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Trends in Associations Between Sickness Absence Before the Age of 65 and Being in Paid Work After the Age of 65: Prospective Study of Three Total Population Cohorts

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ABSTRACT

The increasing workforce participation at higher ages may impact social insurance systems, however, this has hardly been studied at all. We studied associations between sociodemographic factors and prior sickness absence and disability pension, with having paid work and sickness absence after age 65, and if such associations changed over time. We used longitudinal register data regarding three cohorts of all residents in Sweden who turned 65 in 2000, 2005, or 2010 (N = 50,000, 68,000, and 99,000, respectively). Although employment rates when aged 66–71 increased between the cohorts, associations of sociodemographic factors with paid work and sickness absence, when aged 66–71 did not. Both sickness absence and disability pension when aged 60–64 were negatively associated with working past 65. Sickness absence when aged 60–64 was positively associated and disability pension was negatively associated with sickness absence after 65. Possibilities to remain in paid work with different health conditions need to be strengthened to avoid inequalities when raising the retirement age.

KEY POINTS

- Paid work increased from 2000 to 2010, sickness absence increased marginally
- Associations of sociodemographic factors with paid work did not change over time
- Prior sickness absence and disability pension correlate with paid work after age 65
- Sickness absence before age 65 correlates with sickness absence after 65
- Disability pension before age 65 correlates with less sickness absence after 65


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 Supplemental data for this article can be accessed on the [publisher's website](#).

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Background

Improving possibilities for older people to remain longer in paid work as well as raising the retirement age are discussed in many countries (OECD, 2014; United Nations Department of Economic and Social Affairs, 2020), since both the number and proportion of older people in the population is increasing (OECD, 2011). Higher numbers of people in paid work at older ages may affect sickness absence rates and social security costs (Coe & Zamarro, 2011), since higher age is generally associated with higher morbidity (Vellas et al., 1992) and, among people of traditional working ages, with higher sickness absence rates (Allebeck & Mastekaasa, 2004; Beemsterboer et al., 2009). It is generally thought that more people remaining in paid work will put less strain on public pension systems, since there will be more people paying into the system, and fewer people drawing on it, even if some people withdraw their old age pension at the same time as they have paid work (Delegationen för senior arbetskraft, 2020). However, there are some concerns that many people, especially in low income and low education groups, might not be healthy enough to justify increases in the retirement age (Socialdepartementet, 2013). Thus, an increase of the pension age could lead to increased costs for the sickness insurance system, as many already leave the labor market prior to age 65 via this route (Delegationen för senior arbetskraft, 2020).

Individuals in good health or without functional limitations are more likely to be in paid work after the age of 65 (Nilsson, 2016). Remaining in paid work has been reported to be beneficial for health, although the research regarding this is inconclusive (Nilsson, 2016). Morbidity, or the lack thereof, can thus act both as a determinant and consequence of paid work later in life.

It is possible that the expansion of labor market participation after age 65 implies a weakening of health selection effects among those working past 65 and, therefore, might lead to higher sickness absence rates. A study from Sweden found that while the rate of people in paid work increased among those aged 66–70 as well as ≥ 71 years between the years 1995 and 2010, sickness absence rates in fact decreased among both the women and men (Farrants et al., 2017a). Another study found that those who stayed in work after 65 had fewer mean sickness absence days per year before age 65 than those who did not stay in paid work, which was unsurprising, given the previously mentioned health selection effects of working past age 65 (Farrants et al., 2017b). However, both these studies were descriptive and did not test the strength of any associations, nor adjust the models for known factors of importance, such as sociodemographic factors and prior sickness absence and disability pension.

From age 16, all people living in Sweden with income from work or from unemployment benefits are covered by the public sickness absence insurance system and can be granted sickness absence benefits if their work capacity is reduced due to disease or injury, regardless of if it is caused by work or not. Day 1 is a waiting day, with 100% loss of income. After 7 days, a medical certificate is

required. The employer reimburses income loss during days 2–14, after which sickness absence benefits are administered by the Social Insurance Agency. After the age of 65, some restrictions apply. Individuals aged 65 through 69 years can get sickness absence benefits for up to a total of 180 days during those years, after which the Social Insurance Agency may restrict further claims if the reduced work capacity is assessed as permanent. From the age of 70, people may not claim sickness absence benefits for more than 180 days total.

