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Childhood socioeconomic circumstances and disability trajectories in older men and women: a European cohort study

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Background: We observed a lack of population-based longitudinal research examining the association of disadvantaged childhood socioeconomic circumstances (CSC) and disability [activities of daily living (ADL) and instrumental activities of daily living (IADL)] in older age, and whether socioeconomic attainments in adulthood can compensate for a poor socioeconomic start in life. **Methods:** Data on 24 440 persons aged 50–96 in 14 European countries (Survey of Health, Ageing and Retirement in Europe) were used to measure the associations between CSC and limitations with ADL and with IADL, using mixed-effects logistic regression models. Models stratified by gender were adjusted for education during young adulthood, main occupation during middle age, ability to make ends meet during old age and potential confounding and control variables. **Results:** Risks of ADL and IADL limitations increased with age and were different between women and men. For women, a gradient across CSC strata was observed, showing that the more disadvantaged the CSC, the higher the risk of ADL and IADL limitations in old age, even after adjustment for adult socioeconomic indicators. For men, the association between CSC and disability was mediated by the main occupation in middle age and the ability to make ends meet at older age. **Conclusion:** Women who grew up in socioeconomically disadvantaged households were at higher risk of disability in older age and this disadvantage was not attenuated by favourable adult socioeconomic conditions. Men were more likely to make up for a disadvantaged start in adulthood.

Introduction

The risk of disability increases with age, peaks at very old age,[1] and affects women more than men.[2] At least 5.5% of the elderly in Western countries encounter difficulties with activities of daily living (ADL), and at least 15% of them have problems with instrumental activities of daily living (IADL).[3,4]

The disablement process framework posits that biological, psychological and social factors contribute to the development of physical disability.[5] More specifically, socioeconomic circumstances were found to be a latent cause of functional limitations.[6] Most studies focus on socioeconomic indicators in middle adulthood, although the development of ADL and IADL limitations seems to be linked to circumstances in early life, which subsequently influence both health and socioeconomic life trajectories.[7,8] Only a few studies investigated the association between disability in late adulthood and childhood socioeconomic circumstances (CSC).[9–11] Some found the relationship between CSC and disability at old age to be partly mediated by socioeconomic attainments in mid-life.[12,13] Yet, there is no clear evidence if this link can be completely broken by educational and professional opportunities, and whether mediation by adult socioeconomic attainments differ between men and women, assuming that women in older cohorts had more restricted access to education[14] and employment[15] during their life course.

While CSC seems to be a promising predictor of disability in later life, longitudinal data research is still lacking in Europe. Hence, the objectives of this study are to examine the associations between CSC and the risk of ADL and IADL limitations at older age, using a large European longitudinal survey [Survey of Health, Ageing and Retirement in Europe (SHARE)]. A potential mediation by adult socioeconomic indicators was tested.

Methods

Study design

This study used repeated measurements of health and socioeconomic circumstances on participants aged between 50 and 96 years living in 14 European countries of the longitudinal SHARE.[16] The data was collected between 2004 and 2015 at

two-year intervals. In wave 3, respondents answered a retrospective questionnaire (SHARELIFE), which focussed on their life histories.[17] The study sample included individuals who participated in wave 3 and who provided one or more outcome measurements (ADL or IADL) in any of the other five waves (waves 1, 2, 4, 5 and 6). The analytical sample consisted of 24 440 participants (detailed flow chart in Supplementary material—Supplementary figure S1).

Dependent variables

Functional limitations in ADL and IADL served to measure disability. The validated ADL measure[18] implemented in SHARE includes six everyday self-care activities: dressing (including putting on shoes and socks), walking across a room, bathing or showering, eating, getting in or out of bed and using the toilet (including getting up or down).[19] For our analyses, we categorized individuals as having 'no ADL limitations' or '1 or more ADL limitations'.

The IADL index[20] defines the number of limitations with instrumental activities of everyday life. The validated IADL measure implemented in SHARE includes the following seven activities: using a map to figure out how to get around in a strange place, preparing a hot meal, shopping for groceries, making telephone calls, taking medications, doing work around the house or garden and managing money (such as paying bills and keeping track of expenses). The variable was dichotomized into 'no IADL limitations' and '1 or more IADL limitations'.

Childhood socioeconomic circumstances

Four retrospective indicators of socioeconomic circumstances at the age of 10 (SHARELIFE; wave 3), assessing the long-term effects of CSC on health,[21–24] were used to compute the CSC index.[25] Including binary measures of the occupational position of the main breadwinner,[26,27] the number of books at home,[23] household overcrowding,[24] and housing quality,[22] CSC resulted in a five-category variable ranging from 'most disadvantaged' to 'most advantaged' (details on variable composition in Supplementary materials— Supplementary table S1).

