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Depression Symptoms Declining Among Older Adults: Birth Cohort Analyses from the Rust Belt

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Abstract

Objectives.—To investigate potential birth cohort effects in depression symptoms in older adults.

Design.—Population-based prospective cohort.

Setting.—Small-town communities in Pennsylvania.

Participants.—3227 older adults (average baseline age=71.6) born between 1902-1941.

Measurements.—Four decade-long birth cohorts were the primary predictors in this study: 1902-1911, 1912-1921, 1922-1931, and 1932-1941. The outcome was symptoms of depression assessed at baseline and follow-up study visits using a modified Center for Epidemiologic Studies Depression Scale (mCES-D). The depression outcome was operationalized as: 1). A binary outcome of having ≥ 5 depression symptoms on the total mCES-D at any study visit, and 2). A continuous outcome of four factor-analyzed component scores of the mCES-D including Depressed Mood, Anergia/Hopelessness, Withdrawal, and Poor Self-Esteem. All analyses were

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jointly modeled with attrition and adjusted for age, sex, education, Mini Mental State Examination score, antidepressant medications, and total prescription medications.

Results.—Participants from more recently born cohorts were significantly less likely to have a study visit in which they reported 5 depression symptoms, controlling for attrition. Specifically, in comparison to the 1902-1911 referent cohort, the 1912-1921 birth cohort was 43% less likely (OR=0.566, 95% CI: 0.341-0.939), the 1922-1931 birth cohort was 63% less likely (OR=.0369, 95% CI: 0.0215-0.632), and the 1932-1941 cohort was 79% less likely (OR=.205, 95% CI: 0.106-0.399). The cohort effect was most evident in the Depressed Mood and Anergia/ Hopelessness symptom composites.

Conclusions.—Reduced rates of depression symptoms observed in successive birth cohorts of older adults may reflect compression of morbidity or other secular trends.

Keywords

Depression; birth cohort; epidemiology; subsyndromal depression

INTRODUCTION

Major Depressive Disorder (MDD) is among the most common mental illnesses diagnosed in the United States, with prevalence reportedly lower in adults over the age of 65 compared to younger ages.(1) Many older adults with subsyndromal depression, who do not meet the clinical diagnostic criteria for MDD,(2) may still experience symptoms of depression that can negatively affect their quality of life, family well-being, health outcomes, and psychiatric morbidity.(3,4) Both MDD and depression symptoms in older adults are often comorbid with chronic disease, cognitive impairment, and disability.(4) MDD diagnostic criteria require that symptoms not be “attributable to” another medical condition,(2) a particularly challenging attribution to disprove in the presence of chronic comorbidity among older adults. Consequently, the prevalence of subsyndromal depression in older adults is estimated to be between 2-3 times higher than MDD.(3)

Depressive symptoms in older adults increase risk of nonadherence to medical treatment,(5) worse health outcomes of other medical illness,(6) cognitive decline,(7) Alzheimer’s disease,(8) suicide,(9) and overall mortality.(10) Additionally, even in older adults with subsyndromal depression, direct health care costs have been reported to be almost 50% higher than in older adults free from depressive symptoms, independent of medical comorbidities.(11) From a public health and policy perspective, it would be valuable to characterize time trends in depression symptoms in older adults as the US population ages. (12)

Birth cohort analyses have indicated several changing patterns in older adults born more recently, as compared to older adults born closer to the start of the 20th century. More recently born cohorts have been observed to have a lower incidence of dementia and less cognitive impairment in older age than those born in earlier decades.(13–16) Additionally, these birth cohorts are more likely to be non-smokers and have higher educational attainment.(17,18) As the worldwide population age-distribution continues to shift higher,

better characterizing these population health trends in older adults should be an essential prerequisite for public health planning efforts. Changing trends in depressive disorders are well established for younger individuals, with evidence suggesting that prevalence is increasing, or at least stable, in adolescent and mid-life age groups.(19–21) We are aware of no previous studies that investigated cohort trends in depression symptoms specifically in older adults.

