



Long-term risk factors for old-age social exclusion in Sweden: a 30-year longitudinal study

Charlotta Nilsson^{a,b,c,*}, Roger K. Celeste^d, Carin Lennartsson^{a,e}, Kevin J. McKee^f,
Lena Dahlberg^{a,f}

^a Aging Research Center, Karolinska Institutet and Stockholm University, Stockholm, Sweden

^b Stress Research Institute, Stockholm University, Stockholm, Sweden

^c Institute of Gerontology, Jönköping University, Jönköping, Sweden

^d Department of Preventive and Social Dentistry, Federal University of Rio Grande do Sul, Porto Alegre, Rio Grande do Sul, Brazil

^e Swedish Institute for Social Research, Stockholm University, Stockholm, Sweden

^f School of Health and Welfare, Dalarna University, Falun, Sweden

ARTICLE INFO

Keywords:

Life course
Midlife
Late life
Social exclusion
Sweden
Path analysis

ABSTRACT

Purpose of the research: Social exclusion threatens quality of life in older age. However, there is a lack of research on social exclusion from life-course and gender perspectives. We investigated early- and midlife risk factors for old-age social exclusion among women and men.

Materials and methods: Two individually linked studies of Swedish nationally representative samples provided longitudinal data over a 30-year period on 1,819 people at baseline. Indicators of economic exclusion, leisure/social exclusion, and civic exclusion were assessed at early late life ($M=70$ years) and late life ($M=81$). Educational attainment, non-employment, psychological health problems and mobility problems were measured as risk factors at midlife ($M=54$) and late midlife ($M=61$). Path analysis derived a model of old-age social exclusion.

Results: Exclusion on a domain in early late life led to exclusion on the same domain in late life, except for the economic domain. Leisure/social exclusion in early late life also led to civic exclusion in late life. Midlife risk factors influenced late-life exclusion almost exclusively through early late-life exclusion. While model fit could not be significantly improved by allowing coefficients to vary freely by gender, there was a stronger effect of non-employment on exclusion in women and a stronger effect of psychological health problems on exclusion in men.

Conclusions: This study confirms that old-age exclusion is persistent and dynamic, and influenced by risk factors experienced earlier in life. A holistic approach with integrated efforts across different policy areas is needed to efficiently reduce old-age social exclusion.

Introduction

Social exclusion threatens social cohesion and the health and well-being of individuals (Dahlberg & McKee, 2018; Lee & Cagle, 2018; Kristensen et al., 2019; Lee, 2021; Levitas et al., 2007). Older adults have been identified as a group at risk of social exclusion, but have been the focus of surprisingly little research (Walsh et al., 2021). There are also relatively few longitudinal studies on social exclusion and, thus, on social exclusion from a life-course perspective (Van Regenmortel et al., 2016; Walsh et al., 2017). This means that the dynamic nature of social exclusion is not well investigated. This study analyses how educational

attainment and midlife to early late-life health and employment status are related to social exclusion in adults aged 65 to 85 years old.

Social exclusion has been defined as a lack of participation in those key activities regarded as standard for any given society (Burchardt et al., 2002). Social exclusion is commonly conceptualized as multidimensional and dynamic (see e.g., Walsh et al. 2017). Multidimensionality is reflected in the fact that individuals can be excluded from several life domains, such as social relations, financial and material resources, access to services, civic participation, and neighborhoods (Van Regenmortel et al., 2016; Walsh et al., 2017), where exclusion from one domain may increase the risk of exclusion from another (Fritzell et al.,

* Corresponding author.

E-mail address: charlotta.nilsen@ki.se (C. Nilsson).

<https://doi.org/10.1016/j.archger.2022.104760>

Received 3 May 2022; Received in revised form 16 June 2022; Accepted 25 June 2022

Available online 27 June 2022

0167-4943/© 2022 The Author(s). Published by Elsevier B.V. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

2020; Heap et al., 2018; for an overview see Dahlberg, 2021). The dynamic nature of exclusion is observed in the potential for exclusion to accumulate over time resulting in a person experiencing multiple disadvantages (Kneale, 2012).

A life-course perspective provides a framework for understanding how different conditions, such as social exclusion across different life domains, are related to each other and affect an individual over a long period of time (Bell & Marmot, 2017; Hutchison, 2010). Disadvantages and advantages are shaped over the life course (Ferraro & Morton, 2018), where for example multiple negative conditions, within or across different life domains, accumulate with time and increase the risk of future negative conditions (Becker & Boreham, 2009; Bell & Marmot, 2017; Heap & Fors, 2015; Warburton et al., 2013). The process of social exclusion can thus be seen as a vicious circle from which it is hard to escape. Because of the cumulative nature of disadvantages, inequalities may become more pronounced in older age (Fritzell et al., 2020; Nilsen et al., 2021; Phillipson & Scharf, 2004; Warburton et al., 2013). Thus, a life course perspective is required for a comprehensive understanding of social exclusion in older age (Huisman & van Tilburg, 2021)

Exposure to multiple risk factors for social exclusion increases with age, and the oldest old are more likely to be exposed to multiple risk factors than the younger old (Becker & Boreham, 2009). Research has identified several risk factors for old-age social exclusion, such as poor health (Becker & Boreham, 2009; Lee, 2021; Miranti & Yu, 2015; Sacker et al., 2017); long-term illness and disability (Sacker et al., 2017); functional dependence (Walsh, OShea, & Scharf, 2020); and lower education (Chung et al., 2019; Miranti & Yu, 2015). Still, it is not always clear what is a risk factor for, and what is a consequence of, social exclusion. Therefore, longitudinal research is needed to provide clarity on risk factors for old-age social exclusion.

While most social exclusion research has focused on people of working age and issues relevant to that group such as exclusion from the labor market (see e.g. Van Regenmortel et al., 2016; Walsh et al., 2017), from a life-course perspective factors related to social exclusion in midlife might also be relevant when considering social exclusion in older age. For example, unemployment has been shown to have negative health, social and economic effects (Bell & Marmot, 2017; Miranti & Yu, 2015; Popham & Bamba, 2010), and may thus directly and indirectly contribute to exclusion. These effects have also been suggested to be long-lasting with an accumulation over time (Pohlan, 2019). Previous employment status, i.e., low engagement in employment since finishing full-time education, is considered a risk factor for social exclusion in old age (Miranti & Yu, 2015). Employment could be considered as a latent function, i.e., employment does not only provide financial security, but also widens individuals' social networks, enables people to contribute to a higher collective purpose, provides societal recognition and status, and structure and activity (Jahoda, 1982). Thus, unemployment denies people of latent benefits that may contribute to well-being (Jahoda, 1982; Muller & Waters, 2012). At the same time, low education, poor self-perceived health and chronic diseases are risk factors for unemployment (Bell & Marmot, 2017; Van Rijn et al., 2014) and education is well known to be protective against unemployment (Klein, 2015).

