85.2% in the no-, mild-, and moderate-severe-symptoms trajectories, respectively (Table S11). The characteristics of each trajectory are detailed in Table S11.

Trajectory Comparisons

There were statistically significant differences between the three trajectories for prevalence of depressive symptoms, marital status, if health limited ability to work, self-rated general health, pain, total number of mobility limitations, having a long-standing illness, CASP-19 score and life satisfaction score ($p < 0.001$). There was no significant difference between the three trajectories for ethnicity, age, sex, BMI, activities of daily living, instrumental activities of daily living, total number of comorbidities, falls history, physical activity level, comorbidities of the circulatory, respiratory, musculoskeletal, and metabolic systems, mental disorders and neoplasms, alcohol consumption, smoking status, social networks, and whether they had diagnosis of depression or manic depression ($p>0.0001$) (Table S13 - Appendix 2). No adult with hip fracture reported receiving medication or counselling (Table S11).

Missing Data Analysis

In the main analysis, 40% of individuals had their CES-D scores recorded in at least five waves. Trajectories identified using data from the first five waves of data only, and by excluding missing depressive symptoms data were comparable to the main analysis with good kappa agreement for group classification (Table S14 - Appendix 2). For the overall sample, in both analyses the trajectory shapes mirror the main analysis with a slightly more pronounced increase in symptoms in the moderate-severe symptoms trajectory. In the hip fracture group, the analyses showed the trajectories with moderate-severe symptoms had less severe symptoms than the moderate-severe trajectory of the main analysis (Median CES-D scores: <5 out of 8 vs 6 out of 8). In both samples, for the analysis excluding missing data, median CES-D scores for the trajectories did not meet the threshold for depressive symptoms (Figures S1-S4 - Appendix 2).

DISCUSSION

Main findings

The results of this study suggest three distinct trajectories of depressive symptoms in adults aged over 60 in England and in those with hip fracture. Trajectories followed a similar pattern in the overall and hip

fracture populations however, the distribution of depressive symptoms is shifted towards the moderate-severe group for those in the hip fracture subgroup. Individuals in the trajectory in which the median CES-D score met the threshold for depressive symptoms had different characteristics e.g., they were older, more likely to be female, less likely to be married or in a civil partnership and exhibited worse health and quality of life outcomes.

Trajectories

All trajectories remained broadly stable across the study period, with slight uptrends in the trajectories in which the median CES-D score exceeded the threshold for depressive symptoms. A systematic review of depressive symptom trajectories across the lifespan identified two studies with three older adult trajectories - minimal, emerging (subclinical), and moderate or increasing and persistent (25-27). The results of the current study align with the classification of these three-group trajectory studies. However, no major or consistent increase or decrease in symptoms was observed over time in the current study. The studies varied in terms of duration (10 years of follow up (27) and 20 years of follow up (25)), and geographical region (USA (27) and France (25)). These variations may be attributed to compositional differences such as gender, age and racial demographics of populations which have previously been shown to influence the trajectories for depressive symptoms (26).

Among older adults after hip fracture, Cristancho et al identified three trajectories ‘resilient’, ‘distressed’ and ‘depressed’ (5). In contrast to the current study, they noted an uptrend in symptoms for those with depressive symptoms over time (5). Liu and colleagues identified two trajectories of depressive symptoms in the one-year following hip fracture, one trajectory experienced a decline in their symptoms and the other an overall uptrend in symptoms (28). The changes in trajectories over time noted by these earlier studies may relate to the duration and timing of follow-up. Both Cristancho and Liu studies followed participants for one-year after hip fracture, which has been shown to be the most significant period for the risk of developing depressive symptoms after hip fracture (5, 28). The 17-year period investigated by the current study potentially averaged out annual increases and decreases that may have occurred to give overall flat

trajectories. These flat trajectories may indicate there is no 'optimal' time to intervene, and it is never too late to support an older adult experiencing depressive symptoms with hip fracture. These results also suggest symptoms may persist in the longer term after initial recovery, highlighting a potential value for continual monitoring and awareness from health professionals.

A higher median CES-D score was observed for the moderate-severe trajectory for the hip fracture subgroup (6.5 (IQR: 6.0 -7.5)) compared to the moderate-severe trajectory for the overall population (4.0 (IQR: 3.0 - 6.0)). This may suggest greater symptom severity among those with a history of hip fracture. Although the sample size for the moderate-severe symptoms trajectory in the hip fracture group was small, the median CES-D score and its IQR were more compact. This suggests there was less variation in the population of the moderate-severe symptoms trajectory among patients with hip fracture than the overall sample. This is not surprising, as the hip fracture group is expected to be more homogeneous than the overall, larger sample.

Characteristics of trajectories

There were differences in the characteristics of older adults within each trajectory, overall and for those with hip fracture. For example, individuals in the trajectory with moderate-severe symptoms were older, more likely to be female, less likely to be married or in a civil partnership and exhibited worse health and quality of life outcomes. These results are comparable to Musliner et al who reported in the higher symptom trajectories, individuals were more likely to be female, smokers and have poor self-rated general health (26). For adults who sustain a hip fracture, those with depressive symptoms were less likely to be married or in a civil partnership, reported higher pain scores, and exhibited worse outcomes in certain health and quality of life factors than those without depressive symptoms. For all characteristics, these between trajectories comparisons were completed post-hoc and should be confirmed with future appropriately powered prognostic factor analyses (29).

Similar to the study by Liang et al., the current study noted those alone exhibited higher depressive symptoms than those married both overall and for those with hip fracture (30). In contrast, Liu et al noted

no association between marital status and depressive symptoms among older adults after hip fracture (28). These differing findings are surprising given spousal bereavement is a known risk factor of depression (31) and the close relationship between loneliness and depressive symptoms (32). A potential explanation for these differences may relate to interactions between marital status and gender. Indeed, Montagnier et al reported an association between marital status and persistent depression, only for women who were widowed (25).

The extent to which participants in previous studies were in receipt of pharmacological and/or non-pharmacological management for depressive symptoms over time is poorly described. The effectiveness of these management approaches in the general adult population is well-established (33) and are likely to influence the observed trajectories. For the population with hip fracture, Li et al (34) found psychological support therapy significantly decreased self-rated depression scores. Burns et al (35) found marginal reductions in depression scores in hip fracture patients who received psychiatric intervention in the form of visits and phone calls with a psychiatric nurse. Several studies indicate promise (34-37) but the optimal approach is uncertain and limited by methodological concerns including underpowered results (35) and study interventions only being administered to those with either mild or severe depression only rather than a heterogenous population regarding depression severity (35, 37). Using a heterogenous population better represents the population of people with depressive symptoms and therefore would provide more generalisable results for the wider population (38). Therefore, whether specific non-pharmacological interventions are warranted in this population are unknown. For the current study, individuals in the overall population were more likely to receive medication rather than counselling or both medication and counselling however, no significant differences were found between the management approach and trajectory membership. None of the older adults with hip fracture reported receiving medication or counselling. Therefore, replication of the research investigating the interactions between management approaches within trajectories for depression overall and for those with hip fracture is warranted.