We investigated birth cohort trends in depression symptoms in four successive decade-long birth cohorts born between 1902 and 1941 in southwestern Pennsylvania. Based on cohort trends evidencing decreasing medical and cognitive morbidity,(16,22) we hypothesized that prevalence of depression symptoms would decrease in the more recently born cohorts.

METHODS

Participants

Data were pooled from two large prospective cohort studies conducted between 1987 and the present in the Monongahela Valley region of southwestern Pennsylvania. The Monongahela Valley Independent Elders Survey (MoVIES), focused on dementia, ran from 1987 until 2001 with biennial assessments of an initial sample of 1681. The Monongahela-Youghiogheny Healthy Aging Team (MYHAT) study, focused on mild cognitive impairment, has been ongoing since 2006 with annual assessments of an initial sample of 1982. Both samples were recruited using age-stratified random sampling from voter registration lists. Inclusion criteria was similar in both studies: age 65+, no significant vision or hearing impairment, not institutionalized at study entry, and having decisional capacity. Additionally, the MoVIES study required participants to have at least a 6th grade education and be fluent in English. While not explicitly required for study inclusion, all participants in the MYHAT study met these same education and fluency criteria. MYHAT also required participants to score at least 21 on an age-education corrected Mini-Mental State Exam (MMSE).(23,24) Further details regarding recruitment and assessment procedures have been reported previously for MoVIES(25,26) and MYHAT.(27,28) Participants were reassessed biennially in MoVIES and annually in MYHAT, and were followed for an average of 5.72 years. Both studies were approved by the University of Pittsburgh Institutional Review Board and all participants provided written informed consent.

Across the two studies we identified four birth cohorts of sufficient size: 1902-1911, 1912-1921, 1922-1931, and 1932-1941. We excluded participants born before 1902 (n=14), born after 1941 (n=48), and participants with no depression data at any visit (n=338). Compared to the analysis sample, the 338 participants excluded from the analysis for missing data were more likely to be from earlier born cohorts, be less educated, and had a larger proportion of men (Supplementary Table S1).

Predictor variables

Birth cohort was the primary predictor variable. Other covariates included the following: Demographics, including baseline age, sex, race, and self-reported education level categorized as less than high school (<HS), graduated high school (HS), or some college

education or higher (>HS); MMSE score from each study visit; total number of prescription drugs, as a measure of overall morbidity(29,30); and use of antidepressant drugs.

Outcome variables

At each study visit (excluding the baseline MoVIES visit), participants completed a modified Center for Epidemiologic Studies Depression Scale (mCES-D).(31) The modified scale includes all 20 depression symptoms in the original CES-D,(32) but rather than recalling the number of days during the past week that they experienced each symptom, participants instead report whether or not they experienced that symptom over most of the preceding week. Each symptom is scored as absent/present (0/1) with a possible maximum score of 20, so that the total mCES-D score represents number of symptoms. Having at least subsyndromal depression was operationalized for the present study as ≥ 5 endorsed items on the mCES-D, which we have previously established as our threshold.(31) We used two depression outcomes in the models; (1) an mCES-D score ≥ 5 and (2) the number of symptoms endorsed in each of the four factors derived from the factor analysis described next.

Statistical Analyses

Descriptive statistics.—We calculated descriptive statistics in the overall sample and by each birth cohort. For categorical variables, we report frequencies and percentages. For continuous variables, we report mean and standard deviation for baseline age, or median, 25% percentile, and 75% percentile for baseline MMSE and total number of prescription medications. Significant differences between birth cohorts for categorical variables were tested using Pearson's Chi Square Test (or Fisher's Exact Test when any cell count ≤ 5). Significant differences between birth cohorts for continuous variables were tested using one-way analysis of variance (ANOVA) when normally distributed, and Kruskal-Wallis Rank Sum Test when not normally distributed