Adult socioeconomic indicators

Three adult socioeconomic indicators were added as potential mediators. First, based on the International Standard Classification of Education classification, participants' highest educational attainment was integrated by grouping participants with a tertiary education level into 'tertiary', those who reached at least secondary level into 'secondary', and those who finished only primary education into 'primary'. Second, participants' main occupational position was constructed in the same manner as the occupation for the main breadwinner during childhood, with the exception that individuals, who had never done paid work, were grouped separately as 'never worked'. This classification was chosen to account for physically demanding work, rather than opting for a proxy of social class, which can also be influenced by other household members. Third, the mode of the answers to the question 'Is the household able to make ends meet?', ranging from 1 ('with great difficulty') to 4 ('easily'), was calculated across waves (1, 2, 4, 5 and 6) for each participant.

Confounders and controls

Due to their potential association with disability,[28–30] the following two confounding variables were included in all models: birth cohort [1919–28, 1929–38 (Great Depression), 1939–45 (World War II) and after 1945), and country of residence (Austria, Belgium, Czech Republic, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Poland, Spain, Sweden and Switzerland). Additionally, all models were adjusted with two control variables due to their observed association with disability:[31] living with biological parents at the age of 10 (both parents, one biological parent, without biological parents) and participant attrition (no dropout, dropout, death).

Covariates

The following three covariates were included: partnership status (living with a partner vs. alone),[32] chronic disease score (<2 vs. 2 or more of the following conditions: stroke, heart attack, hypertension, diabetes, cancer, Parkinson's disease and asthma),[13] and body mass index (BMI, average of participants' measures over the waves).[5]

Statistical analysis

Mixed-effects logistic regression models were estimated with ADL and IADL as dependent variables. Observations (i.e. Level 1) were nested within participants (i.e. Level 2). Different nested models with various random effects were tested to identify the best random structure using Bayesian information criteria and likelihood ratio tests (data not shown). The best random structure included a random intercept for participants. Analyses were stratified by gender following the literature on disability trajectories at older age[2]. Interactions between gender and CSC were significant.

Model 1 examined the association between CSC and ADL, adjusting for prior confounders (birth cohorts and countries) and control variables (living with biological parents, participant attrition). Age was centred at the midpoint of the sample's age range (73 years). To test whether CSC moderated the effect of ageing on ADL, the models included interaction terms between CSC and age. Sequentially, main effects and interactions of age with educational attainment (Model 2), main occupation (Model 3) and ability to make ends meet (Model 4) were added as potential mediators. Finally, partnership status, number of chronic diseases and BMI were included as covariates (Model 5). Moreover four sensitivity analyses were performed: (i) excluding participants who died during follow-up; (ii) excluding participants who dropped out during follow-up; (iii) excluding participants with visual impairment, using the validated measure eyesight,[33] to check if visual acuity was on the pathway between CSC and disability; (iv) adjusting with an index of the following binary health behaviours: physical inactivity, unhealthy eating, smoking and alcohol consumption.[34] The same sequential analytic strategy was used to examine IADL. A robustness analysis with the index of CSC was conducted using a less restrictive threshold for the indicator of overcrowding ($\geq$1 bedroom per household member). Results (not shown) were similar compared to main analysis. Multicollinearity was quantified using variance inflations factors (VIF). In all final models (i.e. IADL and ADL both in men and women), the highest VIF across socioeconomic predictors was lower than 10 (the highest VIF was 3.38). R, and the lme4 and lmerTest packages were used to estimate the models and parameters.

Results

Participants' characteristics

The sample of 24 440 participants stratified by gender is described in table 1. The distribution in CSC strata was similar between women and men. Overall, men had better socioeconomic conditions in adulthood (education, main occupational position, ability to make ends meet) compared to women. At baseline, women reported more limitations with ADL and IADL compared to men.

Childhood socioeconomic circumstances and limitations with ADL

ADL limitations increased slowly with age among men and women in all adjusted models (table 2). For men, CSC did not change the effect of ageing on ADL trajectories (interactions of CSC and age were not significant; Supplementary figure S3 and table 2), whereas for women the differences between CSC groups increased with age (Supplementary figure S3 and table 2).