Limitations

There are limitations to this study. First, the ELSA sample is comprised of predominantly white community-dwelling individuals limiting generalisability of results to non-white and residential/nursing care populations. Second, data were missing for several variables which were not collected across all waves. We assessed the sensitivity of our findings to missingness by conducting the analyses using data from the first five waves only and then by excluding missing depressive symptoms. We found the results comparable to the main analysis. Third, there is potential selection bias as the year individuals suffered their hip fracture was not available and may relate to the trajectories of depressive symptoms. This also meant we were unable to see the level of change in depressive symptoms after hip fracture. Fourth, there are no gold standards for sample size for latent class analyses. Sample sizes as small as 30 have been shown to produce valid results for simple latent class modelling with distinct classes, while sample sizes from 300-1000 have been suggested for models with multiple indicators and classes. The main concerns regarding inadequate sample size are unpowered models which cannot detect classes, inaccurate solutions produced, and small but relevant classes being missed (39). However, the high posterior probabilities, entropy, and the meaningful components of the different trajectories for our models suggest adequate classifications. Finally, we may have overestimated the prevalence of depressive symptoms by using the CES-D compared with diagnostic criteria (40, 41).

Conclusions

Older adults, and those after hip fracture, follow one of three trajectories of depressive symptoms which are broadly stable over time. This may suggest it is never too late to target depressive symptoms for these patients as symptoms may persist in the longer term. Only one of the three trajectories had a median CES-D score which met the threshold for depressive symptoms. Depressive symptoms' prevalence was higher for those with hip fracture and the distribution of depressive symptoms consistently over time is shifted towards the moderate-severe group for those in the hip fracture subgroup when compared to the overall population. Results suggest a role of factors including age, gender, and marital status in depressive

symptoms trajectories both overall and for those with hip fracture which should be explored in future research.

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Conflict of Interest

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Figure 1. Trajectories of depressive symptoms among 7,050 adults over the age of 60 years

Figure 2. Trajectories of depressive symptoms among 384 adults over the age of 60 years with hip fracture

Model Selections – Overall Population

Table S1 Summary of model selection criteria – By Model

Number of groups	Parameters by group*	BIC	Entropy
3	1 1 1	-60955.72	0.721
3	0 1 1	-60972.96	0.714
3	0 0 1	-60992.90	0.715
4	1 1 1 1	-60633.36	0.681
4	1 1 1 0	-60630.48	0.682
4	1 1 0 0	-60640.01	0.685

Polynomial shapes: 0=intercept, 1=linear, 2=quadratic, 3=cubic
BIC: Bayesian information criterion (for the total number of participants)

Table S2 Posterior probabilities for the assignment of members to different trajectories

Probability	Group 1 n=2726	Group 2 n=3357	Group 3 N=967
Group 1	0.873 (0.148)	0.127 (0.147)	0.000 (0.001)
Group 2	0.088 (0.129)	0.855 (0.141)	0.057 (0.107)
Group 3	0.000 (0.001)	0.122 (0.145)	0.878 (0.146)

Mean (SD)

Table S3 Summary of model selection – By Group for the selected model

Group	Group Membership (%)	Parameter	Estimate (SE)	Probability
1	38.7*	Intercept	-1.278 (0.0449)	<0.001
2	47.6*	Intercept	1.440 (0.0408)	<0.001
3	13.7*	Intercept	-43.26 (15.257)	0.005
		Slope - Linear	0.0238 (0.008)	0.002

*<0.001
SE: Standard Error

Model Selections – Hip Fracture Population

Table S4 Summary of model selection – By Model

Number of groups	Parameters by group*	BIC	Entropy
3	0 0 0	-3843.02	0.782
3	1 1 1	-3848.65	0.777
3	1 1 2	-3851.63	0.777
3	2 1 0	-3850.03	0.788
4	1 1 0 0	-3826.04	0.704
4	1 1 0 1	-3828.27	0.7

Polynomial shapes: 0=intercept, 1=linear, 2=quadratic, 3=cubic
BIC: Bayesian information criterion (for the total number of participants)

Table S5 Posterior probabilities for the assignment of members to different trajectories

Probability	Group 1 n=138	Group 2 n=219	Group 3 n=27
Group 1	0.895 (0.146)	0.105 (0.146)	0.000 (0.000)
Group 2	0.059 (0.106)	0.907 (0.119)	0.034 (0.080)
Group 3	0.000 (0.000)	0.121 (0.159)	0.879 (0.159)

Table S6 Summary of model selection – By Group for the selected model

Group	Group Membership (%)	Parameter	Estimate (SE)	Probability
1	35.5*	Intercept	-0.711 (0.167)	<0.001
2	56.7*	Intercept	2.355 (0.147)	<0.001
3	8.1*	Intercept	5.958 (0.433)	<0.001

*p<0.001
SE: Standard Error

Table S7 Summary and Patterns of Missing Data in the Overall Population

No. of waves with missing data	Frequency (%) *	Wave(s) with missing data	Frequency (%) †
1	540 (7.66)	Wave 9	328 (60.74)
2	483 (6.85)	Waves 8-9	329 (68.12)
3	1100 (15.6)	Waves 1-3, 7-9	961 (87.36)
4	719 (10.2)	Waves 6-9	355 (49.37)
5	795 (11.28)	Waves 5-9	468 (58.87)
6	981 (13.91)	Waves 4-9	656 (66.87)
7	1225 (17.38)	Waves 3-9	886 (72.33)

*Percentage of people with missing data for 1-7 waves

†Percentage of people with missing data at the corresponding wave(s) in relation to the total number of people with missing data

Table S8 Summary and Patterns of Missing Data in the Hip Fracture Population

No. of waves with missing data	Frequency (%)	Wave(s) with missing data	Frequency (%) *
1	37 (9.64)	Wave 9	26 (70.27)
2	39 (10.16)	Waves 8-9	25 (64.1)
3	69 (17.97)	Waves 7-9	36 (52.17)
4	31 (8.07)	Waves 6-9	18 (58.06)
5	47 (12.24)	Waves 5-9	31 (65.96)
6	43 (11.2)	Waves 4-9	37 (86.05)
7	57 (14.84)	Waves 3-9	38 (66.67)

*Percentage of people with missing data for 1-7 waves

†Percentage of people with missing data at the corresponding wave(s) in relation to the total number of people with missing data

Table S9. Characteristics of 7,050 patients overall and by the presence of depressive symptoms at baseline (score of ≥4 on CES-D score)

