Title: Life course socioeconomic position and incidence of mid-late life depression in China and England: a comparative analysis of CHARLS and ELSA

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Harmonization of adulthood socioeconomic position

Educational level was obtained as highest educational attainment in CHARLS, and highest educational qualifications in ELSA. Study-specific hierarchies were defined as: low ('no formal education or illiterate', 'not finished primary school', 'Sishu (home school)', 'elementary school'), medium ('middle school'), and high ('high school', 'vocational school', 'college') in CHARLS; and low ('no qualifications'), medium ('foreign/other,' 'NVQ1/CSE other grade equivalent qualification,' 'NVQ2/GCE O-level equivalent qualification,' 'NVQ3/GCE A level equivalent qualification'), and high ('Higher education below degree,' 'NVQ4/NVQ5/Degree or equivalent qualification) in ELSA.

Physical wealth was measured as selected assets owned by the participant or other members living in their household, which were context-appropriate for China and England. CHARLS included 17 assets such as household appliances, furniture, electronics, vehicles, and valuables. In ELSA, seven assets including electronics, vehicles, valuables, ownership of holiday properties and other land, trusts, and inheritances; were ascertained. The number of reported assets were counted to create scores ranging from 0-17 in CHARLS and 0-7 in ELSA; and grouped into study-specific tertiles in CHARLS (low: 0-3, medium: 4-5, and high: 6-17) and ELSA (low: 0-1, medium: 2, and high: 3-7).

Housing tenure data recorded the status under which participants occupied their residence. CHARLS asked participants whether their current residence was: 'entirely owned by family,' 'partially owned by family,' or 'completely not owned by family;' whereas ELSA queried participants whether they or other household members: 'owned it outright,' 'bought it with the help of a mortgage,' 'paying part rent and part mortgage,' 'renting it,' or 'living here rent free.' These classifications were dichotomised to denote whether or not the participant or other members living in their household owned their current residence. Non-ownership comprised those whose current residence were completely not owned by family (CHARLS); or were partially rented/partially mortgaged, rented, or living there rent free (ELSA).

Harmonization of study covariates

Data on alcohol drinking frequency, self-rated health and number of limitations in activities of daily living (ADLs) were harmonized as described in the table below.