Table 1 Characteristics of participants

	Women	Men
Age, years, mean(SD)	62.36(9.2)	62.75(8.9)
	N(%)	*N*(%)
Birth cohort		
Between 1919 and 1928	1386(10.2)	990(9.2)
Between 1929 and 1938	3049(22.3)	2660(24.7)
Between 1939 and 1945	3052(22.4)	2628(24.4)
After 1945	6161(45.1)	4514(41.8)
Childhood socioeconomic circumstances at the age of 10 years		
Most disadvantaged	2498(18.3)	2059(19.1)
Disadvantaged	3473(25.5)	2693(25.0)
Middle	4452(32.6)	3399(31.5)
Advantaged	2469(18.1)	2019(18.7)
Most advantaged	756(5.5)	622(5.8)
Living with biological parents at the age of ten		
Both parents	12 339(90.4)	9785(90.7)
One biological parent	1035(7.6)	815(7.6)
Without biological parent	274(2.0)	192(1.8)
Level of educational achievement		
Primary	3878(28.4)	2479(23.0)
Secondary	7434(54.5)	5780(53.6)
Tertiary	2336(17.1)	2533(23.5)
Skills of main occupational position during active life		
High-skilled	2237(16.4)	3362(31.2)
Low-skilled	9444(69.2)	7341(68.0)
Never worked	1967(14.4)	89(0.8)
Ability to make ends meet		
Easily	4798(35.2)	4257(39.5)
Fairly easily	4189(30.7)	3353(31.1)
With some difficulty	3091(22.7)	2195(20.3)
With great difficulty	1570(11.5)	987(9.2)
Partnership status		
Alone	4315(31.6)	1787(16.6)
Living with a partner	9333(68.4)	9005(83.4)
Number of chronic diseases		
2 or more	6129(44.9)	4071(37.7)
Less than 2	7519(55.1)	6721(62.3)
Body mass index (continuous)	26.44(4.5)	26.99(3.7)
Countries		
Austria	495 (3.6)	338(3.1)
Belgium	1381(10.1)	1141(10.6)
Czech Republic	920(6.74)	671(6.2)
Denmark	1065(7.8)	893(8.3)
France	1204(8.8)	900(8.3)
Germany	898(6.6)	782(7.3)
Greece	1537(11.3)	1194(11.1)
Ireland	338(2.5)	264(2.5)
Italy	1270(9.3)	1057(9.8)
Netherlands	1039(7.6)	870(8.1)
Poland	920(6.7)	702(6.5)
Spain	1002(7.3)	747(6.9)
Sweden	924(6.8)	734(6.8)
Switzerland	655(4.8)	499(4.6)
Attrition		
No dropout	9766(71.6)	7312(67.8)
Dropout	2881(21.1)	2333(21.6)
Death	1001(7.3)	1147(10.6)
Disability		
1 or more ADL limitations, at baseline	1223(9.0)	709(6.6)
1 or more IADL limitations, at baseline	2221(16.3)	904(8.4)

Abbreviations: ADL, activities of daily living; IADL, instrumental activity of daily living; SD, standard deviation.

Among women, a gradient across CSC strata was observable, showing that the more advantaged the CSC, the lower the risk of ADL limitations (Model 1). This association was robust across models, although attenuated by covariates (Model 5). Furthermore, difficulties to make ends meet were associated with a greater risk of ADL limitations in the fully adjusted model (Model 5), but it did not completely mediate the association with CSC.

Among men, CSC were not associated with the risk of ADL limitations (Model 1). In Model 4, greater difficulty in making ends meet was associated with a higher risk of ADL limitations, whereas holding a tertiary degree was associated with a lower risk. Only difficulty in making ends meet remained associated after adjusting for partnership and health status (Model 5).

Childhood socioeconomic circumstances and limitations with IADL

All five models showed a slow increase of IADL limitations with age among men and women (table 3). The risk of IADL limitations increased with ageing more slowly among women who grew up in

Table 2 Associations between childhood socioeconomic circumstances and trajectories of disability at older age, ADL