	Total	No depressive symptoms [a]	Depressive symptoms [a]
	N=7,050	N=5,991	N=1,059
Age			
60-69	3,846 (54.6)	3,318 (55.4)	528 (49.9) *
70-79	2,428 (34.4)	2,049 (34.2)	379 (35.8) *
80-89	739 (10.5)	594 (9.9)	145 (13.7) *
90-99	37 (0.5)	30 (0.5)	7 (0.7) *
BMI			
<18.5	65 (1.1)	52 (1.0)	13 (1.6) *
18.5-24.9	1,576 (26.6)	1,363 (26.8)	213 (25.7) *
25-29.9	2,572 (43.4)	2,251 (44.2)	321 (38.8) *
30+	1,708 (28.8)	1,427 (28.0)	281 (33.9) *
Hip Fracture	384 (5.4)	297 (5.0)	87 (8.2) *
Pain	2,838 (40.3)	2,148 (35.9)	690 (65.2) *
Sex			
Male	3,257 (46.2)	2,903 (48.5)	354 (33.4) *
Female	3,793 (53.8)	3,088 (51.5)	705 (66.6) *
Ethnicity			
White	6,889 (97.7)	5,874 (98.0)	1,015 (95.8) *
Non-White	161 (2.3)	117 (2.0)	44 (4.2) *
Marital Status			
Single	337 (4.8)	282 (4.7)	55 (5.2) *
Married or in Civil Partnership	4,586 (65.0)	4,061 (67.8)	525 (49.6) *
Separated or Divorced	606 (8.6)	485 (8.1)	121 (11.4) *
Widowed	1,521 (21.6)	1,163 (19.4)	358 (33.8) *
Health			
Health limited ability to work	2,609 (37.0)	1,962 (32.7)	647 (61.1) *
Self-rated general health			
Excellent	809 (11.5)	783 (13.1)	26 (2.5) *
Very Good	2,016 (28.6)	1,857 (31.0)	159 (15.0) *
Good	2,336 (33.1)	2,054 (34.3)	282 (26.6) *
Fair	1,397 (19.8)	1,039 (17.3)	358 (33.8) *
Poor	492 (7.0)	258 (4.3)	234 (22.1) *
Mobility			
Total Mobility Limitations			
0-2	6,105 (86.6)	5,338 (89.1)	767 (72.5) *
3-5	945 (13.3)	653 (10.9)	292 (27.5) *
Total ADL's find Difficult			
0-3	6,088 (97.1)	5,252 (98)	836 (91.8) *
4-6	184 (2.9)	109 (2)	75 (8.2) *
Total IADL's find Difficult			
0-4	6,149 (98.1)	5,282 (98.5)	867 (95.2) *
5-8	123 (1.9)	79 (1.4)	44 (4.8) *
Comorbidities			
Circulatory system diseases	461 (8.1)	372 (7.8)	89 (9.7)
Respiratory system diseases	604 (10.2)	462 (9.3)	142 (14.9) *

	Total	No depressive symptoms [a]	Depressive symptoms [a]
Nervous system diseases	12 (0.2)	9 (0.2)	3 (0.3)
MSK diseases	1,834 (28.3)	1,451 (26.5)	383 (37.8) *
Metabolic diseases	438 (6.2)	342 (5.7)	96 (9.1) *
Mental disorders	21 (0.3)	15 (0.3)	6 (0.6)
Neoplasms	154 (2.2)	131 (2.2)	23 (2.2)
Total Comorbidities			
0-2	6,997 (99.3)	5,960 (99.4)	1,037 (98) *
3-4	53 (0.7)	31 (0.5)	22 (2.0) *
Falls			
Had a fall	2,085 (29.6)	1,599 (26.7)	486 (45.9) *
Number of times fallen			
1-5	4,671 (94.4)	3,938 (95.3)	733 (89.3) *
6-10	196 (4)	140 (3.3)	56 (6.8) *
11-30	61 (0.9)	38 (0.7)	23 (2.8) *
Smoking Status			
Current smoker	761 (14.1)	593 (13.0)	168 (19.9) *
Stopped smoking	4,637 (85.9)	3,961 (87.0)	676 (80.1) *
Alcohol Consumption			
More than twice a day, daily or almost daily	1,845 (26.2)	1,634 (27.3)	211 (20.0) *
3-6 times/week	305 (4.3)	280 (4.7)	25 (2.4) *
1-2 times/week	1,892 (26.9)	1,657 (27.7)	235 (22.3) *
1-2 times/month	728 (10.3)	628 (10.5)	100 (9.5) *
Once every couple months	103 (1.5)	85 (1.4)	18 (1.7) *
1-2 times/year	1,276 (18.1)	1,017 (17.0)	259 (24.5) *
None in the last 12 months	885 (12.6)	678 (11.3)	207 (19.6) *
Physical Activity			
Sedentary	588 (9.6)	416 (7.9)	172 (19.1) *
Low	1,749 (28.4)	1,386 (26.4)	363 (40.3) *
Moderate	2,934 (47.7)	2,636 (50.2)	298 (33.1) *
High	883 (14.3)	815 (15.5)	68 (7.5) *
Social Network			
Member of an organisation	2,115 (30.7)	1,680 (28.5)	435 (42.9) *
Quality of Life			
Limiting long-standing illness	3,478 (56.0)	2,715 (52.2)	763 (76.3) *
Life Satisfaction [b]			
Strongly agree	763 (13.1)	715 (14.2)	48 (6.1) *
Agree	2,999 (51.4)	2,765 (54.8)	234 (29.7) *
Slightly agree	862 (14.8)	707 (14.0)	155 (19.6) *
Neither agree nor disagree	490 (8.4)	391 (7.8)	99 (12.5) *
Slightly disagree	372 (6.4)	277 (5.5)	95 (12.0) *
Disagree	236 (4.0)	131 (2.6)	105 (13.3) *
Strongly disagree	109 (1.9)	56 (1.1)	53 (6.7) *

	Total	No depressive symptoms [a]	Depressive symptoms [a]
CASP-19 Total Score			
0-29	520 (7.7)	317 (5.5)	203 (20.8) *
30-57	6,255 (92.3)	5,480 (94.5)	775 (79.2) *
Depression			
Has depression/manic depression	153 (2.2)	94 (1.6)	59 (5.6) *
Medication or counselling			
Medication	83 (38.4)	57 (39.9)	26 (35.6)
Counselling	10 (4.6)	7 (4.9)	3 (4.1)
Both medication and counselling	45 (20.8)	30 (21.0)	15 (20.5)
None	78 (36.1)	49 (34.3)	29 (39.7)

Note: Data are presented as n (%) for categorical measures.