Factor Analysis.—To find the latent subgroups of the individual symptoms of the mCES-D, we used principal components factor analysis and the varimax rotation. Applying the Kaiser criterion (i.e., eigenvalues ≥ 1), we identified four subgroups of individual symptoms using baseline mCES-D data. The four factors explained 46% of the variance of the original matrix. All items included in the four subgroups achieved loading >0.4 . The items in each factor, as well as factor loadings, are displayed in Table 1. Factor 1 (Depressed Mood) accounted for 28% of the variance of the original matrix. Factor 2 (Anergia/Hopelessness) accounted for 7% of the variance of the original matrix. Factor 3 (Withdrawal) accounted for 6% of the variance of the original matrix. Factor 4 (Poor Self-Esteem) accounted for 5% of the variance of the original matrix. Three items failed to load and therefore were omitted when factors were used as outcomes in the models. The identified factors, based on the current analysis sample comprised of both MYHAT and MoVIES, are similar to a previous factor analysis of the mCES-D performed in only the MoVIES participants,(33) and are fairly consistent with reported meta-analyses factor analyzing the original CES-D.(34,35)

Models.—In modelling the effect of birth cohort on the presence of ≥ 5 depression symptoms or one the four mCES-D factors, we recognized the need to account for possibly

nonrandom attrition and mortality rates, as higher rates of both are associated with depression.(10,36) Therefore, we used a joint modeling approach with shared random effects to simultaneously model the time-varying main events (depression symptoms 5 or the four mCES-D factors) and time to attrition to assess the association between the main event and birth cohort while adjusting for attrition. In the sub-model of 5 depression symptoms, a generalized linear mixed model with logit link adjusted for age, sex, education, antidepressant usage, MMSE, and total prescription medications was used. These covariates were adjusted for on the basis that they were associated both with the primary predictor (birth cohort) and outcome (symptoms of depression). The sub-model of time to attrition was a Weibull proportional hazards model adjusted for age, sex, and education. A shared random effect term was used to link these two sub-models. In joint models of the four mCES-D profiles, the sub-model of the main event was a linear mixed model adjusted for age, sex, education, antidepressant usage, MMSE, and total prescription medications; and the sub-model of time to attrition was a Weibull proportional hazards model adjusted for age, sex, and education. A shared random effect term was used to link the two sub-models. Sex and education were time-invariant covariates. Age, antidepressant medication use, MMSE, and total number of prescription medications were time-varying covariates. R version 3.5.1 and SAS 9.3 (SAS Institute) were used for data analysis, including the NLMIXED procedure for the joint models.

RESULTS

Descriptive statistics are provided for the overall analysis sample (n=3227) and by birth cohort in Table 2. The proportion of each birth cohort that had at least one study visit with 5 mCES-D symptoms was lower in the more recently born cohorts than in the earlier born cohorts ($\chi^2=12.19$, $df=3$, $p=.007$), a trend that was generally consistent in each age group, excluding age 85+ in which event counts, and to some extent prevalence, were low. Additionally, the earlier born cohorts had lower education ($\chi^2=459.32$, $df=6$, $p<.001$), lower MMSE scores (Kruskal-Wallis $H=217.71$, $df=3$, $p<.001$), were less likely to take antidepressant medications ($\chi^2=105.21$, $df=3$, $p<.001$), and took fewer total number of prescription medications (Kruskal-Wallis $H=239.42$, $df=3$, $p<.001$). Lastly, and not unexpectedly, the earlier born cohorts came primarily from the earlier conducted MoVIES study ($\chi^2=1738.3$, $df=3$, $p<.001$), and there was slightly lower average years of follow-up in the birth cohorts that were older at baseline ($F_{(1,3223)}=17.75$, $p<.001$), particularly the 1902-1911 cohort.