Research on the association between gender and social exclusion is relatively rare (Van Regenmortel et al., 2016; Walsh et al., 2017) and the findings are mixed. A Korean study (Chung et al., 2019) found being male as one of several risk factors for old-age social exclusion. However, a multi-country European study (Ogg, 2005) and an English study (Becker & Boreham, 2009) both found women to be at higher risk of social exclusion. Studies have also found no significant association between gender and social exclusion at older ages (Miranti & Yu, 2015; Scharf et al., 2005). Several studies have found women to be at higher risk of exclusion from specific domains, e.g., civic participation (Dahlberg et al., 2020; Del Bono et al., 2007; Kneale, 2012), cultural activities (Kneale, 2012), material resources (Dahlberg et al., 2020; Heap et al., 2017; Kneale, 2012), and access to services/information (Del Bono et al., 2007; Kneale, 2012); whereas older men seem to be at higher risk of

exclusion from social relations (Kneale, 2012). These associations between gender and social exclusion might also be due to factors that vary with gender, such as living arrangements, marital status (Del Bono et al., 2007), labor market participation (OECD, 2021), and health and functioning in older age (Fritzell et al., 2020).

Research on social exclusion in older age has rarely taken a life-course perspective, in which old-age social exclusion can be understood as an accumulation of disadvantages experienced at earlier life stages. A person's employment status, educational level, and physical and mental health prior to older age might influence their level of old-age social exclusion, while a person's gender might be anticipated to influence both the disadvantages experienced throughout the life course and their association with old-age social exclusion. This study aims to investigate the pattern of associations between long-term risk factors and three domains of exclusion in older adults, i.e., leisure/social exclusion, economic exclusion, and civic exclusion. Our research questions are:

- 1) How and to what extent is late-life exclusion predicted by exclusion in early late life and by risk factors for exclusion measured at midlife and late midlife?
- 2) How and to what extent does the prediction of old-age exclusion vary by gender?

Materials and Methods

Design and study participants

This study has a longitudinal, prospective survey design. Two Swedish surveys based on a random selection of the adult population and linked at individual level were used: the Level of Living Survey (LNU) (Fritzell & Lundberg, 2007) and the Swedish Panel Study of the Oldest Old (SWEOLD) (Lennartsson et al., 2014). LNU has been conducted six times: 1968, 1974, 1981, 1991, 2000, and 2010. In each wave, people aged up to 75 years were interviewed. When they reached the upper age limit for study inclusion, they were invited to participate in SWEOLD, which includes people aged 76 years or older and has been conducted five times: 1992, 2002, 2004, 2011, and 2014.

Two open cohorts were combined in the analyses, surveyed at four time-points: midlife (baseline, 46-57 years), late midlife (follow-up 1, 56-65 years), early late life (follow-up 2, 65-74 years), and late life (follow-up 3, 77-85 years). Cohort one consisted of a linked dataset of LNU 1974, 1981, 1991, and SWEOLD 2002. Cohort two consisted of a linked dataset of LNU 1981, 1991, 2000 and SWEOLD 2011. The two cohorts provided a sample N of 1,819 at baseline (See Table 1), which due to attrition (primarily due to mortality) totalled 878 at the third follow-up.

Procedure

For the waves included in our analyses, LNU and SWEOLD data were primarily collected through face-to-face interviews by trained

Table 1
Description of study respondents.

	Baseline (midlife)	Follow-up 1 (late midlife)	Follow-up 2 (early late life)	Follow-up 3 (late life)
Cohort 1	1974	1981	1991	2002
Born 1917-25	(n = 1037)	(n = 746)	(n = 616)	(n = 435)
Cohort 2	1981	1991	2000	2011
Born 1926-35	(n = 782)	(n = 681)	(n = 599)	(n = 443)
Total	n = 1819	n = 1427	n = 1215	n = 878
Mean age, years (±SD)	52 (2.9)	60 (2.7)	70 (2.7)	81 (2.5)
Range age, years	46-57	56-65	65-74	77-85

interviewers. To reduce non-response due to poor health or impaired cognition/communication, SWEOLD interviews were sometimes carried out completely or partly with a proxy (9.5% and 4.1% respectively in our study sample). Proxies were typically a spouse, other close relative, or care professional who knew the older person well. Postal questionnaires (5.5%) were used as a final alternative in SWEOLD 2011, which could be self- or proxy-completed. The response rates of the LNU surveys included in this study were 76.6-85.2 percent and the response rates of the SWEOLD surveys were 84.4-86.2 percent.

Informed consent was obtained prior to each interview. Ethical approvals for the SWEOLD study have been provided by Karolinska Institutet Regional research Ethics Committee (KI reg.no. 03-413), the Regional Ethical Review Board in Stockholm (reg.no. 2010/403-31/4; 2015/1070-31/5), and the Swedish Ethical Review Authority (reg.no. 2019-06324).

Variables

Economic exclusion was assessed with two indicators: cash margin, 'If a situation suddenly arose where you had to raise SEK 14,000 (indexed values, here provided for 2011) in a week, would you be able to manage it?' (0=Withdrawal from own bank account or similar; 1=Loan from a family member/other relatives/friends, bank loan or equivalent, other way/No); and financial resources, 'Have you at any time over the last 12 months had difficulties managing your current expenses for food, rent, bills etc.?' (0=No; 1=Yes).

Leisure/social exclusion was assessed by three indicators: social contacts with friends, social contacts with children, and leisure activities. Social contacts with friends was measured via two questions asking how often respondents visited friends and were visited by friends, respectively (0=Yes, often; 1=Yes, sometimes; 2=No), with the combined responses producing a variable ranging from 0 (Many social contacts) to 4 (No social contacts). Social contacts with children was measured via the question 'How often do you meet and spend time with any of your children?' with six response options anchored by daily (0) and seldom/never (5). Respondents without children were given a score of 6. This question was not included in LNU. Leisure activities were assessed with the question: 'Which of the following leisure activities do you usually do?' followed by a list of activities: gardening, solving crosswords, hobby activities, study circles or courses, helping family members, walks/Nordic walking, reading books, dancing, eating out at restaurants, cultural activities. The answers (0=Yes, often; 1=Yes, sometimes; 2=No) were summed into a scale that ranged from 0 to 20. In LNU 1991 and 2000 when social exclusion was assessed at follow-up 2, the questions on solving crosswords and helping a family member were not included. Also, the item 'cultural activities' was divided into two items: going to the movies and going to the theatre, concerts, museums, exhibitions. The item 'walks/Nordic walking' was instead stated as physical activity. These alterations provided a summative scale ranging from 0 to 18.