All people in Sweden aged 30–64 can claim disability pension if their work capacity is reduced permanently due to disease or injury, regardless of if it is caused by work or not. Sickness absence and disability pension benefits can be granted for full- or part-time (100%, 75%, 50%, or 25%) of the claimant's ordinary work hours. Sickness absence benefits replace 80%, disability pension 65% of lost income, up to a certain level. From age 65, disability pension and unemployment benefits are no longer available. Sweden has a flexible pension age, which at the time of the study started at age 61, although the most common age for old-age pension was 65. Individuals had the statutory right to remain in their permanent position to age 67, after which it was up to the employer whether to retain them or terminate their employment.

Sweden has a high rate of people in work at older ages, compared to in other European countries, especially among women (Klevmarken, 2010; OECD, 2019). This means that experiences from Sweden can be informative for other countries who are also trying to increase labor market participation at higher ages.

Many of the factors determining whether people retire early or late overlap with factors determining sickness absence, which is a challenge when researching sickness absence at older ages. The selection out of the labor market of those with more severe health problems via disability pension or early old-age pension may make age differences in sickness absence appear smaller than they actually are (Barmby et al., 2002; Sandanger et al., 2000). Those without chronic conditions or disabilities are more likely to continue in paid work beyond retirement age (Nilsson, 2012; Virtanen et al., 2014). However, while the associations between morbidity, sickness absence and paid work/retirement have been determined for populations below standard retirement age, to the best of our knowledge, no prior study has examined the same factors related to both working past age 65, and having sickness absence after age 65 in the same study. Therefore, we studied how the same sociodemographic and morbidity-related factors were associated with both remaining in paid work after age 65, and with having sickness absence among those who remained in paid work after age 65, to determine whether smaller differences in sickness absence after age 65 can be ascribed to health selection along sociodemographic axes. The **aim** was thus to investigate associations between socio-demographic factors and prior sickness absence

and disability pension, with remaining in paid work after age 65 as well as with having sickness absence among those in paid work after age 65, and whether these associations changed over time.

Methods

We conducted three longitudinal cohort studies of the association between sickness absence and disability pension when aged 60–64, and with being in paid work and having sickness absence when aged 66–71.

We used register microdata from Statistics Sweden (regarding sociodemographics) and the Swedish Social Insurance Agency (regarding sickness absence and disability pension) holding annual information of all individuals living in Sweden during the years 2000, 2005, or 2010 and who turned 65 during respective year. Data was obtained for 12 years for each individual.

Three study cohorts

All those who were registered as living in Sweden on 31 December 1999, 2004, or 2009, and turned 65 in 2000, 2005, or 2010, respectively, were selected for each respective cohort. We excluded those who were not in paid work according to the definition below at any point during the ages 60–64, as they were not at risk of sickness absence or disability pension. The final study populations were 50,046 in the 2000 cohort, 67,779 in the 2005 cohort, and 98,551 in the 2010 cohort. For each individual in each cohort data was obtained retrospectively for the five years when aged 60–64 and prospectively for six years; when aged 66–71. Information on sickness absence and disability pension from the baseline year was not used, since we had no information on when during the year the individuals turned 65.

Variables

In paid work

To be covered by the public sickness absence scheme, one needed to have an income from work of at least about 840–980 Euros (24% of the price basic amount, a yearly updated amount used to index benefit eligibility, benefit amounts, and some taxation in line with inflation). For the analyses where paid work after 65 was the outcome, we included those who, at any point when aged 60–64, had income from work or work-related benefits (sickness absence, disability pension, unemployment compensation, etc.) amounting to at least 75% of the minimum annual work income for sickness absence benefits. For the analyses where sickness absence after age 65 was the outcome, we included those who had this level of income both at any point when aged 60–64 and also at any point when aged 66–71. This was done as sickness absence benefits in most cases covers 75% of the lost income. Without this adjustment,

individuals with low income who had long sickness absence spells might have been excluded. We used a binary measure of paid work, where individuals who met this requirement are here called “in paid work” and individuals who did not are called “not in paid work.”

Sickness absence

We used a binary indicator of having had any sickness absence spell > 14 days during the ages 60–64 as our first main explanatory variable. We used any sickness absence spell > 14 days during ages 66–71 as one of the outcomes in this study.

Disability pension

We used a binary indicator of having had any disability pension when aged 60–64 as our second main explanatory variable.

Sociodemographic variables at baseline

Sex: woman or man; country of birth: Sweden, other Nordic country, other EU-27, or rest of world (including missing); educational level: elementary (≤ 9 years or missing), high school (10–12 years), or university/college (> 12 years); type of living area: large city (Stockholm, Gothenburg, Malmö with surrounding municipalities), medium-sized town, or small town/rural; family situation: married/cohabiting with children living at home, married/cohabiting with no children living at home, single with children living at home, or single with no children living at home.