	Model 1 OR (95%CI)		Model 2 OR (95%CI)		Model 3 OR (95%CI)		Model 4 OR (95%CI)		Model 5 OR (95%CI)	
Women										
Age	1.19 (1.16–1.21)	***	1.18 (1.16–1.21)	***	1.18 (1.15–1.22)	***	1.16 (1.13–1.20)	**	1.15 (1.11–1.18)	**
Childhood socioeconomic circumstances (ref. Most disadvantaged)										
Disadvantaged	0.68 (0.54–0.86)	**	0.69 (0.55–0.87)	**	0.70 (0.56–0.88)	**	0.78 (0.63–0.97)	*	0.87 (0.72–1.06)	
Middle	0.54 (0.43–0.69)	***	0.58 (0.45–0.74)	***	0.59 (0.46–0.75)	***	0.69 (0.54–0.88)	**	0.76 (0.62–0.95)	*
Advantaged	0.43 (0.32–0.57)	***	0.48 (0.36–0.65)	***	0.51 (0.38–0.68)	***	0.59 (0.45–0.79)	***	0.71 (0.55–0.92)	*
Most advantaged	0.30 (0.19–0.46)	***	0.37 (0.24–0.59)	***	0.39 (0.25–0.61)	***	0.47 (0.31–0.73)	**	0.65 (0.44–0.97)	*
Age × childhood socioeconomic circumstances (ref. Most disadvantaged)										
Age × disadvantaged	0.97 (0.95–0.99)	**	0.97 (0.95–0.99)	**	0.97 (0.95–0.99)	**	0.97 (0.95–0.99)	**	0.98 (0.96–0.99)	*
Age × middle	0.97 (0.95–0.99)	**	0.97 (0.95–0.99)	**	0.97 (0.95–0.99)	**	0.97 (0.96–1.00)	*	0.98 (0.96–1.00)	
Age × advantaged	0.96 (0.94–0.99)	**	0.96 (0.94–0.99)	**	0.96 (0.94–0.99)	**	0.96 (0.94–0.99)	**	0.97 (0.95–0.99)	*
Age × most advantaged	0.96 (0.93–1.00)	*	0.96 (0.92–1.00)	*	0.96 (0.92–0.99)	*	0.96 (0.93–1.00)		0.98 (0.95–1.02)	
Education (ref. Primary)										
Secondary	–		1.01 (0.83–1.21)		1.00 (0.83–1.21)		1.06 (0.88–1.27)		1.11 (0.94–1.30)	
Tertiary	–		0.57 (0.42–0.77)	***	0.63 (0.45–0.89)	**	0.76 (0.55–1.06)		0.90 (0.67–1.21)	
Age × education (ref. Primary)										
Age × secondary	–		1.00 (0.98–1.02)		1.00 (0.99–1.02)		1.01 (0.99–1.02)		1.00 (0.99–1.02)	
Age × tertiary	–		1.00 (0.97–1.02)		1.00 (0.97–1.03)		1.00 (0.97–1.03)		1.00 (0.98–1.03)	
Main occupational position (ref. High-skilled)										
Low-skilled	–		–		1.34 (1.00–1.78)		1.25 (0.94–1.65)		1.27 (0.98–1.64)	*
Never worked	–		–		1.64 (1.15–2.34)	**	1.41 (1.00–1.99)		1.45 (1.06–1.99)	*
Age × main occupational position (ref. High-skilled)										
Age × low-skilled	–		–		0.99 (0.97–1.02)		1.00 (0.97–1.02)		1.00 (0.98–1.02)	
Age × never worked	–		–		1.03 (0.99–1.06)		1.03 (1.00–1.06)	*	1.03 (1.00–1.06)	*
Ability to make ends meet (ref. Easily)	–		–		–					
Fairly easily	–		–		–		1.34 (1.10–1.64)	**	1.14 (0.95–1.37)	
With some difficulty	–		–		–		2.09 (1.67–2.63)	***	1.56 (1.27–1.92)	***
With great difficulty	–		–		–		5.62 (4.22–7.48)	***	3.31 (2.56–4.29)	***
Age × ability to make ends meet (ref. Age × easily)	–		–		–					
Age × fairly easily	–		–		–		1.02 (1.01–1.04)	*	1.02 (1.00–1.04)	*
Age × with some difficulty	–		–		–		1.00 (0.99–1.02)		1.00 (0.99–1.02)	
Age × with great difficulty	–		–		–		1.00 (0.98–1.02)		1.00 (0.98–1.02)	
Men										
Age	1.24 (1.21–1.27)	***	1.23 (1.20–1.27)	***	1.23 (1.18–1.28)	***	1.24 (1.19–1.30)	***	1.22 (1.17–1.26)	***
Childhood socioeconomic circumstances (ref. Most disadvantaged)										
Disadvantaged	0.75 (0.53–1.06)		1.01 (0.71–1.43)		0.86 (0.61–1.22)		0.93 (0.66–1.30)		0.93 (0.69–1.25)	
Middle	0.73 (0.51–1.04)		1.07 (0.74–1.54)		0.95 (0.66–1.38)		1.00 (0.70–1.44)		1.03 (0.76–1.42)	
Advantaged	0.64 (0.42–0.96)		1.06 (0.69–1.64)		0.93 (0.61–1.44)		1.02 (0.67–1.57)		1.00 (0.69–1.45)	
Most advantaged	0.65 (0.36–1.16)		0.99 (0.54–1.83)		1.04 (0.56–1.94)		1.18 (0.64–2.17)		1.14 (0.67–1.94)	
Age × childhood socioeconomic circumstances (ref. Most disadvantaged)										
Age × disadvantaged	0.98 (0.95–1.01)		0.97 (0.94–1.00)		0.97 (0.94–1.00)		0.97 (0.94–1.01)		0.98 (0.95–1.01)	
Age × middle	0.98 (0.95–1.01)		0.97 (0.94–1.00)	*	0.97 (0.94–1.00)		0.97 (0.94–1.00)		0.98 (0.95–1.00)	
Age × advantaged	0.97 (0.94–1.01)		0.96 (0.93–1.00)		0.97 (0.93–1.00)		0.96 (0.93–1.00)	*	0.97 (0.94–1.00)	*
Age × most advantaged	1.00 (0.95–1.06)		0.98 (0.93–1.04)		1.00 (0.94–1.05)		0.99 (0.94–1.05)		0.98 (0.94–1.03)	
Education (ref. Primary)										
Secondary	–		0.75 (0.55–1.00)		0.78 (0.58–1.05)		0.82 (0.61–1.09)		0.93 (0.72–1.20)	
Tertiary	–		0.46 (0.31–0.67)	***	0.55 (0.36–0.83)	**	0.59 (0.39–0.89)	*	0.70 (0.49–1.01)	
Age × education (ref. Primary)										
Age × secondary	–		1.01 (0.99–1.04)		1.01 (0.99–1.04)		1.01 (0.98–1.03)		1.01 (0.98–1.03)	
Age × tertiary	–		1.03 (1.00–1.07)		1.03 (0.99–1.07)		1.02 (0.98–1.06)		1.02 (0.98–1.05)	

(continued)