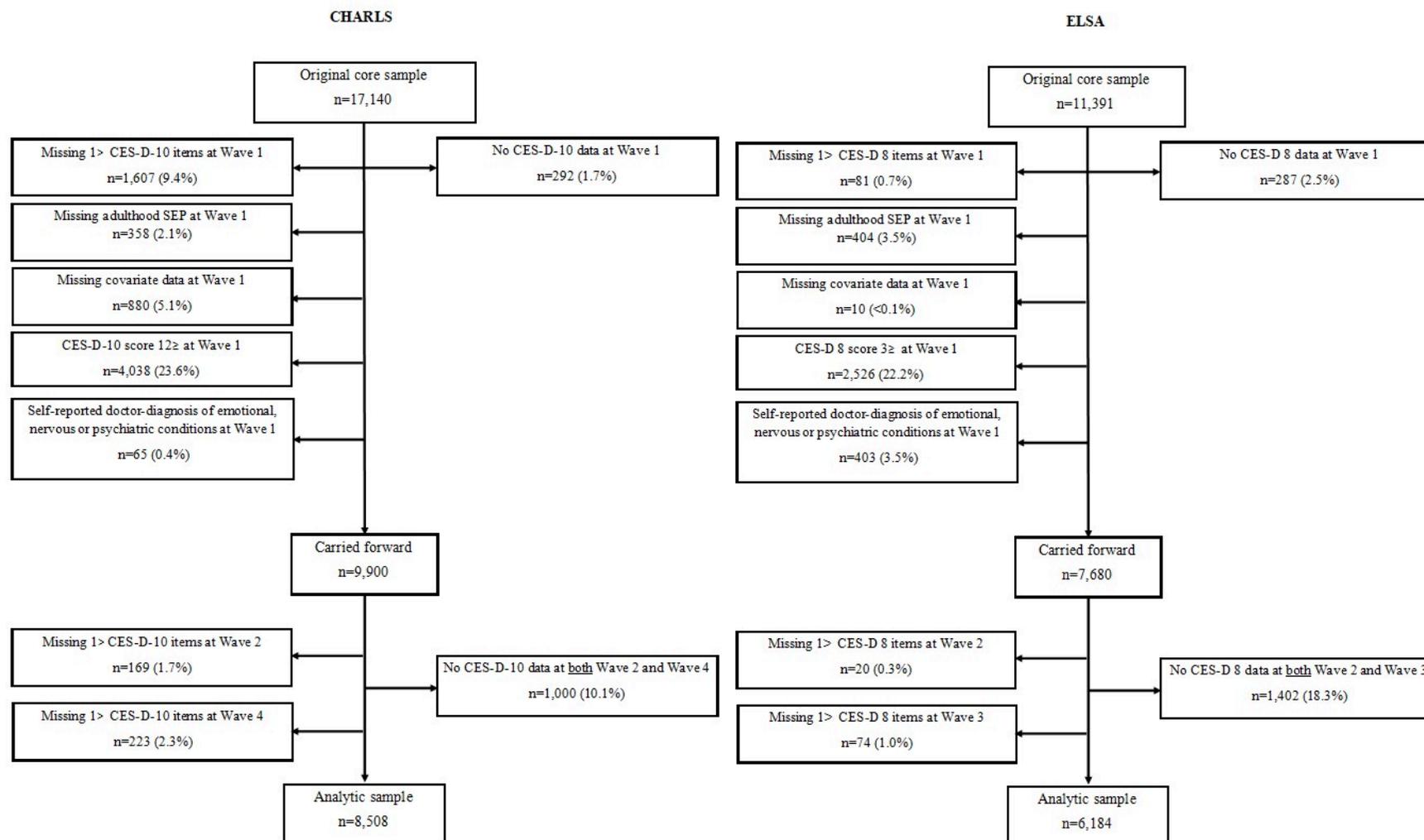| Covariate	Harmonization comment	CHARLS, China		ELSA, England	
		Original data	**Harmonized data**	**Original data**	**Harmonized data**
Alcohol drinking frequency	The data were partially harmonized†‡ to facilitate comparison between original drinking frequency categories. †CHARLS-specific drinking frequency categories. ‡ELSA-specific drinking frequency categories.	None	Never	None	Never
		Less than once a month	Less than once a month	1-2 times a year	Less than once a month
		Once a month	1-3 times a month†	Once every few months	Less than once a month
		2-3 times a month	1-3 times a month†	1-2 times a month	1-2 times a month‡
		Once a week	1-3 times a week†	1-2 times a week	1-2 times a week ‡
		2-3 times a week	1-3 times a week†	3-4 times a week	3-6 times a week ‡
		4-6 times a week	4-6 times a week†	5-6 times a week	3-6 times a week ‡
		Once a day	Almost daily or more	Almost every day	Almost daily or more
		2 times a day	Almost daily or more		
		More than 2 times a day	Almost daily or more		
Self-rated health	The data were harmonized because very few CHARLS participants reported their health was either 'very good.' Likewise, few participants in both studies reported 'very poor' health.	Very good	Very good or good	Very good	Very good or good
		Good	Very good or good	Good	Very good or good
		Fair	Fair	Fair	Fair
		Poor	Bad or very bad	Bad	Bad or very bad
		Very poor	Bad or very bad	Very bad	Bad or very bad
Number of limitations in activities of daily living (ADLs)	Of the range of daily activities that were asked in CHARLS and ELSA, five were comparable between studies. As the studies used different response options, responses to these 5 activities in CHARLS were dichotomised into binary responses denoting no difficulty (0) or any level of difficulty (1). Responses were then summed in each study to generate scores ranging from 0 to 5.	Because of health or memory problems, do you have any difficulty with any of the following activities? For each activity, select whether: 0) No, I don't have any difficulty, 1) I have difficulty but can still do it, 2) Yes, I have difficulty and need help, and 3) I cannot do it. - Dressing, including taking clothes out from a closet, putting them on, buttoning up, and fastening a belt - Bathing or showering - Eating, such as cutting up your food - Getting in and out of bed - Using the toilet, including getting up or down	N of limitations in ADLs (0-5)	Here are a few more everyday activities. Please tell me if you have any difficulty with these because of a physical, mental, emotional or memory problem. Select all that apply: - Dressing, including putting on shoes and socks - Bathing or showering - Eating, such as cutting up your food - Getting in and out of bed - Using the toilet, including getting up or down	N of limitations in ADLs (0-5)