Analysis

Descriptive statistics were calculated for the study cohorts, as well as for being in paid work when aged 66–71 and, among those who were in paid work when aged 66–71, for having sickness absence, related to the sociodemographic variables and to sickness absence and disability pension when aged 60–64. We also conducted logistic regression analyses with results presented as odds ratios (OR) and 95% confidence intervals (CI) for the associations of:

- the sociodemographic variables,
- having sickness absence and disability pension when aged 60–64,

with the two outcomes:

- being in paid work when aged 66–71,
- among those in paid work when aged 66–71, having sickness absence.

Results

Table 1 shows the sociodemographic composition of each of the three cohorts. The proportion with sickness absence when aged 60–64 was higher in the 2005 cohort (43.7%) than in the 2000 cohort (30.9%), and the 2010 cohort (35.9%). This was especially the case for women (24.2% in 2000, 49.6% in 2005, and 40.8% in 2010). The proportion with disability pension aged 60–64 was also highest in the 2005 cohort (18.4%) and was lowest in the 2010 cohort (7.9%).

In all three cohorts, the proportion in paid work decreased with each increasing year of age (**Figure 1**). However, the proportion in paid work was higher at all ages in the 2010 cohort than in the 2005 cohort, which in turn was higher than in the 2000 cohort at each year of age, both before and after age 65. The proportion of those in paid work who had sickness absence when aged 66–71 increased marginally in each consecutive cohort among the women, but not for men (**Figure 2**). A larger proportion of men in paid work than women had sickness absence in the 2000 cohort, while there were no gender differences in the 2010 cohort.

Table 2 shows the proportion of people in paid work when aged 66–71 by sociodemographic categories and by sickness absence and disability pension when aged 60–64. In all three cohorts, a smaller proportion of those with sickness absence in ages 60–64 were in paid work than those who had no sickness absence aged 60–64. The difference was even larger between those with no and those with at least some disability pension when aged 60–64, although still, 14.4% of those who had some disability pension when aged 60–64 in the 2000 cohort, 9.2% in the 2005 cohort, and 25.2% in the 2010 cohort were in paid work to some extent when aged 66–71.

Table 2 also shows proportions among those in work when aged 66–71 who had some sickness absence at any point during follow-up. This proportion was slightly higher in the 2010 cohort than in the 2005 and 2000 cohorts.

Associations with remaining in paid work aged 66-71

Table 3 shows associations between the sociodemographic characteristics, prior sickness absence, and prior disability pension, and being in paid work after age 65, unadjusted and mutually adjusted, among all, as well as among women and men. **Table 4** shows corresponding associations for having sickness absence among those in paid work during follow-up. Supplementary **Figure 1** shows the adjusted ORs for women and men, from **Tables 3 and 4** in forest plots, for easier overview.

When adjusted for other sociodemographic factors and prior sickness absence and disability pension, women born in “EU-27 other than Nordic countries” had a significantly lower probability of being in paid work after age 65 than those born in Sweden, in all cohorts (OR range 0.74–0.84). In the 2010

Table 1. Sociodemographic characteristics* of the three cohorts of individuals who lived in Sweden, turned 65 in 2000, 2005, or 2010, and were in paid work at some point when aged 60-64 presented for all, and stratified by sex

	2000 cohort		2005 cohort		2010 cohort		Women		
	All, N=56 049	Women N=27 634	Men N=28 415	All N=67 799	Women N=32 905	Men N=34 894	All N=98 551	N=51 053	Men N=47 498
	%	%	%	%	%	%	%	%	%
Sex									
Women	49.30			48.53			51.80		
Men	50.70			51.47			48.20		
Birth Country									
Sweden	90.32	90.15	90.47	90.08	90.93	89.28	91.89	91.70	92.05
Other Nordic	5.44	6.05	4.84	4.78	5.17	4.42	4.42	5.12	3.77
Other EU-27	3.01	2.99	3.04	3.27	2.74	3.77	1.85	1.74	1.95
Rest of World	1.23	0.81	1.65	1.87	1.16	2.53	1.83	1.40	2.23
Educational level									
Elementary	42.43	40.26	44.53	34.93	31.94	37.74	27.23	23.16	31.02
High school	36.68	38.08	35.33	40.58	41.58	39.63	42.79	44.21	41.47
University/college	20.89	21.66	20.14	24.50	26.48	22.63	29.98	32.63	27.51
Type of living area									
Large city	31.15	31.49	30.81	31.74	32.55	30.98	32.49	33.40	31.65
Medium town	35.58	35.81	35.36	35.90	35.48	36.29	35.63	35.62	35.64
Small town/rural	33.27	32.70	33.83	32.36	31.97	32.73	31.88	30.98	32.71
Family situation									
Married no children at home	67.50	62.97	71.90	66.01	62.43	69.38	65.25	62.65	67.67
Married with children at home	0.77	0.06	1.47	0.96	0.08	1.79	0.89	0.07	1.64
Single no children at home	31.65	36.94	26.51	32.93	37.44	28.68	33.73	37.24	30.47
Single with children at home	0.07	Too few	Too few	0.10	0.05	0.15	0.13	0.04	0.22
Sickness absence when aged 60-64									
No	69.10	75.58	62.79	56.34	50.38	61.97	64.12	59.21	68.67
Yes	30.90	24.42	37.21	43.66	49.62	38.03	35.88	40.79	31.33
Disability pension when aged 60-64									
No	84.96	85.39	84.55	81.62	78.49	84.58	92.07	90.75	93.30
Yes	15.04	14.61	15.45	18.38	21.51	15.42	7.93	9.25	6.70