Table 2 Continued

	Model 1 OR (95%CI)		Model 2 OR (95%CI)		Model 3 OR (95%CI)		Model 4 OR (95%CI)		Model 5 OR (95%CI)	
Main occupational position (ref. High-skilled)										
Low-skilled	–		–		1.41 (1.05–1.91)	*	1.25 (0.93–1.67)		1.28 (0.99–1.66)	
Never worked	–		–		2.92 (0.80–10.66)		2.65 (0.75–9.39)		1.67 (0.58–4.84)	
Age × main occupational position (ref. High-skilled)										
Age × low-skilled	–		–		1.00 (0.98–1.03)		1.00 (0.97–1.02)		1.00 (0.97–1.02)	
Age × never worked	–		–		1.01 (0.91–1.13)		1.00 (0.90–1.11)		0.96 (0.88–1.05)	
Ability to make ends meet (ref. Easily)	–		–		–					
Fairly easily	–		–		–		1.41 (1.06–1.88)	*	1.34 (1.04–1.72)	*
With some difficulty	–		–		–		2.05 (1.44–2.92)	***	1.83 (1.35–2.49)	***
With great difficulty	–		–		–		4.45 (2.76–7.17)	***	3.97 (2.63–5.99)	***
Age × ability to make ends meet (ref. Age × easily)	–		–		–					
Age × fairly easily	–		–		–		1.00 (0.97–1.02)		0.99 (0.97–1.01)	
Age × with some difficulty	–		–		–		0.99 (0.96–1.01)		0.99 (0.97–1.02)	
Age × with great difficulty	–		–		–		1.00 (0.96–1.04)		1.00 (0.96–1.03)	

Abbreviations: ADL, activities of daily living; OR, odds ratio; CI, confidence interval.
Model 1: Adjusted for confounders and controls: birth cohorts, countries, attrition and living with biological parents.
Model 2: model 1 adjusted for young adulthood socioeconomic circumstances (education).
Model 3: model 2 adjusted for adulthood socioeconomic circumstances (main occupation).
Model 4: model 3 adjusted for old age socioeconomic circumstances (current ability to make ends meet with the household income).
Model 5: model 4 adjusted for covariates: partnership status, number of chronic diseases and body mass index.
P-values: ***: $P<0.001$, **: $P<0.01$, *: $P<0.05$.

middle and advantaged CSC compared to those who lived in the most disadvantaged circumstances (age and CSC interactions), but this was not found among men (Supplementary figure S4).

Among women, a gradient across strata of CSC was observable across all 5 models, suggesting that the higher the socioeconomic advantage in childhood, the lower the risk of IADL limitations in older age. This gradient was barely mediated when including education, main occupational position and ability to make ends meet. All three adult socioeconomic indicators remained associated with the risk of IADL limitations in the fully adjusted model (Model 5).

Among men, three strata of CSC (middle, advantaged and most advantaged) were associated with a lower risk of IADL limitations at older age. These associations were slightly attenuated when adjusting for education (Model 2), particularly for the most advantaged group, and more strongly when adjusting for main occupation (Model 3) and ability to make ends meet (Model 4). Men with a low-skilled main occupational position or who never worked, as well as those reporting difficulties to make ends meet, were at a higher risk of IADL limitations, whereas the risk of IADL limitations was reduced for men with a secondary or tertiary degree (Models 4 and 5).

Sensitivity analyses

Adjusting the final model (Model 5) for attrition by death (Supplementary table S1) and by dropout (Supplementary table S2) yielded similar results for ADL and IADL limitations. Similar changes to the fully adjusted model were observed when excluding respondents with visual impairment (Supplementary table S3) and when including an index of health behaviours (Supplementary table S4). Among women, the main occupational position was no longer associated with the risk of ADL limitations. While the ability to make ends meet remained significantly associated, the association of CSC and ADL was only preserved when adjusting for health behaviours (Supplementary table S4). For men, the association of education and IADL was attenuated in both sensitivity analyses (Supplementary tables S3 and S4). When excluding men with visual impairment, the risk of IADL limitations became associated with middle and advantaged CSC, but the association of the main occupational position was no longer significant.

Discussion

Main findings

Overall, ADL and IADL limitations increased slowly over the process of ageing, among all participants, but the risk for ADL and IADL limitations differed by gender.

For women, results showed a clear social gradient: more advantaged CSC was associated with a lower risk of ADL and IADL limitations in later life. These associations were attenuated when including adult socioeconomic indicators and covariates but remained significant. Differences in the risk of ADL and IADL limitations by CSC increased with the process of ageing.

For men, disadvantaged CSC was associated with greater risk IADL limitations in later life. This association was mediated by education, the main occupational position and the ability to make ends meet. No association between CSC and risk of ADL limitations was observed.

Results did not change when adjusting the final model for attrition by death and by dropout. Including health behaviours yielded similar results, except for women whose main occupational position was no longer associated with ADL. When excluding women with visual impairment, only the association of the ability to make ends meet and ADL remained significant. When excluding men with visual impairment, IADL became associated with middle and advantaged CSC, but main occupational position was no longer significant and the association with education disappeared.