[a] No Depressive Symptoms = CES-D Score <4, Depressive Symptoms = CES-D Score ≥ 4

[b] Life Satisfaction Question: Is participant satisfied with their life

BMI: Body Mass Index; ADL: Activities of Daily Living; IADL: Instrumental Activities of Daily Living; CASP-19 – CASP-19 Quality of Life Scale

* $p<0.005$

Table S10. Prevalence of depressive symptoms and characteristics of each trajectory group for the total population

	No symptoms (n=2726)		Mild Symptoms (n=3357)		Moderate-severe Symptoms (n=967)	
	N	%	N	%	N	%
Prevalence of Depressive Symptoms [a] *						
CES-D<4	2715	99.6	2941	87.6	335	34.6
CES-D≥4	11	0.4	416	12.39	632	65.36
CES-D Total Score [a b]	0.0	0.0-0.0	1.0	1.0-2.0	4.0	3.0-6.0
Age*						
60-69	1711	62.8	1697	50.6	438	45.3
70-79	831	30.5	1226	36.5	371	38.4
80-89	174	6.4	411	12.2	154	15.9
90-99	10	0.4	23	0.7	4	0.4
BMI [c]						
<18.5	21	0.9	31	1.1	13	1.7
18.5-24.9	685	28.8	701	25.0	190	25.5
25-29.9	1099	46.2	1192	42.6	281	37.7
30+	572	24.1	875	31.3	261	35.0
Hip Fracture*	97	3.6	208	6.2	79	8.2
Pain*	631	23.1	1557	46.4	650	67.2
Sex*						
Male	1554	57.0	1404	41.8	299	30.9
Female	1172	43.0	1953	58.2	668	69.1
Ethnicity*						
White	2677	98.2	3288	97.9	924	95.6
Non-White	49	1.8	69	2.1	43	4.4
Marital Status*						
Single	127	4.7	160	4.8	50	5.2
Married or in Civil Partnership	2005	73.6	2094	62.4	487	50.4
Separated or Divorced	208	7.6	277	8.3	121	12.5
Widowed	386	14.2	826	24.6	309	32
Health						
Health limited ability to work*	529	19.4	1438	42.8	642	66.4
Self-rated general health*						
Excellent	526	19.3	261	7.8	22	2.3
Very Good	1053	38.6	842	25.1	121	12.5
Good	848	31.1	1229	36.6	259	26.8
Fair	271	9.9	780	23.2	346	35.8
Poor	28	1.0	245	7.3	219	22.6
Mobility*						
Total Mobility Limitations						
0-2	2,640	96.9	2,819	84.1	646	66.8
3-5	86	3.2	538	16	321	33.1
Total ADL's find Difficult						
0-3	2,433	99.5	2,890	97	765	90.3
4-6	11	0.4	90	3	83	9.8
Total IADL's find Difficult						

	No symptoms (n=2726)		Mild Symptoms (n=3357)		Moderate-severe Symptoms (n=967)	
0-4	2,427	99.3	2,919	97.9	803	94.7
5-8	17	0.7	61	2	45	5.3
Comorbidities						
Circulatory system diseases* [c]	126	6.1	250	9.1	85	10.1
Respiratory system diseases* [c]	165	7.7	310	10.7	129	14.8
Nervous system diseases [c]	2	0.1	7	0.3	3	0.4
MSK diseases* [c]	436	18.3	1005	31.9	393	41.7
Metabolic diseases*	129	4.7	218	6.5	91	9.4
Mental disorders	4	0.1	10	0.3	7	0.7
Neoplasms	49	1.8	81	2.4	24	2.5
Total Comorbidities*						
0-2	2719	99.8	3328	99.1	950	98.3
3-4	7	0.3	29	0.8	17	1.8
Falls						
Had a fall*	572	21.0	1075	32	438	45.3
Number of times fallen* [c]						
1-5	1630	97.6	2338	93.8	703	89.2
6-10	34	2.1	106	4.3	56	7.1
11-30	4	0.3	35	1.2	22	2.8
Smoking Status* [c]						
Current smoker	224	11.2	362	13.8	175	22.3
Stopped smoking	1773	88.8	2256	86.2	608	77.7
Alcohol Consumption* [c]						
More than twice a day, daily or almost daily	822	30.2	829	24.8	194	20.1
3-6 times/week	164	6.0	120	3.6	21	2.2
1-2 times/week	805	29.6	882	26.4	205	21.2
1-2 times/month	279	10.2	361	10.8	88	9.1
Once every couple months	31	1.1	55	1.6	17	1.8
1-2 times/year	400	14.7	652	19.5	224	23.2
None in the last 12 months	221	8.1	448	13.4	216	22.4
Physical Activity* [c]						
Sedentary	82	3.4	325	11.1	181	21.5
Low	482	20.1	903	30.9	364	43.3
Moderate	1341	56.0	1343	46	250	29.8
High	491	20.5	347	11.9	45	5.4
Social Network [c]						
Member of an organisation*	648	24.1	1063	32.4	404	43.7
Quality of Life						
Limiting long-standing illness* [c]	898	40.9	1850	60.1	730	78.2
Life Satisfaction* [c]						
Strongly agree	417	17.8	309	11.2	37	5.1
Agree	1508	64.5	1318	47.7	173	23.6
Slightly agree	240	10.3	499	18.1	123	16.8
Neither agree nor disagree	97	4.1	284	10.3	109	14.9
Slightly disagree	50	2.1	206	7.5	116	15.8
Disagree	23	1.0	106	3.8	107	14.6
Strongly disagree	3	0.1	39	1.4	67	9.2

	No symptoms (n=2726)		Mild Symptoms (n=3357)		Moderate-severe Symptoms (n=967)	
CASP-19 Total Score* [c]						
0-29	83	3.1	235	7.3	202	22.7
30-57	2598	96.9	2969	92.7	688	77.3
Depression						
Has depression/manic depression* [c]	19	0.7	66	2	68	7
Medication or counselling						
Medication	13	39.4	39	37.1	31	39.7
Counselling	0	0.0	4	3.8	6	7.7
Both medication and counselling	7	21.2	23	21.9	15	19.2
None	13	39.4	39	37.1	26	33.3

Note: [a] Depressive Symptoms: Prevalence of Depressive Symptoms per trajectory group; CES-D Total Score

[b] Median (Interquartile Range (IQR))

[c] Missing Values: BMI: n=1129; ADL: n=778; IADL: n=778; CASP-19: n=275; Limiting long-standing illness: n=844; Circulatory system diseases: n=1389; Respiratory system diseases: n=1144; Nervous system diseases: n=1392; MSK diseases: n=571; number of times fallen: n=2101; smoking: n=1652; alcohol consumption: n=16; physical activity: n=896; member of an organisation: n=150; number of close family members: n=519; life satisfaction: n=1219; (manic) depression: n=6834

* Chi-squared $p<0.001$

Table S11. Prevalence of depressive symptoms and characteristics of each trajectory group for the hip fracture population