Civic exclusion was assessed with four indicators: voting, 'Did you vote in the previous election?' (0=Yes; 1=No); reading newspapers, (0=Yes, often; 1=Yes, sometimes; 2=No); ability to deal with public authorities, 'Would you be able to write a letter yourself to appeal a decision made by a public authority?' (0=Yes; 1=No); and participation in organizations, this indicator formed by two questions 'Do you belong to an organization for retired people, a political party, a church (other than the state church), religious organization or other organization?' (0=Yes; 1=No) and 'How often do you participate in activities with organizations (pensioner organizations, political parties, and specified other organizations) with five response options anchored by several times a week (0) and never/almost never (4) and with not being a member of any organization coded as 5. In LNU 1991 and 2000, the question on 'reading newspapers' was not included.

Non-employment was assessed by the total number of hours in employment in the year prior to the interview. If the respondent

answered zero hours, they were coded as non-employed, i.e., not participating in the labor market due to e.g., retirement, unemployment, or being a homemaker. Non-employed participants were either retired, unemployed, on long-term sick leave, or homemakers. Students ($n = 13$) were coded as missing as they are not excluded from the labor market to the same extent as the other groups.

Mobility problems was assessed with three indicators in LNU: ability to walk 100 meters fairly briskly (0=Yes;1=No), ability to climb stairs without difficulties (0=Yes; 1=No), and ability to run 100 meters without difficulties (0=Yes; 1=No). The answers to these indicators were summed into a scale that ranged between 0 and 3, a high number indicating more mobility problems.

Psychological health problems was assessed with two indicators: 'Have you in the last 12 months suffered from depression or deep sadness?' (0=No; 1=Yes, mild; 2=Yes, severe) and 'Have you in the last 12 months experienced nervousness or anxiety?' (0=No; 1=Yes, mild; 2=Yes, severe). The answers to these indicators were combined into a scale (0=No problem; 1=One mild problem; 2=Two mild problems or at least one severe problem).

Information on *education attainment* was collected at baseline and coded as a dichotomous variable (compulsory school or higher than compulsory school). If the respondent had missing information at baseline, information on level of education in the following waves was used.

Information on *gender* and *age* was obtained from the national register as part of the sampling process.

Data analysis

The indicators of social exclusion were transformed into standardized z-scores (mean of 0 and standard deviation of 1) before being summed within domains, with a higher number indicating more exclusion. We conducted path analysis based on an initial conceptual model (Fig. 1), testing direct and indirect pathways after including relevant independent variables, i.e., educational attainment, health problems (psychological and mobility) and non-employment, for old-age social exclusion. The model was adjusted for age at baseline (year at birth). Weighted least squares mean and variance adjusted (WLSMV) estimator was used because most of our variables had a very high level of skewness and were therefore transformed into ordinal variables based on deciles. Due to participant attrition, we adopted a pairwise approach to estimate associations between variables of different waves. Standardized coefficients (SC) were scaled as standard deviations (SDs) for both independent and dependent variables and were interpreted according to Kline (1994). Two absolute fit indices were assessed and values under 0.05 for Root Mean Square Error of Approximation (RMSEA) or below 1.0 for Weighted Root Mean Square Residual (WRMR) suggest close approximate (adequate) fit. The Comparative Fit Index (CFI) and the Tucker-Lewis index (TLI) represent incremental fit and values above 0.95 are indicative of good fit. Stata 15.1 was used for data management and descriptive statistics, while path analyses were performed with Mplus 7.11.

Results

At midlife (baseline), there were 50.9 percent women, but over time, the proportion of women increased to 58.4 percent at late life. About 23 percent of the analytic sample was non-employed at midlife, approximately half of whom were unemployed or on long-term sick leave. At late midlife, 26.2 percent of the respondents were non-employed, of whom 77.5 percent were retired, and 20.6 percent were homemakers (Table 2). Mobility problems increased with age, while psychological health problems were fairly stable over time until the participants reached late life when they increased significantly (Table 2).

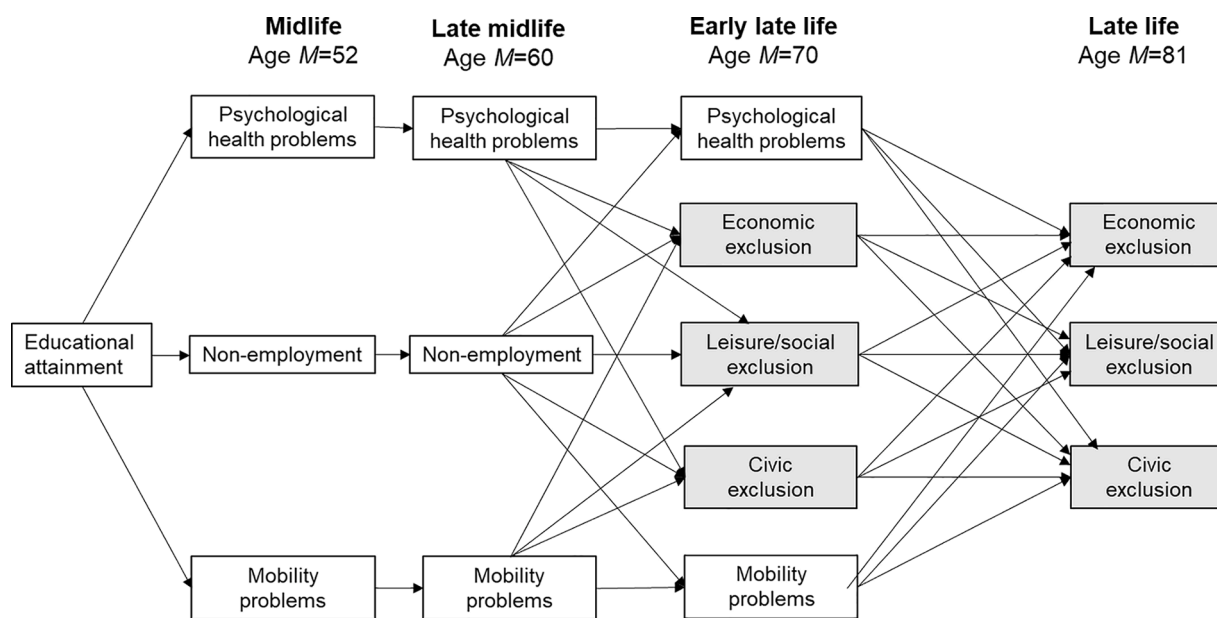


Fig. 1. Initial path model (Model 1).

Table 2
Descriptive statistics of the study respondents.