Table 3 Associations between childhood socioeconomic circumstances and trajectories of disability at older age, IADL

	Model 1 OR (95%CI)		Model 2 OR (95%CI)		Model 3 OR (95%CI)		Model 4 OR (95%CI)		Model 5 OR (95%CI)	
Women										
Age	1.15 (1.14–1.16)	***	1.15 (1.13–1.16)	***	1.15 (1.12–1.17)	***	1.15 (1.12–1.18)	***	1.14 (1.12–1.17)	***
Childhood socioeconomic circumstances (ref. Most disadvantaged)										
Disadvantaged	0.67 (0.57–0.79)	***	0.70 (0.60–0.82)	***	0.71 (0.61–0.83)	***	0.76 (0.65–0.89)	**	0.80 (0.69–0.93)	**
Middle	0.48 (0.41–0.57)	***	0.55 (0.46–0.65)	***	0.56 (0.47–0.67)	***	0.63 (0.53–0.74)	***	0.66 (0.56–0.78)	***
Advantaged	0.41 (0.33–0.49)	***	0.50 (0.41–0.61)	***	0.52 (0.42–0.64)	***	0.58 (0.48–0.71)	***	0.65 (0.53–0.79)	***
Most advantaged	0.28 (0.21–0.38)	***	0.40 (0.29–0.54)	***	0.43 (0.31–0.59)	***	0.50 (0.37–0.68)	***	0.58 (0.43–0.78)	***
Age × childhood socioeconomic circumstances (ref. Most disadvantaged)										
Age × disadvantaged	0.98 (0.96–0.99)	**	0.98 (0.96–0.99)	**	0.98 (0.96–0.99)	**	0.97 (0.96–0.99)	***	0.98 (0.96–0.99)	**
Age × middle	0.97 (0.96–0.98)	***	0.97 (0.95–0.98)	***	0.97 (0.95–0.98)	***	0.96 (0.95–0.98)	***	0.96 (0.95–0.98)	***
Age × advantaged	0.97 (0.95–0.98)	***	0.96 (0.95–0.98)	***	0.96 (0.95–0.98)	***	0.96 (0.94–0.98)	***	0.96 (0.95–0.98)	***
Age × most advantaged	0.97 (0.94–0.99)	**	0.96 (0.94–0.99)	**	0.96 (0.94–0.99)	**	0.96 (0.93–0.98)	**	0.97 (0.94–0.99)	**
Education (ref. Primary)										
Secondary	–		0.75 (0.65–0.85)	***	0.77 (0.68–0.88)	***	0.81 (0.71–0.92)	**	0.84 (0.74–0.95)	**
Tertiary	–		0.45 (0.36–0.56)	***	0.56 (0.44–0.72)	***	0.64 (0.50–0.81)	***	0.70 (0.56–0.88)	**
Age × education (ref. Primary)										
Age × secondary	–		1.01 (1.00–1.02)		1.01 (1.00–1.02)		1.00 (0.99–1.02)		1.00 (0.99–1.01)	
Age × tertiary	–		1.01 (0.99–1.03)		1.01 (0.99–1.03)		1.01 (0.99–1.03)		1.01 (0.99–1.02)	
Main occupational position (ref. High-skilled)										
Low-skilled	–		–		1.50 (1.23–1.85)	***	1.39 (1.14–1.70)	**	1.40 (1.15–1.70)	**
Never worked	–		–		1.99 (1.56–2.55)	***	1.75 (1.37–2.24)	***	1.79 (1.42–2.27)	***
Age × main occupational position (ref. High-skilled)										
Age × low-skilled	–		–		1.00 (0.98–1.02)		1.00 (0.98–1.02)		1.00 (0.99–1.02)	
Age × never worked	–		–		1.01 (0.99–1.03)		1.01 (0.99–1.03)		1.01 (0.99–1.03)	
Ability to make ends meet (ref. Easily)										
Fairly easily	–		–		–		1.35 (1.18–1.56)	***	1.23 (1.07–1.41)	**
With some difficulty	–		–		–		2.00 (1.70–2.35)	***	1.62 (1.38–1.89)	***
With great difficulty	–		–		–		4.43 (3.61–5.44)	***	3.12 (2.56–3.81)	***
Age × ability to make ends meet (ref. Age × easily)										
Age × fairly easily	–		–		–		1.00 (0.99–1.02)		1.00 (0.99–1.01)	
Age × with some difficulty	–		–		–		1.00 (0.99–1.01)		1.00 (0.99–1.01)	
Age × with great difficulty	–		–		–		1.00 (0.98–1.01)		1.00 (0.98–1.01)	
Men										
Age	1.23 (1.21–1.26)	***	1.22 (1.20–1.25)	***	1.25 (1.21–1.29)	***	1.25 (1.21–1.29)	***	1.24 (1.20–1.28)	***
Childhood socioeconomic circumstances (ref. Most disadvantaged)										
Disadvantaged	0.81 (0.63–1.04)		0.88 (0.69–1.13)		0.95 (0.75–1.22)		0.96 (0.76–1.22)		0.99 (0.80–1.23)	
Middle	0.53 (0.41–0.69)	***	0.64 (0.49–0.84)	**	0.70 (0.54–0.91)	**	0.76 (0.59–0.97)	*	0.80 (0.64–1.01)	
Advantaged	0.46 (0.34–0.63)	***	0.62 (0.45–0.85)	**	0.69 (0.50–0.94)	*	0.75 (0.55–1.02)		0.78 (0.58–1.03)	
Most advantaged	0.45 (0.29–0.70)	***	0.69 (0.44–1.08)		0.81 (0.52–1.27)		0.85 (0.55–1.31)		0.86 (0.57–1.29)	
Age × childhood socioeconomic circumstances (ref. Most disadvantaged)										
Age × disadvantaged	1.00 (0.97–1.02)		1.00 (0.98–1.02)		0.99 (0.97–1.02)		0.99 (0.97–1.01)		1.00 (0.98–1.02)	
Age × middle	0.98 (0.96–1.00)		0.98 (0.96–1.01)		0.98 (0.95–1.00)		0.98 (0.95–1.00)		0.98 (0.96–1.00)	
Age × advantaged	0.98 (0.96–1.01)		0.98 (0.96–1.01)		0.97 (0.95–1.00)		0.97 (0.95–1.00)		0.98 (0.95–1.00)	
Age × most advantaged	1.02 (0.98–1.06)		1.02 (0.98–1.06)		1.01 (0.97–1.05)		1.00 (0.96–1.05)		1.00 (0.96–1.04)	
Education (ref. Primary)										
Secondary	–		0.64 (0.52–0.80)	***	0.66 (0.53–0.82)	***	0.73 (0.60–0.90)	**	0.77 (0.64–0.94)	**
Tertiary	–		0.40 (0.30–0.53)	***	0.46 (0.34–0.62)	***	0.59 (0.44–0.79)	***	0.64 (0.48–0.84)	**
Age × education (ref. Primary)										
Age × secondary	–		1.01 (0.99–1.03)		1.01 (0.99–1.03)		1.01 (0.99–1.03)		1.01 (0.99–1.02)	
Age × tertiary	–		1.01 (0.98–1.04)		1.00 (0.97–1.03)		1.00 (0.97–1.03)		1.00 (0.97–1.03)	