	No symptoms (n=138)		Mild Symptoms (n=219)		Severe Symptoms (n=27)		Total (n=384)	
	N	%	N	%	N	%	N	%
Prevalence of Depressive Symptoms [a] *								
CES-D<4	137	99.3	156	71.2	4	14.8	297	77.3
CES-D≥4	1	0.7	63	28.8	23	85.2	87	22.7
CES-D Total Score [a b]	0	0.0-1.0	2	1.0-5.0	6.5	6.0-7.5	2.0	0.0-4.0
Age [d]	79	74-84	79	72-84	78	73-83	79	73-84
60-69	13	10.4	41	20.3	1	4.5	55	15.8
70-79	50	40.0	65	32.2	12	54.5	127	36.4
80-89	60	48.0	87	43.1	9	40.9	156	44.7
90-99	2	1.6	9	4.5	0	0.0	11	3.2
BMI [d]								
18.5-24.9	10	41.7	12	32.4	3	60.0	25	37.9
25-29.9	11	45.8	13	35.2	1	20.0	25	37.9
30+	3	12.5	12	32.4	1	20.0	16	24.2
Pain* [d]	44	34.9	126	63.3	18	75.0	188	53.9
Sex								
Male	55	39.9	71	32.4	3	11.1	129	33.6
Female	83	60.1	148	67.6	24	88.9	255	66.4
Ethnicity* [d]								
White	122	100.0	187	98.4	21	91.3	330	98.5
Non-White	0	0.0	3	1.6	2	8.7	5	1.5
Marital Status*								
Single	7	5.1	13	5.9	1	3.7	21	5.5
Married or in Civil Partnership	77	55.8	84	38.4	5	18.5	166	43.2
Separated or Divorced	5	3.6	19	8.7	7	25.9	31	8.1
Widowed	49	35.5	103	47.0	14	51.9	166	43.2
Health* [d]								
Health limited ability to work	45	41.7	116	74.4	16	88.9	177	62.8
Self-rated general health								
Excellent	10	9.3	2	1.3	0	0.0	12	4.3
Very Good	30	27.8	20	12.8	1	5.6	51	18.1
Good	42	38.9	49	31.4	3	16.7	94	33.3
Fair	22	20.4	53	34.0	4	22.2	79	28.0
Poor	4	3.7	32	20.5	10	55.6	46	16.3
Mobility								
Total Mobility Limitations								
0-2	73	65.2	49	33.1	1	4.8	123	43.7
3-5	39	34.9	99	66.8	20	95.2	158	56.3
Total ADL's find Difficult								
0-3	101	90.1	113	76.8	14	66.6	228	81.4
4-6	11	9.9	34	23.1	7	33.3	52	18.6
Total IADL's find Difficult								
0-4	96	85.8	123	83.6	17	80.9	236	84.3

	No symptoms (n=138)		Mild Symptoms (n=219)		Severe Symptoms (n=27)		Total (n=384)	
5-9	16	14.4	24	16.3	4	19	44	15.7
Comorbidities [d]								
Circulatory system diseases	4	30.8	9	47.4	4	80.0	17	45.9
Respiratory system diseases	7	63.6	22	81.5	4	66.7	33	75.0
Nervous system diseases	0	0	0	0	0	0	0	0
MSK diseases	31	67.4	60	81.1	13	86.7	104	77.0
Metabolic diseases	8	7.1	9	6.1	2	9.5	19	6.8
Mental disorders	2	1.8	1	0.7	0	0.0	3	1.1
Neoplasms	8	7.1	6	4.1	0	0.0	14	5.0
Total Comorbidities								
0-2	111	99	145	97.9	20	95.3	276	98.3
3-4	1	0.9	3	2.1	1	4.8	5	1.8
Falls [d]								
Had a fall	75	59.5	143	71.9	20	83.3	238	68.2
Number of times fallen								
1-5	78	94	139	94.6	17	89.4	234	93.9
6-10	3	3.6	7	4.8	2	10.5	12	4.8
11-30	2	2.4	1	0.7	0	0	3	1.2
Smoking Status [d]								
Current smoker	3	11.5	16	27.6	2	20.0	21	22.3
Stopped smoking	23	88.5	42	72.4	8	80.0	73	77.7
Alcohol Consumption [d]								
More than twice a day, daily or almost daily	24	21.4	30	18.9	4	20.0	58	19.9
3-6 times/week	8	7.1	5	3.1	1	5.0	14	4.8
1-2 times/week	28	25.0	33	20.8	3	15.0	64	22.0
1-2 times/month	13	11.6	13	8.2	1	5.0	27	9.3
Once every couple months	7	6.3	8	5.0	0	0.0	15	5.2
1-2 times/year	12	10.7	28	17.6	4	20.0	44	15.1
None in the last 12 months	20	17.9	42	26.4	7	35.0	69	23.7
Physical Activity [d]								
Sedentary	6	18.2	36	45.0	4	44.4	46	37.7
Low	14	42.4	26	32.5	5	55.6	45	36.9
Moderate	8	24.2	15	18.8	0	0.0	23	18.9
High	5	15.2	3	3.8	0	0.0	8	6.6
Social Network [d]								
Member of an organisation	25	23.6	56	39.2	8	47.1	89	33.5
Quality of Life								
Limiting long-standing illness* [d]	69	71.1	164	87.2	24	96.0	257	82.9
Life Satisfaction* [d]								
Strongly agree	16	18.2	8	8.9	0	0.0	24	12.7
Agree	38	43.2	29	32.2	1	9.1	68	36.0
Slightly agree	18	20.5	16	17.8	1	9.1	35	18.5
Neither agree nor disagree	7	8.0	18	20.0	1	9.1	26	13.8
Slightly disagree	7	8.0	6	6.7	1	9.1	14	7.4
Disagree	2	2.3	10	11.1	4	36.4	16	8.5
Strongly disagree	0	0.0	3	3.3	3	27.3	6	3.2
CASP-19 Total Score* [d]								
0-29	4	4.0	24	17.6	4	28.6	32	12.7

	No symptoms (n=138)		Mild Symptoms (n=219)		Severe Symptoms (n=27)		Total (n=384)	
30-57	97	96.0	112	82.4	10	71.4	219	87.3
Depression* [c] [d]								
Has depression/manic depression	2	1.8	3	2.0	2	9.5	7	2.5

Note: [a] Depressive Symptoms: The prevalence of Depressive Symptoms per trajectory group; CES-D Total Score

[b] Median (IQR)

[c] § No observations of medication or counselling data in those with hip fracture

[d] Missing Values: age: n=35; BMI: n=318; Mobility: n=103; ADL: n=104; IADL: n=104; CASP-19: n=133; ethnicity: n=49; Health limited ability to work: n=102; Self-rated general health: n=102; Limiting long-standing illness: n=74; Circulatory system diseases: n=347; Respiratory system diseases: n=340; Nervous system diseases: n=377; MSK diseases: n=249; metabolic diseases: n=103; mental disorders: n=103; neoplasms: n=103; Total Comorbidities: n=103; Had a fall: n=35; number of times fallen: n=135; overall pain: n=35; smoking: n=290; alcohol consumption: n=93; physical activity: n=262; member of an organisation: n=118; number of close family members: n=171; life satisfaction: n=195; (manic) depression: n=103

* Chi-squared $p<0.001$

Figure S1 Trajectory models in overall population using the first five waves of Depressive Symptoms data