In the joint model of 5 depression symptoms, we observed a significant overall birth cohort effect ($F_{(3,3220)}=9.27$, $p<.0001$). Specifically, participants from more recently born cohorts were less likely than the 1902-1911 referent birth cohort to have a study visit in which they endorsed 5 mCES-D symptoms (Table 3). In testing additional pairwise comparisons of each birth cohort to each earlier born cohort, each subsequent birth cohort was less likely than each earlier born cohort to have a study visit with 5 depression symptoms (1922-1931 vs 1912-1921: OR=0.652, 95% CI OR: 0.464 - 0.915; 1932-1941 vs 1912-1921: OR=0.363, 95% CI OR: 0.231 - 0.571; 1932-1941 vs 1922-1931: OR=0.557, 95% CI OR: 0.350 - 0.886). However, after applying a Bonferroni correction of the type I error rate accounting for all six

birth cohort comparisons ($\alpha=.05/6=.0083$), only the 1932-1941 vs 1902-1911, 1932-1941 vs 1912-1921, and 1922-1931 vs 1902-1911 comparisons were statistically significant.

In joint models of the four mCES-D factor outcomes, we observed a significant birth cohort effect in 3 of the 4 factors: Depressed Mood ($F_{(3,3220)}=9.16$, $p<.001$), Anergia/Hopelessness ($F_{(3,3220)}=59.75$, $p<.001$) and Withdrawal ($F_{(3,3220)}=3.85$, $p=.009$)(Table 4). The birth cohort effect in each of these factors was fairly consistent with the primary analysis, with participants in more recently born cohorts endorsing fewer symptoms in comparison to the 1902-1911 birth cohort. The birth cohort effect was most evident for Depressed Mood and Anergia/Hopelessness. Only the 1932-1941 cohort reported fewer symptoms of Withdrawal compared to the 1902-1911 referent cohort. We observed no cohort effect for Poor Self-Esteem ($F_{(3,3220)}=1.00$, $p=.390$). Figure 1 displays trajectories in each mCES-D factor by birth cohort.

DISCUSSION

The presented analysis investigated depression in two ways: a categorical cutoff of 5 symptoms of depression on the total mCES-D, and four factor analyzed components of the mCES-D. Across the four birth cohorts we examined, we report significantly lower endorsement of depression symptoms on the mCES-D in more recently born cohorts. Specifically, in comparison to the earliest born 1902-1911 cohort, we observed 79% lower odds of having 5 depression symptoms in the 1932-1941 birth cohort, 63% lower odds in the 1922-1931 birth cohort, and 43% lower odds in the 1912-1921 birth cohort. From a public health and population trends standpoint, these reported effect sizes suggest a meaningful reduction in depression symptom endorsement among older adults across successive birth cohorts. Additionally, each subsequent birth cohort had lower odds of having 5 depression symptoms when compared to each preceding birth cohort, suggesting a continually decreasing endorsement of depression symptoms across the examined cohorts, although this observation was not fully statistically significant with adjustment for multiple comparisons. When considering the factor analyzed components of the mCES-D, the declining trend was reflected most in items involving depressed mood and anergia/hopelessness.

Our reported declining rate of symptoms of depression in older adults stands in contrast to the increasing or stable rates of MDD reported from younger age groups.(19,21) While no previous studies have examined cohort effects in depression symptoms among older adults, the Epidemiologic Catchment Area (ECA) examined trends in MDD in cohorts born in the years 1905 to 1964, which overlaps partially with the birth years represented in the MoVIES/MYHAT cohort.(19) However, the ECA study took place when the participants were considerably younger.(37) To illustrate, the cumulative incidence of major depression in the ECA 1935-1944 birth cohort was calculated up to age 44. In the MoVIES/MYHAT birth cohort with the same birth decade (1932-1941), we prospectively measured symptoms of depression in participants who had an average age of 70 at baseline. The ECA investigators further indicated that the increasing depression trend appeared to be slowing in the most recently born cohorts.