(continued)

Table 3 Continued

	Model 1 OR (95%CI)		Model 2 OR (95%CI)		Model 3 OR (95%CI)		Model 4 OR (95%CI)		Model 5 OR (95%CI)	
Main occupational position (ref. High-skilled)										
Low-skilled	–		–		1.37 (1.10–1.70)	**	1.27 (1.02–1.57)	*	1.22 (1.00–1.49)	*
Never worked	–		–		4.45 (1.85–10.71)	**	3.79 (1.64–8.73)	**	2.73 (1.27–5.84)	*
Age × main occupational position (ref. High-skilled)										
Age × low-skilled	–		–		0.98 (0.96–1.00)	*	0.98 (0.97–1.00)		0.98 (0.97–1.00)	
Age × never worked	–		–		0.94 (0.87–1.00)		0.94 (0.87–1.00)		0.92 (0.87–0.98)	*
Ability to make ends meet (ref. Easily)										
Fairly easily	–		–		–		1.62 (1.32–1.99)	***	1.52 (1.26–1.84)	***
With some difficulty	–		–		–		2.90 (2.26–3.72)	***	2.46 (1.96–3.10)	***
With great difficulty	–		–		–		5.49 (3.94–7.65)	***	4.51 (3.32–6.12)	***
Age × ability to make ends meet (ref. Age × easily)										
Age × fairly easily	–		–		–		1.00 (0.98–1.02)		0.99 (0.97–1.01)	
Age × with some difficulty	–		–		–		1.00 (0.98–1.02)		0.99 (0.97–1.01)	
Age × with great difficulty	–		–		–		0.99 (0.96–1.02)		0.99 (0.96–1.01)	

Abbreviations: IADL, instrumental activity of daily living; OR, odds ratio; CI, confidence interval.
Model 1: adjusted for confounders and controls: birth cohorts, countries, attrition and living with biological parents.
Model 2: model 1 adjusted for young adulthood socioeconomic circumstances (education).
Model 3: model 2 adjusted for adulthood socioeconomic circumstances (main occupation).
Model 4: model 3 adjusted for old age socioeconomic circumstances (current ability to make ends meet with the household income).
Model 5: model 4 adjusted for covariates: partnership status, number of chronic diseases and body mass index.
P-values: ***: $P<0.001$, **: $P<0.01$, *: $P<0.05$.

Lastly, among women, the significant growth over ageing of the risk of ADL and IADL limitations by CSC groups suggests that poor socioeconomic circumstances in childhood are related to an overall risk of disability in old age as well as to disability trajectories of individuals in the ageing process. For men however, we cannot find evidence of growing differences over ageing in the risk of IADL limitations by CSC groups. It means that we observed an association of CSC on the overall level of IADL, but not on ADL, and not on IADL trajectories.

Comparison with previous studies

In this study, at baseline, women had a higher probability of experiencing disability in old age than men in Europe, which confirms previous findings.[2,11,35] Cohort variations in disability trajectories[29] can influence gender differences. Although this difference in gender still needs clarification,[36] our analysis showed that women's adult socioeconomic attainments cannot compensate for disadvantaged CSC. However, this compensation was observed among men, whose high-skilled occupation and ability to make ends meet lowered the risk of IADL limitations by CSC.