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Description of the study-specific analytic samples

We excluded 18.3% of CHARLS and 6.9% of ELSA original cohort participants for having a CES-D item non-response of 1>, and no adulthood SEP and covariate data at Wave 1. To estimate the incidence of clinically significant depressive symptoms among non-cases; we omitted participants with CES-D 10 scores of 12≥ in CHARLS and CES-D 8 scores of 3≥ in ELSA, plus those with ever self-reported doctor-diagnosis of emotional, nervous, or psychiatric conditions at Wave 1 (CHARLS: 24.0% ELSA: 25.7%). For the four-year prospective data, we excluded participants with no repeated CES-D measures (out of a possible two), and those with a CES-D item non-response of 1> in any of the two assessments (CHARLS: 8.1%; ELSA: 13.1%). Hence, the main samples, for the analysis of adulthood SEP, comprised 8,508 CHARLS and 6,184 ELSA participants.

As childhood SEP was not collected until Wave 3; and offspring SEP (i.e., adult cadre child) was not part of the core interview at Wave 1 in CHARLS; fewer participants had these data available. We, therefore, derived sub-samples for the analysis of childhood (CHARLS: 7,637; ELSA: 3,305) and offspring (CHARLS: 6,831) SEP, respectively, which included all main analytic sample participants with these data.

Selection diagrams of the derivation of the analytic samples are shown in Figures S1 – S3.

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Supplemental Figure S1 Selection diagram of the main CHARLS and ELSA analytic samples for adulthood SEP

CHARLS

ELSA

Original core sample
n=17,140

Missing 1> CES-D-10 items at Wave 1	No CES-D-10 data at Wave 1
n=1,607 (9.4%)	n=292 (1.7%)

Missing adulthood SEP at Wave 1
n=358 (2.1%)

Missing covariate data at Wave 1
n=880 (5.1%)

CES-D-10 score 12≥ at Wave 1
n=4,038 (23.6%)

Self-reported doctor-diagnosis of emotional,
nervous or psychiatric conditions at Wave 1
n=65 (0.4%)

Carried forward
n=9,900

| Missing 1> CES-D-10 items at Wave 2	No CES-D-10 data at both Wave 2 and Wave 4
n=169 (1.7%)	n=1,000 (10.1%)

Missing 1> CES-D-10 items at Wave 4
n=223 (2.3%)

Analytic sample
n=8,508

Original core sample
n=11,391

Missing 1> CES-D 8 items at Wave 1	No CES-D 8 data at Wave 1
n=81 (0.7%)	n=287 (2.5%)

Missing adulthood SEP at Wave 1
n=404 (3.5%)

Missing covariate data at Wave 1
n=10 (<0.1%)

CES-D 8 score 3≥ at Wave 1
n=2,526 (22.2%)

Self-reported doctor-diagnosis of emotional,
nervous or psychiatric conditions at Wave 1
n=403 (3.5%)

Carried forward
n=7,680

Missing 1> CES-D 8 items at Wave 2	No CES-D 8 data at both Wave 2 and Wave 3
n=20 (0.3%)	n=1,402 (18.3%)