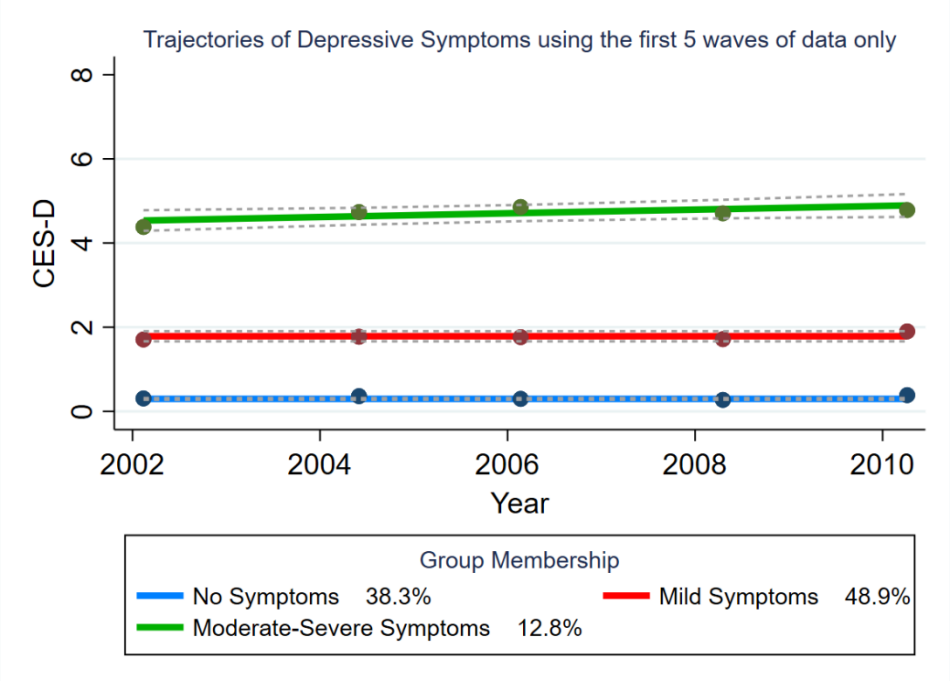


Figure S2 Trajectory models in overall population using complete cases of Depressive Symptoms data

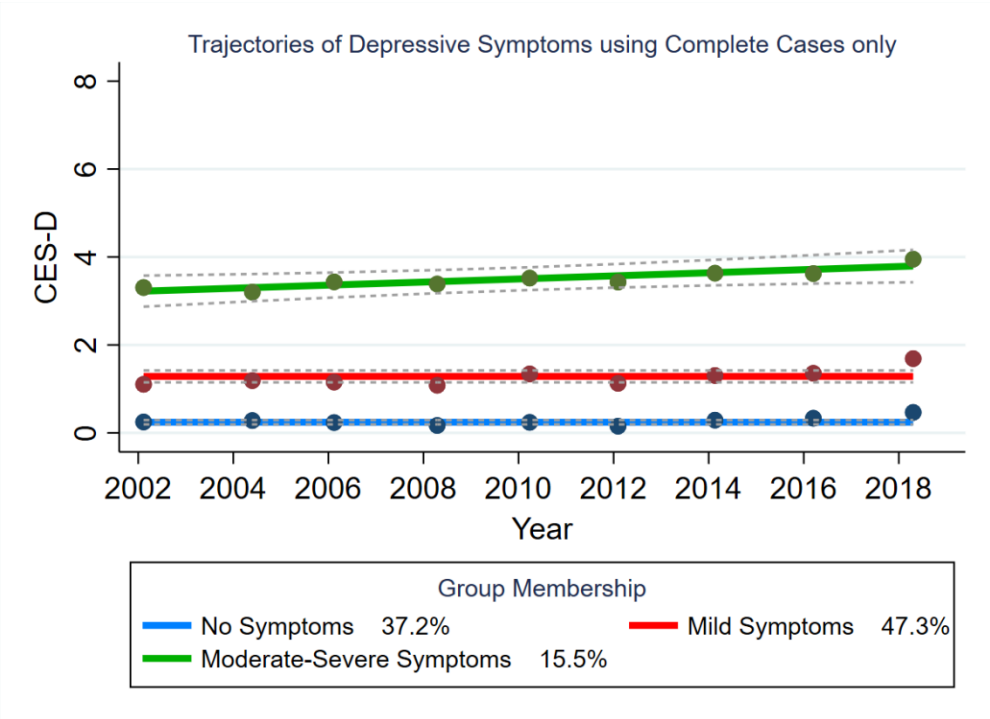


Figure S3 Trajectory models in the hip fracture population using the first five waves of Depressive Symptoms data

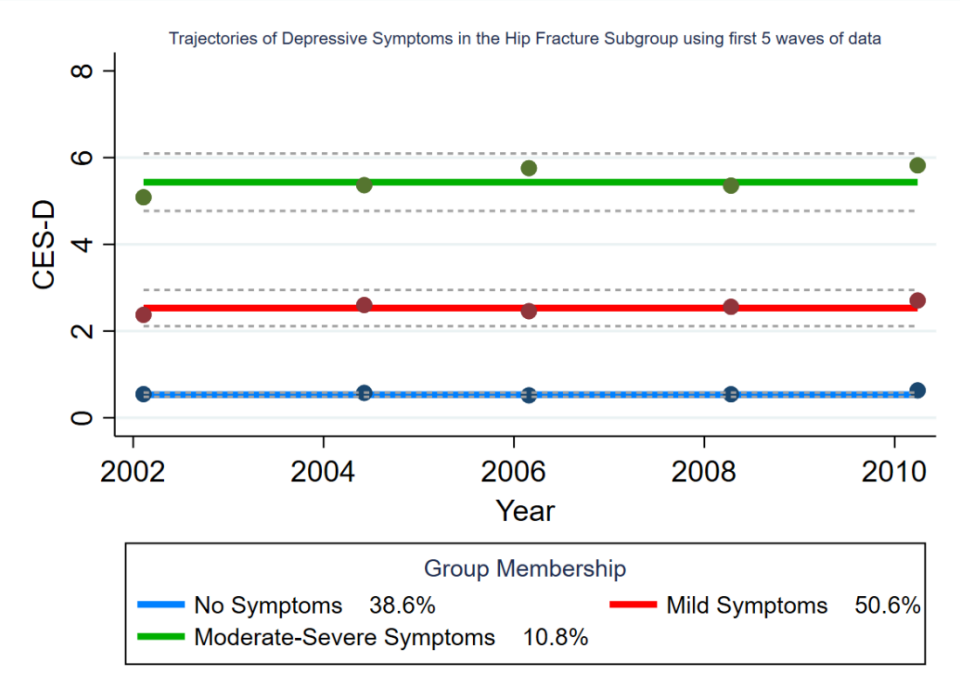
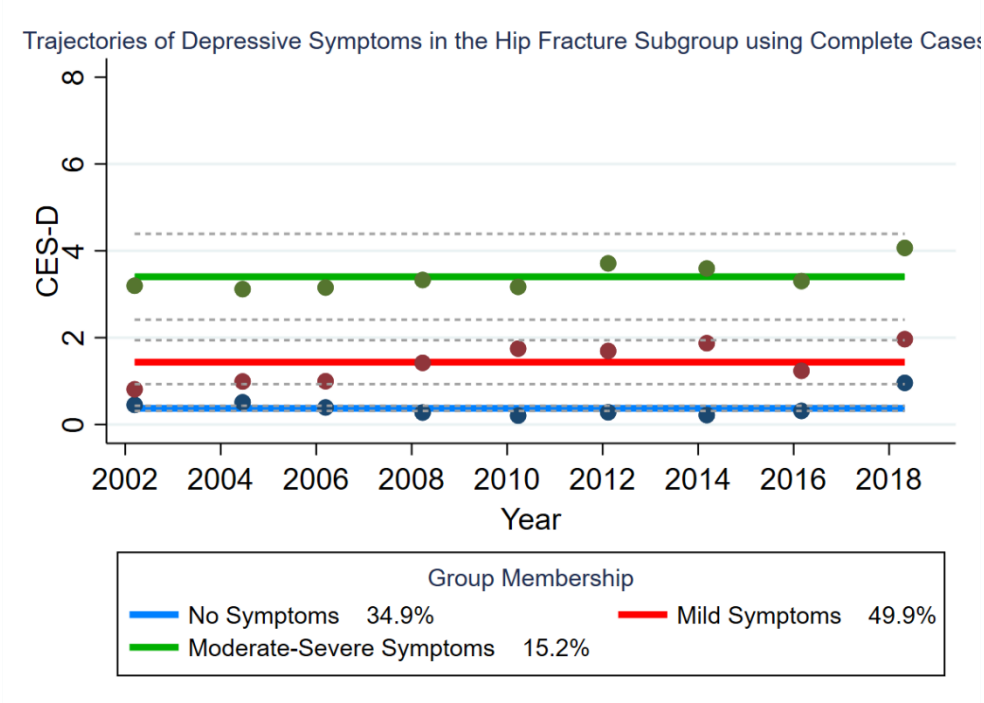