In the present study, the cohort effect was unexplained by changing patterns in education and antidepressant medication usage, which were higher in the more recently born cohorts. It is possible that lower reporting of depression symptoms is related to compression of morbidity, with more recently born older adults living longer into older age free from functional impairment than earlier born older adults.(22) Symptoms of depression are more common in individuals with medical conditions.(38) However, we observed a significant birth cohort effect even with adjustment for total prescription medications, which we have used previously to represent medical morbidity.(29,30)

Given the reported associations between cognitive impairment and depression,(39) the observed cohort trend may be related to trends evidencing compression of cognitive morbidity.(13–16) However, while lower MMSE was related to higher overall mCES-D symptoms and more endorsed items on each of the four factors, including MMSE in our model did not explain the observed birth cohort effect.

We have no obvious interpretation for the finding that there was a significant birth cohort effect in the expression of the Depressed Mood, Anergia/Hopelessness, and Withdrawal symptoms but not Poor Self-Esteem symptoms. Potentially, it may suggest that there is not only a quantitative change in depression symptoms but a qualitative time trend in how older adults experience or express depression. This may be of clinical relevance as different generations age into older adulthood and deserves further investigation.

Strengths and Limitations

The two cohorts pooled in the present study were recruited from communities in economically depressed post-industrial regions and represent an underserved population rarely targeted for health research. The stable population of the region facilitates longitudinal research. Both MoVIES and MYHAT were randomly selected community-based samples which enhance their external validity (generalizability) to the population at large. As the present results are reported from four birth cohorts that are predominantly white, our findings should be replicated in other cohorts with larger representations of ethnic minorities. Further analyses should investigate other secular trends, which might help to explain declining trends in depression symptoms. Future population research focused on depressive disorders should include diagnostic assessment to detect these disorders and determine whether there are also declining trends in major depression in older adults.

CONCLUSIONS

As life expectancy increases in the population, reduced rates of depression symptoms in older adults might reflect compression of morbidity, or a declining trend in medical comorbidity. If confirmed in other cohorts, the trend is a positive development that may also influence other health outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Conflict of Interests and Sources of Funding:

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Highlights

1. **What is the primary question addressed by this study?** Are there birth cohort effects in depression symptoms among older adults?
2. **What is the main finding of this study?** More recently born cohorts of older adults report fewer depression symptoms than earlier born cohorts, particularly symptoms involving depressed mood, anergia, and hopelessness.
3. **What is the meaning of the finding?** Reduced rates of depression symptoms in more recently born older adults may reflect birth cohort trends in compression of medical morbidity and cognitive morbidity.

Figure 1.
Predicted Average Number of Symptoms in Each mCES-D Factor by Birth Cohort and Age

Table 1.

Factor-Analyzed Composites of the mCES-D in MoVIES and MYHAT Sample (n=3227)

mCES-D Item	Factors			
	Depressed Mood	Anergia and Hopelessness	Withdrawal	Poor Self-Esteem
I felt I could not shake off the blues even with help from family and friends	0.588 *	0.202	0.266	0.227
I felt depressed	0.729 *	0.248	0.182	0.074
I was happy	0.574 *	0.377	0.047	0.036
I felt lonely	0.497 *	0.272	0.131	0.167
I had crying spells	0.667 *	−0.108	0.275	−0.049
I felt sad	0.765 *	0.138	0.198	0.156
I felt that everything I did was an effort	0.113	0.709 *	0.270	0.040
I felt hopeful about the future	0.256	0.596 *	−0.109	0.055
I enjoyed life	0.464	0.481 *	0.002	0.181
I could not get going	0.157	0.676 *	0.288	−0.001
I was bothered by things that don't usually bother me	0.207	−0.095	0.690 *	0.055
I did not feel like eating; my appetite was poor	0.157	0.290	0.421 *	0.038
I had trouble keeping my mind on what I was doing	0.051	0.286	0.609 *	0.058
I talked less than usual	0.233	0.101	0.481 *	0.229
I thought my life had been a failure	0.165	0.191	0.092	0.485 *
People were unfriendly	0.124	0.045	0.073	0.788 *
I felt that people dislike me	0.044	−0.013	0.080	0.801 *
I felt that I was as good as other people	0.087	0.366	0.161	0.232
I felt fearful	0.352	0.255	0.044	0.197
My sleep was restless	0.225	0.312	0.327	0.082
Factor % Variance Explained	28.0%	7.0%	6.0%	5.0%