Missing 1> CES-D 8 items at Wave 3
n=74 (1.0%)

Analytic sample
n=6,184

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Supplemental Figure S2 Selection diagram of the CHARLS and ELSA analytic sub-samples for severe childhood/adolescent SEP
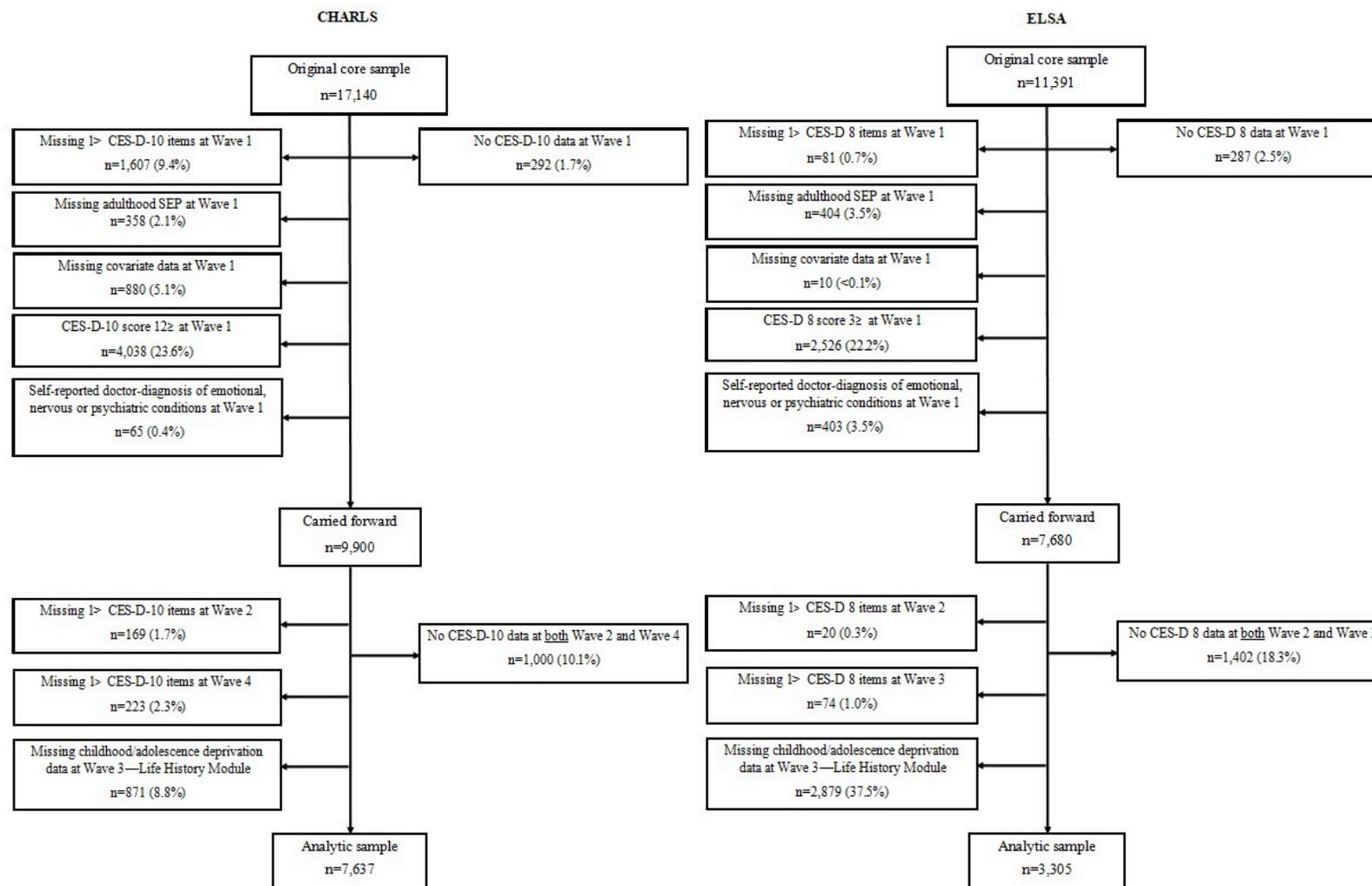
Supplemental Figure S3 Selection diagram of the CHARLS analytic sub-sample for offspring SEP
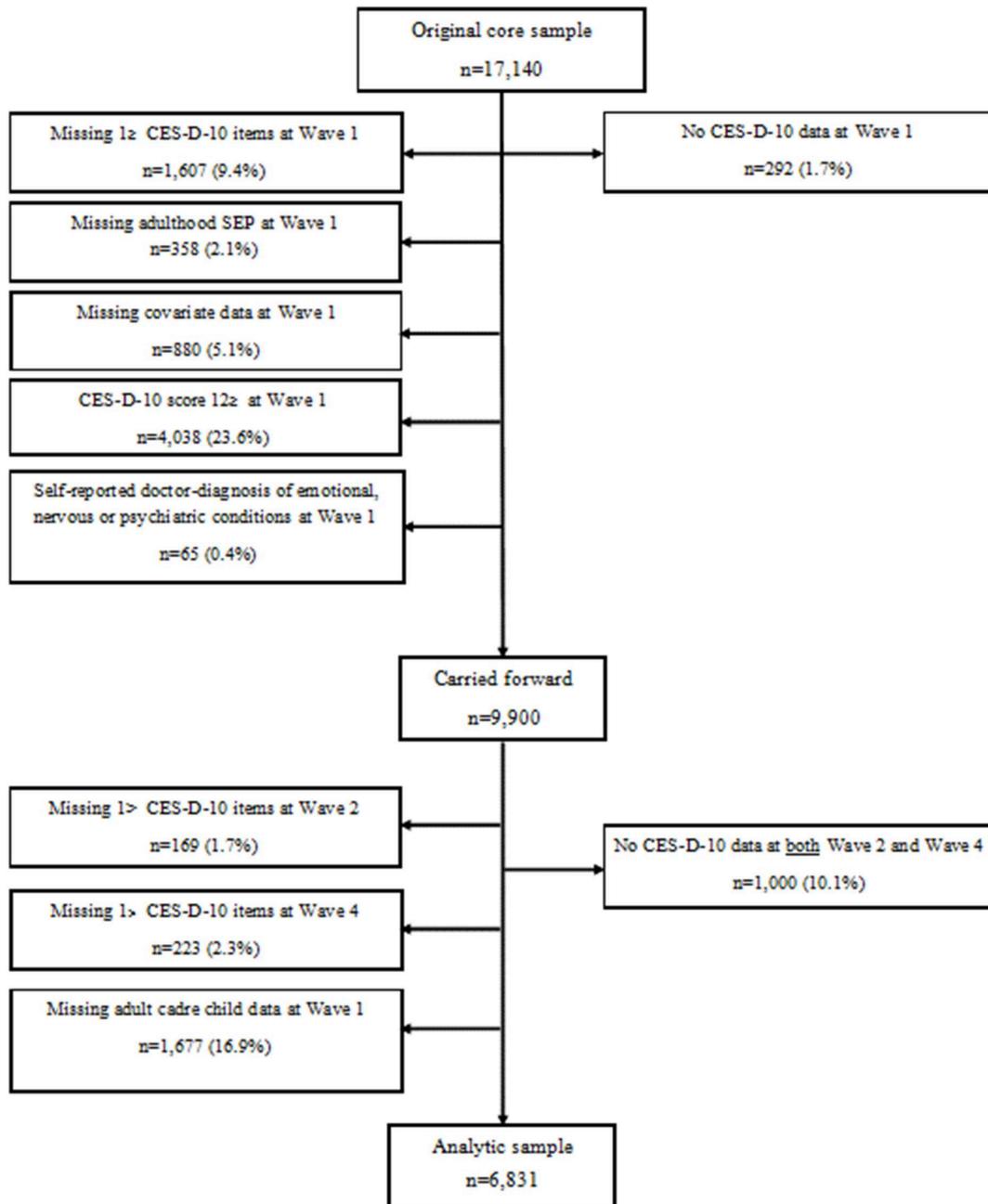
Supplemental Figure S4 Study-specific incidence rates of depressive symptom