Figure S4 Trajectory models in the hip fracture population using complete cases of Depressive Symptoms data



Bonferroni adjustment: alpha level/number of tests 0.05/33= 0.0015

Table S12 Chi-squared Test Results – Overall Population

Characteristic	n	Chi-square	p-value
Depressive Symptoms		2393.87	<0.001
CESD<4	5991		
CESD>4	1059		
Self-rated general health		1239.33	<0.001
Excellent	809		
Very Good	2,016		
Good	2,336		
Fair	1,397		
Poor	492		
Life Satisfaction		1111.23	<0.001
Strongly agree	763		
Agree	2,999		
Slightly agree	862		
Neither agree nor disagree	490		
Slightly disagree	372		
Disagree	236		
Strongly disagree	109		
Total IADL's find Difficult		850.70	<0.001
0-4	6,149		
5-8	123		
Total Mobility Limitations		795.16	<0.001
0-2	6,105		
3-5	945		
Health limited ability to work	2,609	769.35	<0.001
Total ADL's find Difficult		683.73	<0.001
0-3	6,088		
4-6	184		
Pain	2,838	676.41	<0.001
Physical Activity		574.22	<0.001
Sedentary	588		
Low	1,749		
Moderate	2,934		
High	883		
Limiting long-standing illness	3,478	412.05	<0.001
CASP-19 Total Score		363.26	<0.001
0-29	520		
30-57	6255		

Total Comorbidities		298.10	<0.001
0-2	6,997		
3-4	53		
Number of times fallen		289.26	<0.001
1-5	4,671		
6-10	196		
11-30	61		
Sex		244.79	<0.001
Male	3,257		
Female	3,793		
Alcohol Consumption		243.24	<0.001
More than twice a day, daily or almost daily	1,845		
3-6 times/week	305		
1-2 times/week	1,892		
1-2 times/month	728		
Once every couple months	103		
1-2 times/year	1,276		
None in the last 12 months	885		
Diseases of the MSK System	1,834	221.18	<0.001
Had a fall	2,085	221.00	<0.001
Marital Status		219.17	<0.001
Single	337		
Married or in Civil Partnership	4,586		
Separated or Divorced	606		
Widowed	1,521		
Age		163.82	<0.001
60-69	3846		
70-79	2428		
80-89	739		
90-99	37		
Depression/manic depression	153	136.19	<0.001
Member of an organisation	2,115	133.26	<0.001
Smoking Status		57.87	<0.001
Current smoker	761		
Stopped smoking	4,637		
BMI		55.86	<0.001
<18.5	65		
18.5-24.9	1576		
25-29.9	2572		
30+	1708		
Hip Fracture	384	36.46	<0.001

Diseases of the respiratory system	604	35.61	<0.001
Metabolic diseases	438	27.68	<0.001
Ethnicity		23.95	<0.001
White	6,889		
Non-White	161		
Diseases of the circulatory system	461	18.65	<0.001
Mental disorders	21	8.01	0.02
Neoplasms	154	3.13	0.21
Diseases of the nervous system	12	2.35	0.31
Medication or counselling in last 2 years		3.80	0.7
Medication	83		
Counselling	10		
Both medication and counselling	45		
None	78		

Table S13 Chi-squared Test Results – Hip Fracture Population

Characteristic	n	Chi-square	p-value
Depressive Symptoms		102.79	<0.001
CESD<4	297		
CESD>4	87		
Self-rated general health		56.25	<0.001
Excellent	12		
Very Good	51		
Good	94		
Fair	79		
Poor	46		
Life Satisfaction		51.86	<0.001
Strongly agree	24		
Agree	68		
Slightly agree	35		
Neither agree nor disagree	26		
Slightly disagree	14		
Disagree	16		
Strongly disagree	6		
Total Mobility Limitations		49.71	<0.001
0-2	123		
3-5	158		