	Baseline ^a (midlife)	Follow-up 1 ^b (late midlife)	Follow-up 2 ^c (early late life)			Follow-up 3 ^d (late life)		
Social exclusion domains, inter-quartile range			25%	50%	75%	25%	50%	75%
Leisure/social exclusion	-	-	-0.74	-0.01	0.79	-0.50	0.01	0.42
Economic exclusion	-	-	0.00	0.00	0.00	0.00	1.06	1.06
Civic exclusion	-	-	1.10	2.50	2.90	0.15	0.64	0.85
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)			<i>n</i> (%)		
Women	926 (50.9)	720 (50.5)	650 (53.5)			513 (58.4)		
Men	893 (49.1)	707 (49.5)	565 (46.5)			365 (41.6)		
Employed or not^e								
Employed	1,382 (77.4)	1,041 (73.8)						
Non-employed	403 (22.6)	369 (26.2)	-	-	-	-	-	-
Unemployed/long-term sick leave	198 (49.1)	7 (1.9)	-	-	-	-	-	-
Retired	50 (12.4)	286 (77.5)	-	-	-	-	-	-
Homemakers	155 (38.5)	76 (20.6)	-	-	-	-	-	-
Psychological health problems								
None	1,316 (81.3)	1,172 (82.3)	1,011 (83.8)			567 (65.7)		
Mild	180 (11.1)	138 (9.7)	111 (9.2)			166 (19.2)		
Severe	122 (7.5)	114 (8.0)	84 (7.0)			130 (15.1)		
Mobility problems								
0 = None	1,255 (77.5)	899 (63.0)	592 (48.8)			223 (25.5)		
1	163 (10.1)	251 (17.6)	325 (26.8)			287 (32.8)		
2	100 (6.2)	152 (10.7)	135 (11.7)			211 (24.1)		
3 = Severe	102 (6.3)	124 (8.7)	154 (12.7)			155 (17.7)		
Level of education								
Compulsory	1,502 (82.6)	1,139 (79.8)	950 (78.6)			662 (78.5)		
Beyond compulsory	316 (17.4)	288 (20.2)	259 (21.4)			181 (21.5)		

^a 46-57 years, M=52.

^b 56-65 years, M=60.

^c 65-75 years, M=70.

^d 77-85 years, M=81.

^e Employment status was not assessed in the SWEOLD study due to participants having passed retirement age.

Path analysis models

The initial conceptual model (Fig. 1) was rejected based on its fit estimates (see Table 3, Model 1). The initial model was improved using the following procedure: firstly, new paths were introduced based on high values of modification indices (MI) after considering their

theoretical plausibility. Secondly, paths were removed if $p > 0.20$. All modifications were introduced in a stepwise manner, one by one, with close examination of the effect in the model. Thirdly, all coefficients for women and men were constrained to be equal and this model (Model 2) had a satisfactory model fit.

However, based on theoretical considerations, we tested for gender

Table 3
Fit indices summary

	Model 1	Model 2	Model 3	Model 3a	Model 3b
Chi-square	1186.8	270.4	280.5	239.8	239.3
Degrees of freedom	170	145	120	143	124
Num parameters	154	145	170	147	166
CFI	0.76	0.97	0.96	0.98	0.97
TLI	0.71	0.96	0.94	0.97	0.96
RMSEA	0.08	0.03	0.04	0.02	0.03
WRMR	2.97	1.39	1.29	1.26	1.19
P-values for comparison among nested models					
M2 versus M3	P=0.432				
M3a versus M3b	P=0.452				

invariance by releasing coefficients to be freely estimated, i.e., an unconstrained model (Model 3).

In a second round of modifications (Model 3a), further paths were included or removed to accommodate gender differences found in Model 3, using the same modification procedures as described above. To explore which gender differences could improve the model, each coefficient was tested separately. Statistically non-significant coefficients in either the women's or the men's model were removed. Based on MI values, relevant alternative paths were also introduced into either model. Finally, the model with gender differences in some coefficients and paths (Model 3b) was tested for multigroup invariance by gender.

A χ^2 test to compare models (difftest) was carried out to compare the nested partially constrained version of Model 3 (Model 3a) in which we constrained all common unstandardized coefficients to be equal by gender against a version of Model 3 (Model 3b) in which all coefficients were allowed to vary (see Table 3). As the difftest yielded a $p=0.45$, we concluded that the difference in common coefficients between genders was not statistically significant, and the partially constrained Model 3a was thus considered the final model by the criterion of parsimony. Although we could not test for a significant improvement in model fit between Model 3a and Model 1 and 2 as the models were not nested, the model fit estimates for Model 3a were better overall than for Model 1

(Table 3). The results from Model 3a, the final model with additional gender coefficients, are presented in Figs. 2 and 3, and summarized below.

Model 1: Initial model. Model 2: M1 with modifications. Model 3: M2 unconstrained* estimated coeff. by gender. Model 3a: M3 with additional coeff according to gender. Model 3b: M3a unconstrained* estimated coeff. by gender. *non-estimated coefficients remain constrained at zero. CFI = Comparative Fit Index. TLI = Tucker-Lewis index. RMSEA = Root Mean Square Error of Approximation. WLSMV = Weighted least squares mean and variance adjusted.

Long-term risk factors for social exclusion among women

No direct effects were observed from educational attainment, mobility problems, and psychological health problems on economic exclusion at late life. However, there was a moderate effect from psychological health problems at late midlife on economic exclusion at early late life (Est.=0.37, $p < 0.01$). Also, an indirect effect was observed from educational attainment via non-employment to psychological health problems in late midlife, and from educational attainment via psychological health problems, in midlife and late midlife, on economic exclusion at early late life (Fig. 2).

There was a moderate direct effect from leisure/social exclusion (Est.=0.41, $p < 0.01$) and a small direct effect from psychological health problems (Est.=0.14, $p < 0.01$) at early late life on leisure/social exclusion at late life. An indirect effect was also observed from educational attainment via leisure/social exclusion at early late life, and from educational attainment via non-employment in midlife via leisure/social exclusion at early late life. An indirect effect was also observed from educational attainment via non-employment in midlife and late midlife via psychological health problems in midlife, late midlife and at early late life. Finally, an indirect effect was observed from educational attainment via non-employment and mobility problems in midlife and late midlife via leisure/social exclusion at early late life (Fig. 2).