onset per 1,000 person-months by childhood/adolescent and offspring SEP
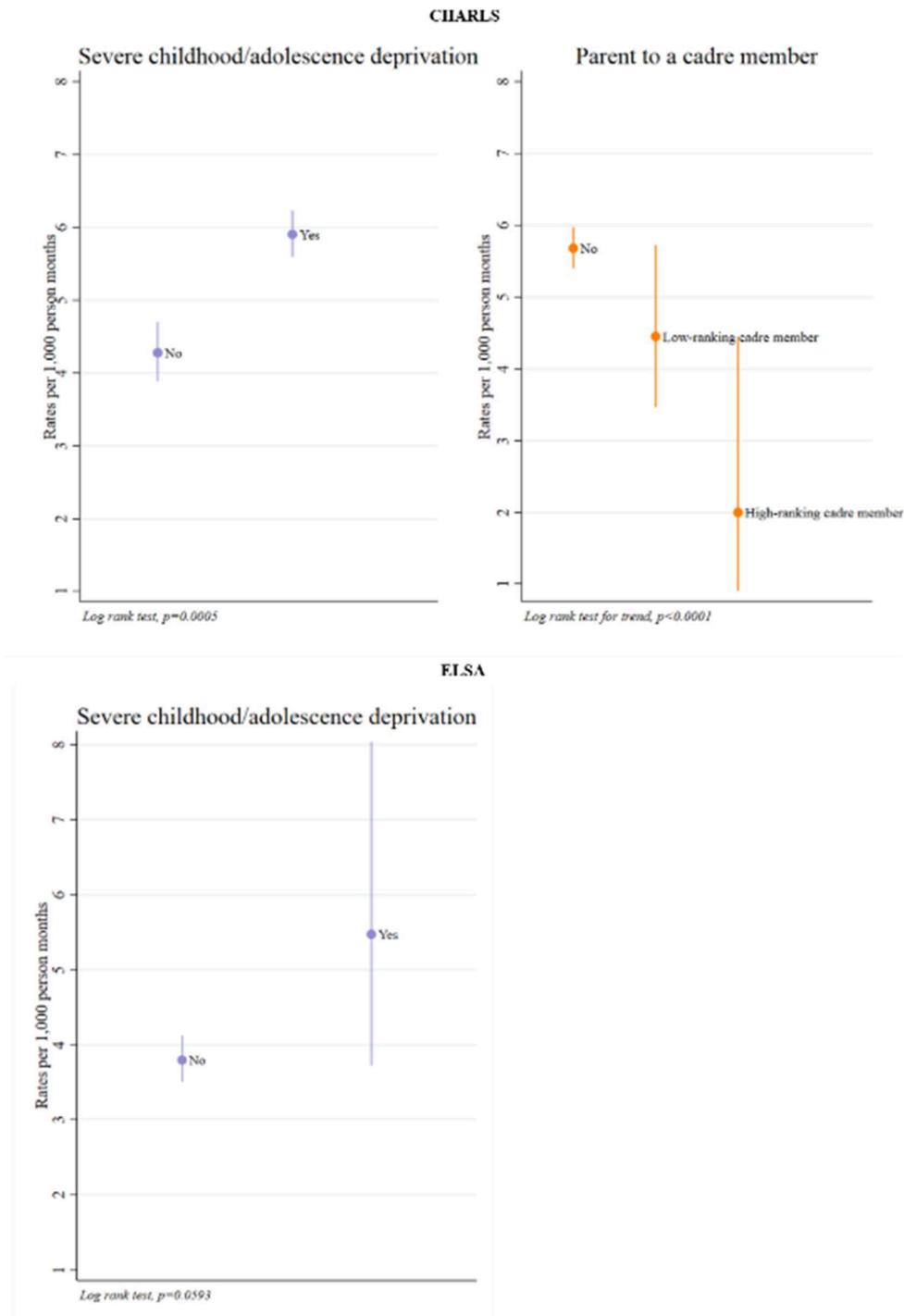
Supplemental Table S1 ELSA-specific hazard ratios (HRs) of depressive symptom onset by physical wealth tertiles by ten-year age groups