This result is novel to the field and questions previous studies indicating only a partial mediation by adult socioeconomic indicators, relying on analyses not stratified by gender.[12,13] The observed mediating effect among men was robust to sensitivity analyses including health behaviours, which is in line with previous findings.[37] A first explanation for these findings is the cumulative advantage and disadvantage hypothesis:[38] when having a bad start in life, women seemed to be at higher risk of accumulating disadvantaged socioeconomic opportunities over the life course, while men were not, because of gender inequalities for these respondents who lived a great part of their life in the 20th century (i.e. respondents were born between 1919 and 1954), and this despite better access to education for younger cohorts.[14] Given the social norms (responsibility for the family and restricted access to education), social mobility—via education and occupation—was limited and therefore mainly driven by changes at the household level.

Strengths and limitations

The sample size of 24 440 participants was sufficient to draw robust conclusions. To reduce health selection bias, we included the maximum number of respondents, i.e. those who completed the retrospective module (wave 3) and at least one of the other five waves (waves 1, 2, 4, 5 and 6). Mixed-effects models allowed using incomplete and unbalanced data. The stratification by gender provided a more detailed picture about the differences in disability trajectories according to CSC and the uncertain role of adult socioeconomic indicators. However, this study has six limitations. First, self-reported retrospective information on childhood and adult socioeconomic indicators was used, which may be subject to recall bias. Nevertheless, the reliability of recall of simple measures of socioeconomic circumstances in a survey of older adults is good.[39] Second, cross-national comparison on the prevalence of ADL and IADL is known to be limited by contextual, social and cultural differences across countries,[40] for which we controlled by adjusting for country of residence. Third, we did not have information on all disability covariates, i.e. cognitive impairment. However, this lack of information should not bias our results since cognitive impairment is probably not a confounder of the association between CSC and ADL. Fourth, a limited number of SHARE participants answered the SHARELIFE module in wave 3, resulting in a significant reduction of the analytical sample. This may cause information bias on the exposure. Fifth, attrition is a significant issue in longitudinal studies with old age participants. To limit this bias, all models were controlled for mediator-outcome confounding. Such a strategy did not solve the issue of missing data due to attrition.

Sixth, 2% of women and 1.8% of men in our sample grew up without their biological parents, raising the question of the relevance of the CSC score. For respondents who were adopted by their family (grand-parents, uncle or aunt) or by a host family, we consider that the score may apply to them. However, for respondents who grew up in a children's home ($N = 308$), the score of CSC may be less reliable.

Conclusion

The more disadvantaged the socioeconomic circumstances during childhood are, the higher the risk of disability in old age. Men and women are not able to compensate for an unfavourable start in life equally well. For men, the association between CSC and disability is mediated by adult socioeconomic indicators, such as their main occupation during active life and their ability to make ends meet with their household income in older age. Conversely, for women, this association is only partially mediated. Our findings suggest that men born in the first half of the 20th century are more likely to make up for disadvantaged CSC than women over the life course, resulting in less disabling conditions at old age.

Supplementary data

Supplementary data are available at *EURPUB* online.

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Key points

- The more advantaged the socioeconomic circumstances during childhood are, the lower the risk for disability in older age.
- Women, in contrast to men, could not compensate their risk for disability associated with childhood socioeconomic circumstances by adult socioeconomic attainments.
- Findings underline childhood as a sensitive period of the life course to which public health policies should pay attention.

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The prevalence of elder abuse in institutional settings: a systematic review and meta-analysis

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Background: A recent study has shown that close to one in six older adults have experienced elder abuse in a community setting in the past year. It is thought that abuse in institutions is just as prevalent. Few systematic evidence of the scale of the problem exists in elder care facilities. The aim of this review is to conduct a systematic review and meta-analysis of the problem in institutional settings and to provide estimates of the prevalence of elder abuse in the past 12 months. **Methods:** Fourteen academic databases and other online platforms were systematically searched for studies on elder abuse. Additionally, 26 experts in the field were consulted to identify further studies. All studies were screened for inclusion criteria by two independent reviewers. Data were extracted, and meta-analysis was conducted. Self-reported data from older residents and staff were considered separately. **Results:** Nine studies met the inclusion criteria from an initial of 55 studies identified for review. Overall abuse estimates, based on staff reports, suggest that 64.2% of staff admitted to elder abuse in the past year. There were insufficient studies to calculate an overall prevalence estimate based on self-reported data from older residents. Prevalence estimates for abuse subtypes reported by older residents were highest for psychological abuse (33.4%), followed by physical (14.1%), financial (13.8%), neglect (11.6%), and sexual abuse (1.9%). **Conclusions:** The prevalence of elder abuse in institutions is high. Global action to improve surveillance and monitoring of institutional elder abuse is vital to inform policy action to prevent elder abuse.

Introduction

Elder abuse is an important public health issue with serious social, economic and health consequences. The global prevalence of past year elder abuse in the community settings is 15.7%, or approximately one in six older adults.[1] According to the World Health Organization (WHO), elder abuse is defined as 'a single, or repeated act, or lack of appropriate action, occurring within any relationship where there is an expectation of trust which causes harm or distress to an older person'.[2] Elder abuse can be categorized according to: type of abuse—psychological, physical, sexual, and financial abuse and neglect; type of abuser—family members,