Direct effects on civic exclusion at late life were observed from civic exclusion (Est.=0.37, $p < 0.01$) at early late life, from leisure/social

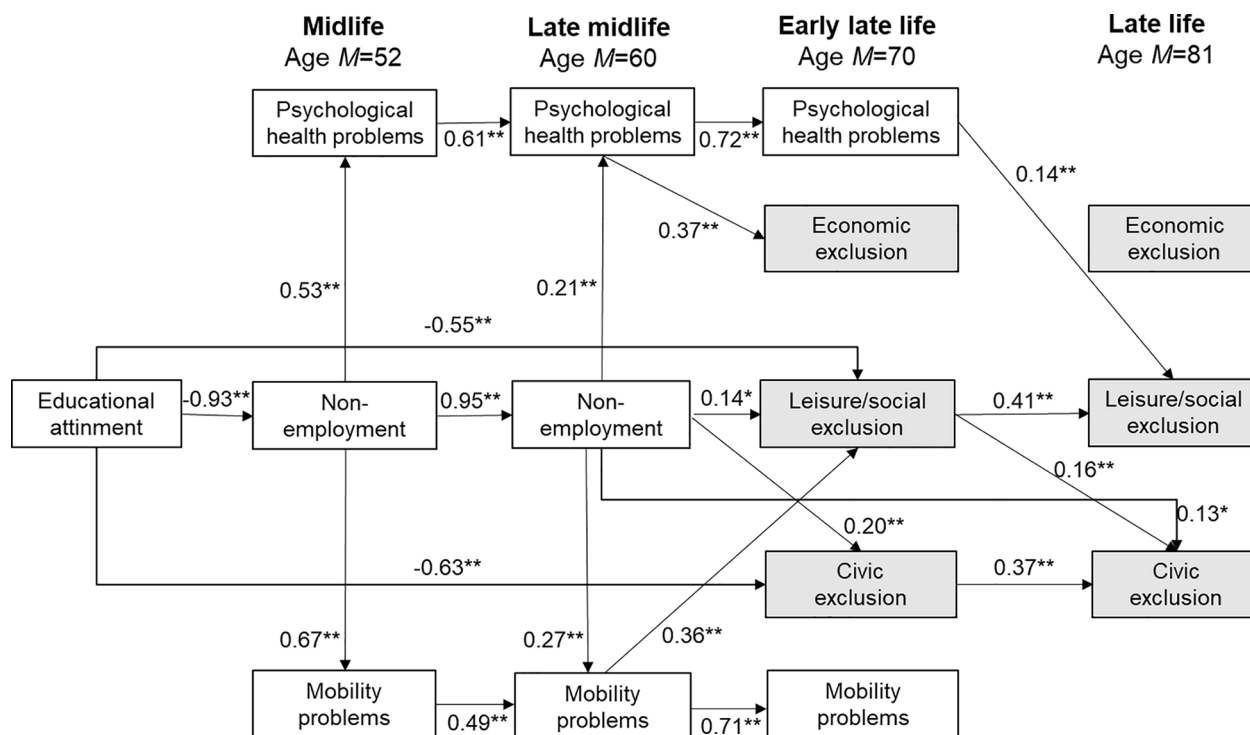


Fig. 2. Final path model (Model 3a) with additional gender coefficients, here for women. For clarity, control variable age is not shown in the figure. ** $p < .01$, * $p < .05$.

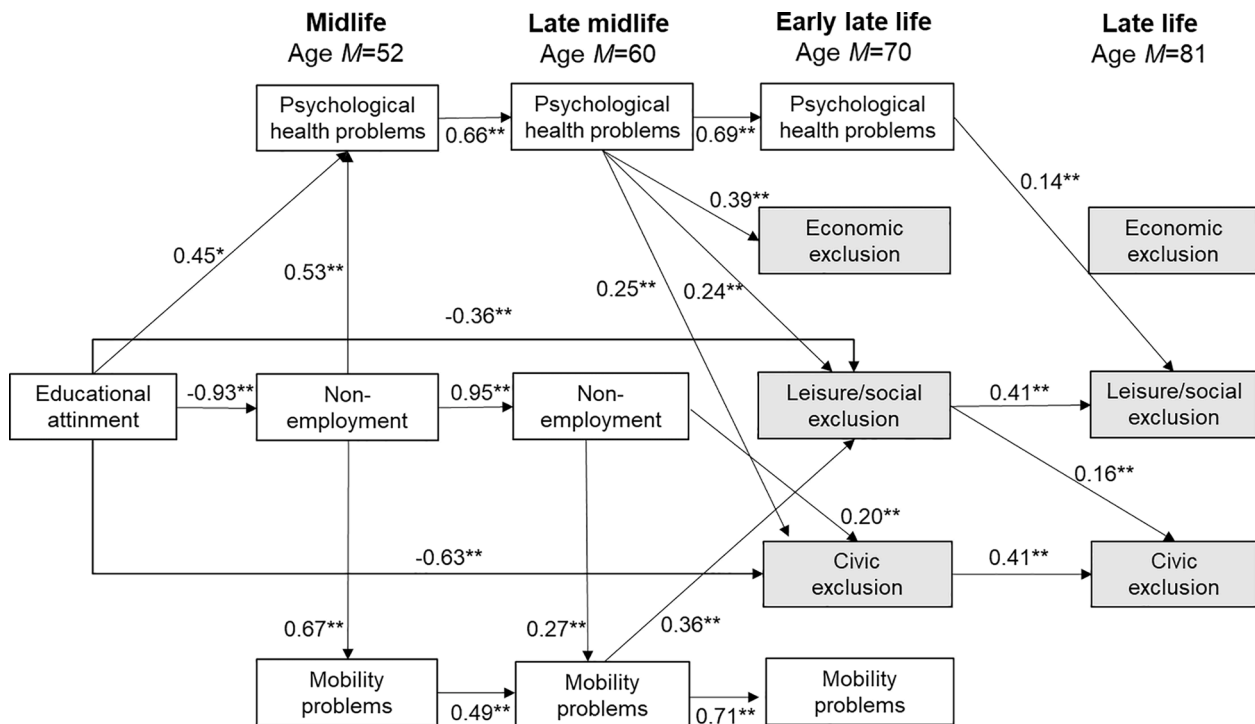


Fig. 3. Final path model (Model 3a) with additional gender coefficients, here for men. For clarity, control variable age is not shown in the figure. ** $p < .01$, * $p < .05$.

exclusion (Est.=0.16, $p < 0.01$) at early late life, and from non-employment at late midlife (Est.=0.13, $p=0.02$). There were indirect effects on civic exclusion at late life by different paths, one via civic exclusion at early late life and one via non-employment at midlife and late midlife and either civic exclusion at early late life or leisure/social exclusion at early late life. Finally, an indirect effect was observed from mobility problems at midlife and late midlife via leisure/social exclusion at early late life (Fig. 2).

Long-term risk factors for social exclusion among men

No direct effects were observed from risk factors on *economic exclusion* at late life. However, a moderate effect was observed from psychological health problems at late midlife on economic exclusion at early late life (Est.=0.39, $p < 0.01$). An indirect effect was observed from educational attainment via non-employment or psychological health problems at midlife via psychological health problems at late midlife (Fig. 3).