Age group (years)	ELSA (CES-D 8 score ≥ 3)					
	Model 1*		Model 2†		Model 3‡	
	HR	95% CI	HR	95% CI	HR	95% CI
50-59 years						
Low physical wealth	1.00	-	1.00	-	1.00	-
Medium physical wealth	0.94	0.74, 1.18	1.01	0.80, 1.27	1.07	0.85, 1.35
High physical wealth	0.76	0.57, 1.00	0.87	0.65, 1.17	0.95	0.70, 1.27
60-69 years						
Low physical wealth	1.00	-	1.00	-	1.00	-
Medium physical wealth	0.60	0.48, 0.75	0.66	0.52, 0.83	0.69	0.55, 0.88
High physical wealth	0.57	0.42, 0.78	0.70	0.51, 0.96	0.74	0.54, 1.03
70 ≥ years						
Low physical wealth	1.00	-	1.00	-	1.00	-
Medium physical wealth	0.70	0.57, 0.87	0.76	0.61, 0.94	0.80	0.64, 1.00
High physical wealth	0.41	0.25, 0.66	0.44	0.27, 0.71	0.47	0.29, 0.77

*Adjusted for age group, gender, and geographical region (CHARLS: urban vs. rural area; ELSA: government office region). †Adjusted for Model 1 covariates plus marital status, smoking status, alcohol drinking frequency, self-rated health, and number of limitations of ADLs. ‡Adjusted for Model 2 covariates plus all measures of adulthood SEP.

Supplemental Table S2 ELSA-specific hazard ratios (HRs) of depressive symptom onset by adulthood and childhood/adolescent SEP over 14-year follow-up

Adulthood and childhood SEP	ELSA (CES-D 8 score ≥ 3)					
	Model 1*		Model 2†		Model 3‡	
	HR	95% CI	HR	95% CI	HR	95% CI
Educational level						
Low	1.00	-	1.00	-	1.00	-
Medium	0.81	0.74, 0.90	0.91	0.82, 0.99	0.94	0.85, 1.03
High	0.63	0.57, 0.71	0.74	0.66, 0.84	0.79	0.70, 0.89
Physical wealth						
Low	1.00	-	1.00	-	1.00	-
Medium	0.80	0.73, 0.87	0.87	0.79, 0.96	0.92	0.83, 1.01
High	0.66	0.58, 0.75	0.77	0.68, 0.88	0.83	0.72, 0.95
Residence ownership						
Yes	1.00	-	1.00	-	1.00	-
No	1.52	1.37, 1.70	1.28	1.14, 1.43	1.20	1.07, 1.35
Severe childhood/adolescent deprivation						
No	1.00	-	1.00	-	1.00	-
Yes	1.35	1.01, 1.82	1.25	0.92, 1.69	1.25	0.92, 1.70

*Adjusted for age group, gender, and geographical region (CHARLS: urban vs. rural area; ELSA: government office region). †Adjusted for Model 1 covariates plus marital status, smoking status, alcohol drinking frequency, self-rated health, and number of limitations of ADLs. ‡Adjusted for Model 2 covariates plus all measures of adulthood SEP.