Notes: mCES-D: Modified Center for Epidemiologic Studies Depression Scale. Cells contain factor loadings, with the highest factor loading 0.400 highlighted under the factor name. Three items failed to load onto any factor: I felt that I was as good as other people, I felt fearful, and My sleep was restless.

* Factor Loading 0.400

Table 2.

Descriptive Statistics by Birth Cohort and Total Sample

	1902-1911	1912-1921	1922-1931	1932-1941	Total	p
Analysis Sample, N	305	1202	1051	669	3227	-
Baseline Age, Mean (SD)	80.6 (4.2)	75.7 (8.2)	79.0 (5.5)	70.2 (2.9)	76.1 (7.1)	<.001 *
Female Sex, N (%)	204 (66.9)	727 (60.5)	634 (60.3)	400 (59.8)	1965 (60.9)	.160 **
<HS Education, N (%)	173 (56.7)	420 (34.9)	152 (14.5)	42 (6.3)	787 (24.4)	<.001 **
HS Education, N (%)	52 (17.1)	484 (40.3)	497 (47.3)	296 (44.3)	1329 (41.2)	
>HS Education, N (%)	80 (26.2)	298 (24.8)	402 (38.3)	331 (49.5)	1111 (34.4)	
Baseline Antidepressant Use, N (%)	7 (2.3)	51 (4.2)	113 (10.8)	112 (16.8)	283 (8.8)	<.001 **
MYHAT Study, N (%)	12 (3.9)	323 (26.9)	926 (88.1)	669 (100.0)	1930 (59.8)	<.001 **
Baseline MMSE, Median (Q1-Q3)	23.5 (21.8-26.0)	27.0 (26.0-28.0)	28.0 (27.0-29.0)	29.0 (28.0-30.0)	28.0 (27.0-2.09)	<.001 ***
Baseline Number of Rx Medications, Median (Q1-Q3)	2 (1-3)	2 (0-4)	4 (2-6)	4 (2-6)	3 (1-5)	<.001 ***
Person-Years, Mean (SD)	4.60 (3.64)	6.13 (4.08)	5.39 (3.62)	6.03 (3.46)	5.72 (3.80)	<.001 *
At least one visit with mCES-D 5, N (%)						
Overall	70 (23.0)	229 (19.1)	168 (16.0)	102 (15.2)	569 (17.6)	.007 **
Baseline Age Between 65-74 (n=1540)	-	153 (19.51)	15 (11.72)	97 (15.45)	265 (17.21)	.031 ****
Baseline Age Between 75-84 (n=1288)	64 (22.94)	25 (26.04)	148 (16.97)	5 (12.20)	242 (18.79)	.025 ****
Baseline Age 85+ (n=399)	6 (23.08)	51 (15.84)	5 (9.80)	-	62 (15.54)	.326 ****

Notes: SD: Standard Deviation; HS: high school; MYHAT: Monongahela Youghiogheny Healthy Aging Team; MMSE: Mini-Mental State Exam; Q: Quartile; Rx: Prescription; mCES-D: Modified Center for Epidemiologic Studies Depression Scale. p-values reflect tests for significant differences between birth cohorts using the following tests:

* ANOVA

** Pearson's Chi-Square test

*** Kruskal-Wallis rank sum test

**** Fisher's Exact Test

Table 3.Covariate Effects on Depression Symptoms (≥ 5 mCES-D)