There was a moderate direct effect from leisure/social exclusion (Est.=0.41, $p < 0.01$) and a small direct effect from psychological health problems (Est.=0.14, $p < 0.01$) at early late life on *leisure/social exclusion* at late life. An indirect effect was observed from educational attainment via leisure/social exclusion at early late life. An indirect effect was also observed from educational attainment via non-employment or psychological health problems at midlife, via psychological health problems at late midlife and early late life, or via psychological health problems at late midlife and leisure/social exclusion at early late life. An indirect effect was also observed from educational attainment via non-employment and mobility problems in midlife via leisure/social exclusion at early late life (Fig. 3).

There was a moderate direct effect from civic exclusion (Est.=0.41, $p < 0.01$) and a small direct effect from leisure/social exclusion (Est.=0.16, $p < 0.01$) at early late life on *civic exclusion* at late life. An indirect effect was observed from educational attainment via civic exclusion or leisure/social exclusion at early late life on civic exclusion at late life, and from educational attainment via non-employment at midlife and late midlife on civic exclusion at early late life. Also, an

indirect effect on civic exclusion at late life was observed from mobility problems at midlife and late midlife via leisure/social exclusion at early late life (Fig. 3).

Discussion

The present study examined long-term risk factors for old-age social exclusion using longitudinal data over 30 years from a representative sample of the adult population in Sweden. Two key features of social exclusion are that it is both persistent and dynamic as well as multidimensional, yet these features are rarely examined in empirical research on older adults.

Our first research question concerned how and to what extent late-life exclusion is predicted by social exclusion in early late life and by risk factors for exclusion measured at late midlife and midlife. We found that there is a persistence of exclusion among older adults, as exclusion from most domains in early late life affects exclusion from the same domain in late life. Exclusion from one domain in early late life can also affect other domains of exclusion in late life, in our study illustrated by links between leisure/social exclusion and civic exclusion. However, the lack of paths leading to late life economic exclusion may indicate that cumulative disadvantages do not occur for all domains of social exclusion. Thus, our findings indicate that social exclusion is both persistent and dynamic, underlining the need for more longitudinal studies to provide further evidence on cumulative disadvantages in social exclusion (Ferraro & Morton, 2018).

Educational attainment had both indirect effects on exclusion in late life via two paths, non-employment and psychological health problems, but also a direct effect on leisure/social and civic exclusion in early late life. Overall, we found that non-employment earlier in life plays an important role in old-age exclusion, as it had direct or indirect effects on all exclusion domains studied, except for economic exclusion in both early late life and late life. While the finding that non-employment is not a risk factor for economic exclusion could be thought surprising, this should be considered in the context of the financial security system in Sweden: although labor market activity and previous income affect the amount of pension received, all retired persons are guaranteed a

minimum pension level.

It is well established that educational attainment and non-employment play a significant role in late-life health inequalities (Chapko et al., 2018; Fritzell et al., 2020; Harber-Aschan et al., 2020). While education has been found to be a risk factor for social exclusion in early late life (Chung et al., 2019; Miranti & Yu, 2015), it is likely that different risk factors accumulate over the life course via linked exposures that, in turn, cause an accumulation of disadvantages over the life course (Ferraro & Morton, 2018; Kuh et al., 2014). For example, higher education is a gateway to employment (Bell & Marmot, 2017; Klein, 2015) and occupations with better working conditions, while those with a lower education have a higher risk of non-employment or occupations that cause poorer health (Bell & Marmot, 2017). Employment provides financial security, but also social networks, identity, status, structure, and a sense of purpose (Jahoda, 1982; Lundberg & Cooper, 2010; Waddell & Burton, 2006). Thus, not being part of the labor force may cause exclusion in late life due to being denied these latent benefits (Muller & Waters, 2012). Our finding that non-employment influences several social exclusion domains later in life highlights the importance of taking a life-course approach when proposing strategies to reduce old-age exclusion, with such strategies being initiated by midlife, if not sooner (Darin-Mattsson et al., 2018; Ferraro & Morton, 2018; Kuh et al., 2014).

Our second research question addressed how and to what extent the prediction of late-life exclusion varies by gender. Our path analysis models suggest that risk factors for old-age exclusion do not differ substantially for women and men. The model fit did not improve when allowing the model to vary freely by gender, while the version of the second model in which all coefficients were allowed to vary did not have a significantly better model fit than the partially constrained version of the second model in which all common unstandardized coefficients were constrained to be equal by gender. However, there was some variation in the paths for women and men in this final model. Firstly, non-employed women faced a higher risk of exclusion in early late life than non-employed men. Opportunities in terms of education and employment as well as expectations regarding, e.g., marriage and family are gendered, and the social world of older women has traditionally been more family- than employment-centred (Thompson & de Medeiros, 2019). Nevertheless, being denied the latent function of employment can have long-term effects regarding exclusion, as discussed above. This may indicate that for women, being outside of the labor force reduces possibilities for making connections outside family relations that last into old age, which in turn may influence their level of leisure/social and civic participation. While there is an acknowledged lack of gender perspective in research on social exclusion among older adults, there is also a need to examine the intersectionality between gender and socioeconomic position in old-age social exclusion.

Secondly, psychological health problems in midlife played a significant role in understanding old-age social exclusion among men. Health, and particularly psychological health, is considered a risk factor for old-age social exclusion (Becker & Boreham, 2009; Lee, 2021; Miranti & Yu, 2015; Sacker et al., 2017; Walsh, OShea, & Scharf, 2020). For men, psychological health was at least partly linked to non-employment. While non-employment did not have the same direct effects on late-life exclusion for men as for women, it had an impact on psychological health problems, that followed them through late midlife and later resulted in higher levels of social exclusion.

Strengths and weaknesses

This study contributes to the understanding of old-age exclusion by its life-course approach and gender perspective. The LNU and SWEOLD surveys provide a unique opportunity to follow individuals for approximately 30 years in addition to retrospective data on educational attainment. Another strength of the study is that LNU and SWEOLD are based on a representative sample of the adult population in Sweden with

high response rates (Fritzell & Lundberg, 2007; Lennartsson et al., 2014). Although all studies including older adults are prone to selective survival, the high response rates suggest that this type of selection bias has been minimized (Celeste & Fritzell, 2018; Kelfve et al., 2017). Although path analysis simultaneously adjusts the analyses for all variables included in the model, it is still possible that some residual confounding remains that may influence the paths towards old-age exclusion. Like all models, our path analysis models cannot account for the influence of extraneous variables and are dependent upon how included concepts and variables are operationalized and measured.

Since the LNU and SWEOLD surveys were not designed to specifically examine social exclusion, the number of exclusion domains that could be considered were limited to those for which a range of valid indicators were available, while some of the indicators themselves were less than optimal. There were also differences in how some indicators were measured in the two datasets and therefore across different measurement points, which means that some constructs are not entirely consistent throughout the study. The measurement of other variables often required assumptions: for example, participants were classified as non-employed if a member of one of several distinct sub-groups, meaning that the non-employed category was quite heterogeneous; while having no children was coded as being more excluded than having children with whom one seldom or never had contact. There is thus a need for future research that examines long-term risk factors for late-life exclusion to confirm our findings and also extend our work to consider other domains and indicators.