* Exact numbers for cells with <10 people are not shown. If there are <10 among either women or men, the numbers for the other sex are also withheld.

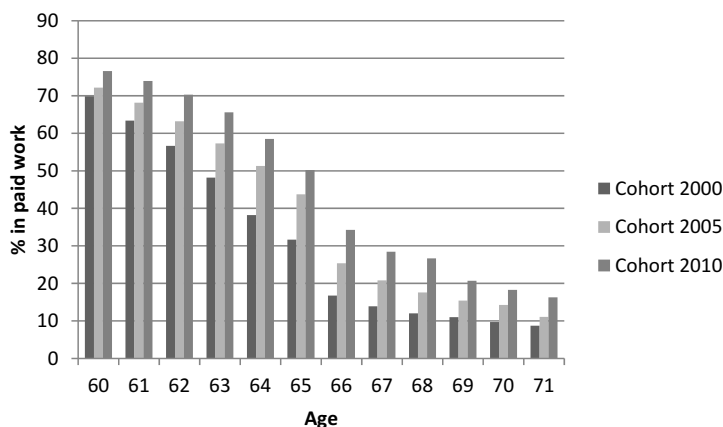


Figure 1. Proportion (%) of individuals with an income from work high enough to qualify for sickness absence benefits by age, among all in Sweden who turned 65 in 2000 (N = 50,046), 2005 (N = 67,779), or 2010 (N = 98,551).

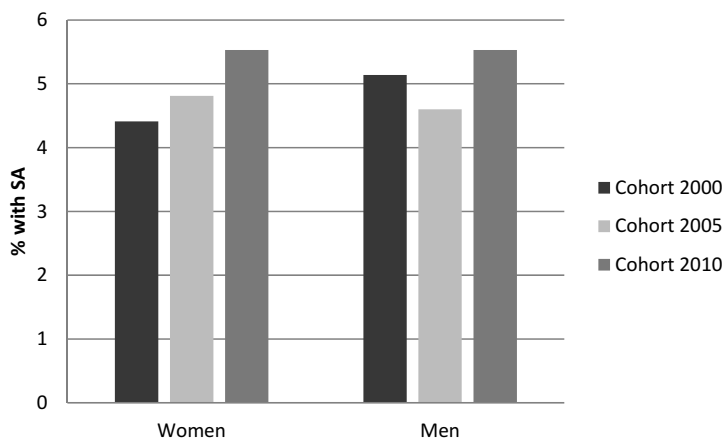


Figure 2. Proportion (%) with any sickness absence (SA) among women and men in paid in paid work aged 66–71 in 2000 (N = 6280 women, 9086 men), 2005 (N = 11,463 women, 16,484 men), and 2010 (N = 20,252 women, 27,246 men).

cohort, women born in “the rest of the world” were significantly more likely than those born in Sweden to be in paid work after age 65 (1.23, 1.05–1.44). Men born in “EU-27 other than Nordic countries” had a significantly lower probability of being in paid work after age 65 than those born in Sweden, in all cohorts (OR range 0.70–0.79). This was also the case for men born in the “rest of the world” (OR range 0.64–0.77).

Women and men with lower education than university/college had a lower probability of being in paid work in all three cohorts. For men only, that association was significantly smaller in the 2010 cohort, than in the other two cohorts.

Table 2. Numbers and proportions (%)* of individuals in paid work when aged 66–71 among all individuals who were in paid work when aged 60–64, and of individuals with sickness absence (SA) among those in paid work when aged 66–71, in three cohorts of the individuals who lived in Sweden, turned 65 in 2000, 2005, or 2010, and were in paid work at some point when aged 60–64, presented for all and stratified by sex.