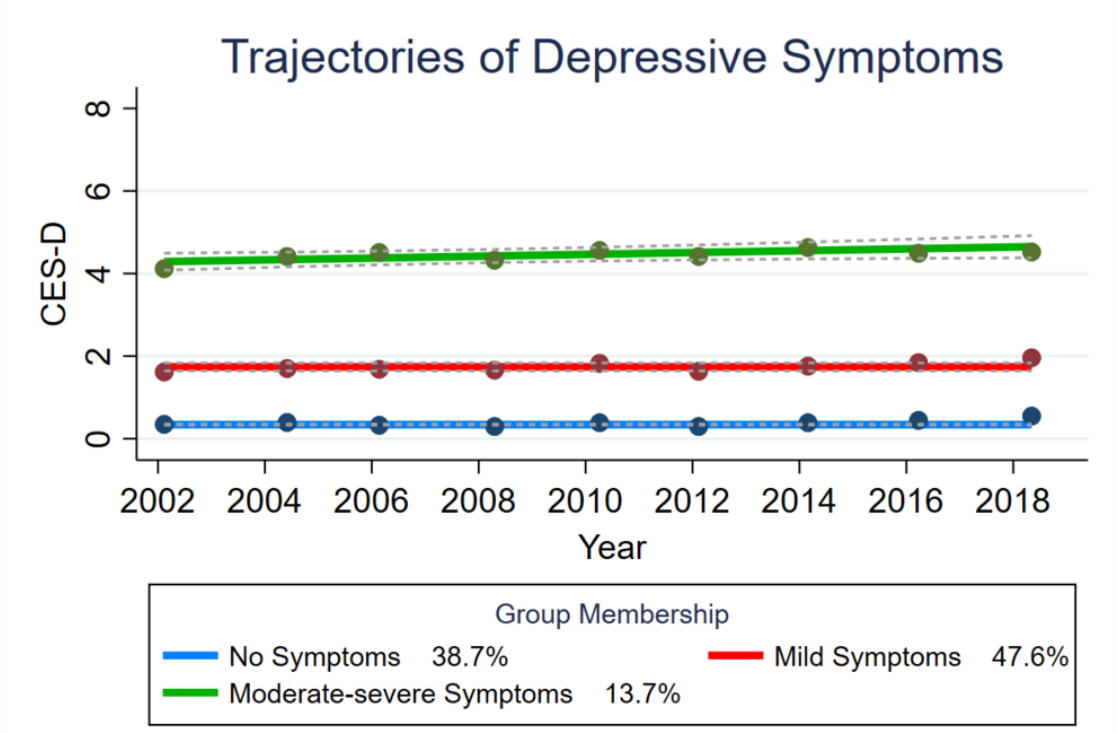
Total IADL's find Difficult		39.38	0.003
0-4	236		
5-8	44		
Health limited ability to work	177	34.80	<0.001
Pain	188	29.66	<0.001
Marital Status		27.58	<0.001
Single	21		
Married or in Civil Partnership	166		
Separated or Divorced	31		
Widowed	166		
Number of times fallen		27.37	0.197
1-5	234		
6-10	12		
11-30	3		
Total ADL's find Difficult		26.71	0.009
0-3	228		
4-6	52		
Total Comorbidities		19.58	0.012
0-2	276		
3-4	5		
Limiting long-standing illness	257	14.99	<0.001
Physical Activity		13.59	0.03
Sedentary	46		
Low	45		
Moderate	23		
High	8		
Age		13.33	0.038
60-69	55		
70-79	127		
80-89	156		
90-99	11		
CASP-19 Total Score		13.10	0.001
0-29	32		
30-57	219		
Alcohol Consumption		11.56	0.48
More than twice a day, daily or almost daily	58		
3-6 times/week	14		
1-2 times/week	64		
1-2 times/month	27		
Once every couple months	15		
1-2 times/year	44		
None in the last 12 months	69		

Ethnicity		9.97	0.01
White	330		
Non-White	5		
Sex		8.68	0.01
Male	129		
Female	255		
Had a fall	238	8.14	0.02
Member of an organisation	89	8.14	0.02
Depression/manic depression	7	4.64	0.10
BMI		4.35	0.361
18.5-24.9	25		
25-29.9	25		
30+	16		
Diseases of the MSK System	104	3.89	0.14
Diseases of the circulatory system	17	3.56	0.17
Smoking Status		2.70	0.26
Current smoker	21		
Stopped smoking	73		
Neoplasms	14	2.47	0.29
Diseases of the respiratory system	33	1.58	0.45
Mental disorders	3	0.99	0.61
Metabolic diseases	19	0.39	0.82

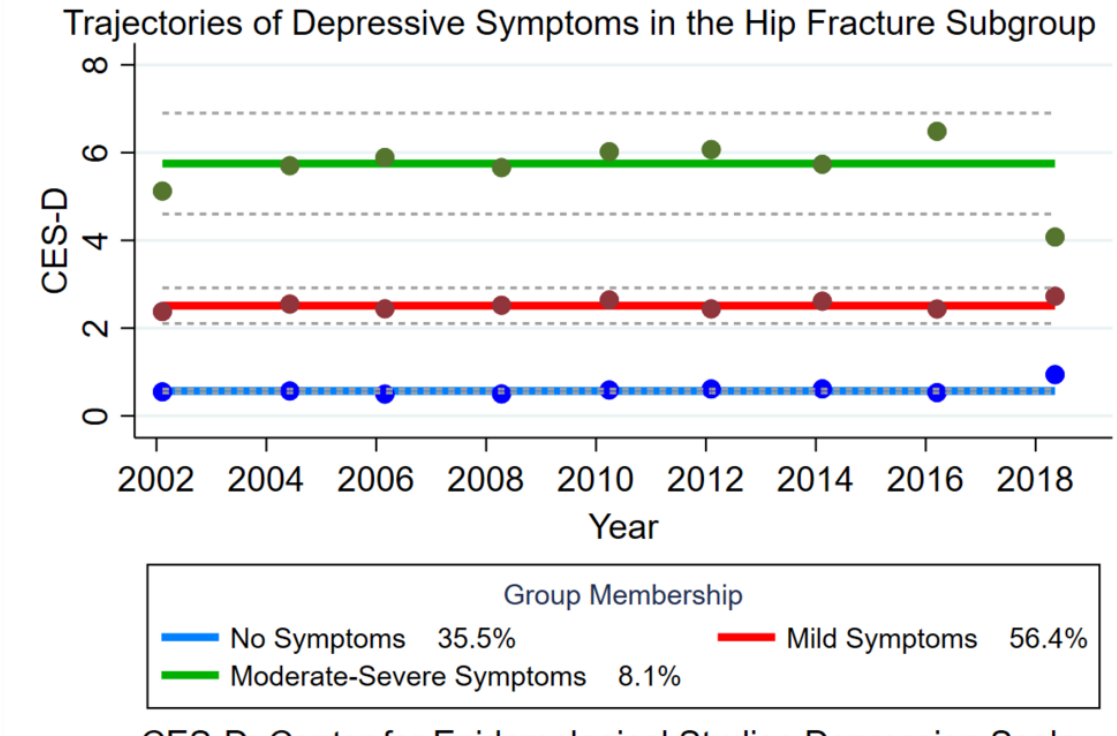
Table S14 Kappa Agreements for Sensitivity Analysis for Missing Data in Trajectory Models

		Kappa*	Agreement (%)	p-value
Overall Population	1st 5 years only	0.8	88.14	<0.001
	Complete cases only	0.68	80.78	<0.001
Hip Fracture Population	1st 5 years only	0.84	90.89	<0.001
	Complete cases only	0.35	60.66	<0.001

* Kappa agreement for group classification



CES-D: Center for Epidemological Studies Depression Scale



CES-D: Center for Epidemological Studies Depression Scale