Conclusions

To conclude, this study confirms the persistent and dynamic aspects of social exclusion. For most domains of social exclusion, exclusion in one life domain increased the risk of subsequent exclusion from the same domain. At the same time, exclusion was multidimensional, where exclusion in one life domain had implications for exclusion in other life domains. Risk factors for social exclusion in later life did not vary greatly by gender, although there were some variations of note such as the stronger effect of non-employment in women and the stronger effect of psychological health problems in men. If the problem of old-age social exclusion is to be addressed effectively, our findings indicate a need for a preventive and holistic approach with integrated efforts across different policy areas targeting a broad range of risk factors for social exclusion in midlife, in order to avoid an accumulation of disadvantages that may increase social inequalities in late life.

Funding

This work was supported by Forte, Swedish Council for Working Life and Social Research (grant numbers 2017-00668, 2019-01141).

CRedit authorship contribution statement

Charlotta Nilsen: Conceptualization, Methodology, Software, Data curation, Writing – original draft. **Roger K. Celeste:** Conceptualization, Methodology, Software, Formal analysis, Writing – review & editing. **Carin Lennartsson:** Conceptualization, Investigation, Writing – review & editing, Funding acquisition. **Kevin J. McKee:** Conceptualization, Methodology, Writing – review & editing, Funding acquisition. **Lena Dahlberg:** Conceptualization, Writing – review & editing, Project administration, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no competing interests.

Acknowledgement

RKC has a PQ2 fellowship from the Brazilian National Research Council (CNPq: 311592/2019-8).