	OR	95% CI OR	p
Born 1902-1911 (referent)	-	-	-
Born 1912-1921	0.566	0.341 - 0.939	.028
Born 1922-1931	0.369	0.215 - 0.632	<.001
Born 1932-1941	0.205	0.106 - 0.399	<.001
Age	0.708	0.542 - 0.926	.012
Female Sex	2.658	1.963 - 3.600	<.001
HS education	0.435	0.307 - 0.617	<.001
>HS education	0.336	0.229 - 0.491	<.001
Antidepressant use	2.670	1.882 - 3.787	<.001
MMSE	0.856	0.824 - 0.890	<.001
Number of Rx Medications	1.152	1.104 - 1.203	<.001

Notes: Reference Groups are Born 1902-1911, Male Sex, <HS Education, and no antidepressant use. mCES-D: Modified Center for Epidemiologic Studies Depression Scale; OR: odds ratio; CI: confidence interval; HS: high school; MMSE: Mini-Mental State Exam; Rx: Prescription.

Degrees of Freedom for all terms = 3220

Model: Generalized linear mixed sub-model with logit link and Weibull proportional hazards time to attrition sub-model joint with shared random effect terms.

Table 4.

Covariate Effects on mCES-D Factor Scores

	Depressed Mood			Anergia/Hopelessness			Withdrawal			Poor Self-Esteem		
	β	95% CI β	p	β	95% CI β	p	β	95% CI β	p	β	95% CI β	p
Born 1902-1911	-	-	-	-	-	-	-	-	-	-	-	-
Born 1912-1921	-0.006	-0.026 - 0.013	.524	-0.081	-0.109 - -0.053	<.001	-0.006	-0.020 - 0.008	.390	-0.006	-0.015 - 0.003	.161
Born 1922-1931	-0.025	-0.045 - -0.006	.009	-0.132	-0.160 - -0.105	<.001	-0.007	-0.021 - 0.007	.334	-0.007	-0.015 - 0.002	.117
Born 1932-1941	-0.033	-0.054 - -0.011	.003	-0.150	-0.179 - -0.121	<.001	-0.018	-0.033 - -0.003	.019	-0.008	-0.017 - 0.001	.088
Age	-0.003	-0.008 - 0.002	.233	-0.010	-0.016 - -0.004	.002	-0.007	-0.010 - -0.003	<.001	-0.003	-0.005 - -0.001	<.001
Female Sex	0.032	0.024 - 0.039	<.001	0.020	0.011 - 0.030	<.001	0.021	0.016 - 0.027	<.001	0.003	0.000 - 0.006	.044
HS education	-0.029	-0.042 - -0.016	<.001	-0.030	-0.045 - -0.015	<.001	-0.012	-0.020 - -0.003	.005	-0.005	-0.001 - 0.000	.067
>HS education	-0.037	-0.049 - -0.024	<.001	-0.040	-0.055 - -0.025	<.001	-0.012	-0.021 - -0.004	.003	-0.006	-0.011 - -0.001	.014
Antidepressant use	0.032	0.017 - 0.047	<.001	0.028	0.012 - 0.045	<.001	0.023	0.013 - 0.034	<.001	0.004	-0.001 - 0.001	.129
MMSE	-0.005	-0.006 - -0.003	<.001	-0.008	-0.001 - -0.006	<.001	-0.004	-0.005 - -0.003	<.001	-0.001	-0.002 - -0.001	<.001
Number of Rx Medications	0.003	0.002 - 0.004	<.001	0.008	0.007 - 0.010	<.001	0.002	0.001 - 0.003	<.001	0.000	-0.000 - 0.001	.086

Notes: Reference Groups are Born 1902-1911, Male Sex, <HS Education, and no antidepressant use. mCES-D: Modified Center for Epidemiologic Studies Depression Scale; CI: Confidence Interval; HS: high school; MMSE: Mini-Mental State Exam; Rx: Prescription.

Degrees of Freedom for all terms = 3220

Model: Linear mixed sub-model and Weibull proportional hazards time to attrition sub-model joint with shared random effect terms.