References

- Becker, E., & Boreham, R. (2009). *Understanding the risks of social exclusion across the life course: Older age*. Cabinet Office and National Centre for Social Research.
- Bell, R., & Marmot, M. (2017). *Life course approach to understanding inequalities in health in later life. Oxford textbook of geriatric medicine* (pp. 69–76). Oxford University Press.
- Burchardt, T., Le Grand, J., & Piachaud, D. (2002). Degrees of exclusion: Developing a dynamic, multidimensional measure. In J. Hills, J. Le Grand, & D. Piachaud (Eds.), *Understanding social exclusion* (pp. 30–43). Oxford University Press.
- Chapko, D., McCormack, R., Black, C., Staff, R., & Murray, A. (2018). Life-course determinants of cognitive reserve (CR) in cognitive aging and dementia—a systematic literature review. *Aging & Mental Health*, 22(8), 921–932. <https://doi.org/10.1080/13607863.2017.1348471>
- Chung, S., Jeon, H., Song, A., & Kim, J. H. (2019). Developmental trajectories and predictors of social exclusion among older Koreans: Exploring the multidimensional nature of social exclusion. *Social Indicators Research*, 144(1), 97–112. <https://doi.org/10.1007/s11205-018-2045-6>
- Celeste, R. K., & Fritzell, J. (2018). Do socioeconomic inequalities in pain, psychological distress and oral health increase or decrease over the life course? Evidence from Sweden over 43 years of follow-up. *Journal of Epidemiology and Community Health*, 72(2), 160–167. <https://doi.org/10.1136/jech-2017-209123>
- Dahlberg, L. (2021). Introduction: Framing exclusion interrelationships. In K. Walsh, T. Scharf, A. Wanka, & S. Van Regenmortel (Eds.), *Social exclusion in later life: Interdisciplinary and policy perspectives* (pp. 289–295). Springer.
- Dahlberg, L., & McKee, K. J. (2018). Social exclusion and well-being among older adults in rural and urban areas. *Archives of Gerontology and Geriatrics*, 79, 176–184. <https://doi.org/10.1016/j.archger.2018.08.007>
- Dahlberg, L., McKee, K. J., Fritzell, J., Heap, J., & Lennartsson, C. (2020). Trends and gender associations in social exclusion in older adults in Sweden over two decades. *Archives of Gerontology and Geriatrics*, 89. <https://doi.org/10.1016/j.archger.2020.104032>
- Darin-Mattsson, A., Andel, R., Celeste, R. K., & Kåreholt, I. (2018). Linking financial hardship throughout the life-course with psychological distress in old age: Sensitive period, accumulation of risks, and chain of risks hypotheses. *Social Science & Medicine*, 201, 111–119. <https://doi.org/10.1016/j.socscimed.2018.02.012>
- Del Bono, E., Sala, E., Hancock, R., Gunnell, C., & Parisi, L. (2007). *Gender, older people and social exclusion: A gendered review and secondary analysis of the data* (No. 2007-13). ISER Working Paper Series.
- Ferraro, K. F., & Morton, P. M. (2018). What do we mean by accumulation? Advancing conceptual precision for a core idea in Gerontology. *The Journals of Gerontology: Series B*, 73(2), 269–278. <https://doi.org/10.1093/geronb/gbv094>
- Fritzell, J., Lennartsson, C., & Zaidi, A. (2020). Trends and inequality in the new active ageing and well-being index of the oldest old: A case study of Sweden. *Journal of Population Ageing*, 1–18. <https://doi.org/10.1007/s12062-020-09264-9>
- Fritzell, J., & Lundberg, O. (2007). *Health inequalities and welfare resources: continuity and change in Sweden*. Policy Press.
- Harber-Aschan, L., Calderón-Larrañaga, A., Darin-Mattsson, A., Hu, X., Fratiglioni, L., & Dekhtyar, S. (2020). Beyond the social gradient: the role of lifelong socioeconomic status in older adults' health trajectories. *Aging (Albany NY)*, 12(24), 24693. <https://doi.org/10.18632/aging.202342>
- Heap, J., & Fors, S. (2015). Duration and accumulation of disadvantages in old age. *Social Indicators Research*, 123(2), 411–429. <https://doi.org/10.1007/s11205-014-0744-1>
- Heap, J., Fors, S., & Lennartsson, C. (2017). Coexisting disadvantages in later life: Demographic and socio-economic inequalities. *Journal of population ageing*, 10(3), 247–267. <https://doi.org/10.1007/s12062-016-9158-y>
- Heap, J., Fritzell, J., & Lennartsson, C. (2018). Associations between and coexistence of disadvantages in the oldest old people in Sweden: Patterns of change between 1992 and 2011. *Journal of European Social Policy*, 28(3), 197–210. <https://doi.org/10.1177/0958928718760100>
- Huisman, M., & van Tilburg, T. G. (2021). Social exclusion and social isolation in later life. In K. F. Ferraro, & D. Carr (Eds.), *Handbook of aging and the social sciences* (9th ed., pp. 99–114). Academic Press.
- Hutchison, E. D. (2010). A life course perspective. *Dimensions of human behavior: The changing life course*, 4, 1–38.
- Jahoda, M. (1982). *Employment and unemployment: A social-psychological analysis*. Cambridge University Press.
- Kelfve, S., Fors, S., & Lennartsson, C. (2017). Getting better all the time? Selective attrition and compositional changes in longitudinal and life-course studies. *Longitudinal and Life Course Studies*, 8(1), 104–120. <https://doi.org/10.14301/lcs.v8i1.350>
- Klein, M. (2015). The increasing unemployment gap between the low and high educated in West Germany. Structural or cyclical crowding-out? *Social Science Research*, 50, 110–125. <https://doi.org/10.1016/j.ssresearch.2014.11.010>
- Kline, P. (1994). *An easy guide to factor analysis* (1st ed.). London: Routledge.
- Kneale, D. (2012). *Is social exclusion still important for older people?* London: International Longevity Centre - UK.
- Kristensen, K., König, H. H., & Hajek, A. (2019). The association of multimorbidity, loneliness, social exclusion and network size: findings from the population-based German Ageing Survey. *BMC Public Health*, 19(1), 1–10. <https://doi.org/10.1186/s12889-019-7741-x>
- Kuh, D., Richards, M., Cooper, R., Hardy, R., & Ben-Shlomo, Y. (2014). Life course epidemiology, ageing research and maturing cohort studies: a dynamic combination for understanding healthy ageing. *A Life Course Approach to Healthy Ageing*, 3–15.
- Lee, S. (2021). Social exclusion and subjective well-being among older adults in Europe: Findings from the European social survey. *The Journals of Gerontology: Series B*, 76(2), 425–434. <https://doi.org/10.1093/geronb/gbaa172>
- Lee, J., & Cagle, J. G. (2018). Social exclusion factors influencing life satisfaction among older adults. *Journal of Poverty and Social Justice*, 26(1), 35–50. <https://doi.org/10.1332/175982717x15127351091521>
- Lennartsson, C., Agahi, N., Hols-Salén, L., Kelfve, S., Kåreholt, I., Lundberg, O., ... Thorslund, M. (2014). Data resource profile: the Swedish panel study of living conditions of the oldest old (SWEOLD). *International journal of epidemiology*, 43(3), 731–738. <https://doi.org/10.1093/ije/dyu057>
- Levitas, R., Pantazis, C., Fahmy, E., Gordon, D., Lloyd-Reichling, E., & Patsios, D. (2007). *The multi-dimensional analysis of social exclusion*. Social Exclusion Task Force.
- Lundberg, U., & Cooper, C. L. (2010). *The science of occupational health: Stress, psychobiology, and the new world of work*. John Wiley & Sons.
- Miranti, R., & Yu, P. (2015). Why social exclusion persists among older people in Australia. *Social Inclusion*, 3(4), 112–126. <https://doi.org/10.17645/si.v3i4.214>
- Muller, J., & Waters, L. (2012). A review of the latent and manifest benefits (LAMB) scale. *Australian Journal of Career Development*, 21(1), 31–37. <https://doi.org/10.1177/103841621202100105>
- Nilsen, C., Darin-Mattsson, A., Hyde, M., & Wastesson, W. J. (2021). Life-course trajectories of working conditions and successful aging. *Scandinavian Journal of Public Health*. <https://doi.org/10.1177/14034948211013279>, 14034948211013279.
- OECD. (2021). *This information is retrieved from the OECD labour market statistics*. <http://stats.oecd.org/>.
- Ogg, J. (2005). Social exclusion and insecurity among older Europeans: the influence of welfare regimes. *Ageing and Society*, 25(1), 69. <https://doi.org/10.1017/S0144686x04002788>
- Phillipson, C., & Scharf, T. (2004). *The impact of government policy on social exclusion among older people. A review of the literature for the Social Exclusion Unit in the Breaking the Cycle series*. Social Exclusion Unit.
- Pohlan, L. (2019). Unemployment and social exclusion. *Journal of Economic Behavior & Organization*, 164, 273–299. <https://doi.org/10.1016/j.jebo.2019.06.006>
- Popham, F., & Bamba, C. (2010). Evidence from the 2001 English Census on the contribution of employment status to the social gradient in self-rated health. *Journal of Epidemiology & Community Health*, 64(3), 277–280. <https://doi.org/10.1136/jech.2009.087452>
- Sacker, A., Ross, A., MacLeod, C. A., Netuveli, G., & Windle, G. (2017). Health and social exclusion in older age: evidence from Understanding Society, the UK household longitudinal study. *Journal of Epidemiology and Community Health*, 71(7), 681–690. <https://doi.org/10.1136/jech-2016-208037>
- Scharf, T., Phillipson, C., & Smith, A. E. (2005). Social exclusion of older people in deprived urban communities of England. *European Journal of Ageing*, 2(2), 76–87.
- Thompson, H. T., & de Medeiros, K. (2019). The gendered nature of later life relationships. In L. W. Kaye, & C. M. Singer (Eds.), *Social isolation of older adults: Strategies to bolster health and well-being* (pp. 235–252). Springer.
- Van Regenmortel, S., De Donder, L., Dury, S., Smetcoren, A.-S., De Witte, N., & Verté, D. (2016). Social exclusion in later life: A systematic review of the literature. *Journal of Population Ageing*, 9(4), 315–344. <https://doi.org/10.1007/s12062-016-9145-3>
- Van Rijn, R. M., Robroek, S. J., Brouwer, S., & Burdorf, A. (2014). Influence of poor health on exit from paid employment: a systematic review. *Occupational and Environmental Medicine*, 71(4), 295–301. <https://doi.org/10.1136/oemed-2013-101591>
- Waddell, G., & Burton, A. K. (2006). *Is work good for your health and well-being?* The Stationery Office.
- Walsh, K., O'Shea, E., & Scharf, T. (2020). Rural old-age social exclusion: a conceptual framework on mediators of exclusion across the lifecourse, 40 pp. 2311–2337. Ageing & Society. <https://doi.org/10.1017/S0144686X19000606>
- Walsh, K., Scharf, T., & Keating, N. (2017). Social exclusion of older persons: A scoping review and conceptual framework. *European Journal of Ageing*, 14(1), 81–98. <https://doi.org/10.1007/s10433-016-0398-8>
- Walsh, K., Scharf, T., Van Regenmortel, S., & Wanka, A. (2021). The intersection of ageing and social exclusion. In K. Walsh, T. Scharf, A. Wanka, & S. Van Regenmortel (Eds.), *Social exclusion in later life: Interdisciplinary and policy perspectives* (pp. 3–21). Springer.
- Warburton, J., Ng, S. H., & Shardlow, S. M. (2013). Social inclusion in an ageing world: introduction to the special issue. *Ageing & Society*, 33(1), 1–15.