	2000 cohort		2005 cohort		2010 cohort		2000 cohort		2005 cohort		2010 cohort		2000 cohort		2005 cohort		2010 cohort	
	All	%	All	%	All	%	Women	%	Women	%	Women	%	Men	%	Men	%	Men	%
<i>In paid work</i>	n = 16,068		n = 26,799		n = 47,498		n = 6280		n = 11,017		n = 20,252		n = 9806		n = 15,782		n = 27,246	
% of all																		
Sex																		
All	28.70		39.53		48.20		22.73		33.48		42.67		34.51		45.23		53.33	
Women																		
Men																		
Birth Country																		
Sweden	28.89		39.96		48.42		22.69		33.77		42.65		34.90		45.91		53.77	
Other Nordic	23.50		31.20		41.88		20.10		27.53		40.33		27.64		35.23		43.83	
Other EU-27	32.21		42.30		50.82		27.88		36.00		44.81		36.34		46.62		55.82	
Rest of World	29.34		34.91		49.50		27.68		31.33		50.15		30.13		36.47		49.12	
Educational level																		
Elementary	23.65		32.96		42.31		17.65		25.60		53.77		28.92		38.84		48.01	
High school	27.27		37.80		45.23		21.50		31.79		43.83		33.32		43.74		51.15	
University/college	41.47		51.75		57.78		34.32		45.63		55.82		48.94		58.50		62.61	
Type of living area at age 65																		
Large city	32.94		43.75		51.80		38.61		38.84		47.42		37.99		48.61		56.10	
Medium town	26.76		38.37		47.00		32.28		31.72		40.88		32.93		44.50		52.68	
Small town/rural	26.81		36.67		45.86		29.11		29.98		39.62		32.99		42.83		51.36	
Family situation at age 65																		
Married no children at home	29.22		39.62		47.77		21.30		30.99		39.43		35.97		46.95		54.94	
Married with children at home	52.66		65.23		72.74		62.50		77.78		82.86		52.28		64.69		72.32	
Single no children at home	26.94		38.53		48.29		25.05		37.48		47.99		29.49		39.82		48.63	
Single with children at home	54.76		58.82		70.54		Too few		87.50		88.24		Too few		50.00		67.86	
Sickness absence when aged 60–64																		
No	31.68		44.04		50.62		24.88		37.46		44.68		37.65		49.08		55.38	
Yes	23.79		33.71		43.87		19.62		29.44		39.76		28.59		38.96		48.83	
Disability pension when aged 60–64																		
No	31.23		43.99		50.18		24.86		37.99		44.66		37.49		49.23		55.16	
Yes	14.41		9.17		25.19		10.26		17.02		23.16		18.22		23.29		27.78	

(Continued)

Table 2. (Continued).

	2000 cohort All n = 788 %	2005 cohort All n = 1310 %	2010 cohort All n = 2626 %	2000 cohort Women n = 277 %	2005 cohort Women n = 551 %	2010 cohort Women n = 1119 %	2000 cohort Men n = 511 %	2005 cohort Men n = 759 %	2010 cohort Men n = 1507 %
<i>Sickness absence when aged 66–71 % of those in paid work</i>									
Sex									
All	4.90	4.89	5.53	4.11	4.81	5.53	4.83	4.60	5.53
Women									
Men									
Birth Country									
Sweden	4.45	4.51	5.25	4.00	4.63	5.24	4.73	4.42	5.26
Other Nordic	5.18	5.59	7.34	4.29	5.36	7.86	5.96	5.79	6.75
Other EU-27	5.49	6.58	10.57	5.46	8.88	10.24	5.50	5.36	10.79
Rest of World	7.37	8.66	10.29	Too few	Too few	9.28	Too few	Too few	10.89
Educational level									
Elementary	4.36	4.54	4.54	3.73	4.38	5.50	4.70	4.63	5.77
High school	4.70	4.56	4.56	3.93	4.67	5.16	5.22	4.48	5.69
University/college	4.60	4.98	4.98	4.68	5.25	5.90	4.54	4.75	5.12
Type of living area at age 65									
Large city	5.79	6.22	6.69	5.22	6.73	6.69	6.20	5.82	6.69
Medium town	4.01	4.24	5.04	3.93	3.88	5.08	4.06	4.48	5.00
Small town	3.76	3.44	4.75	2.91	3.40	4.55	4.26	3.46	4.89
Family situation at age 65									
Married no children at home	4.22	3.96	4.89	3.35	3.39	4.32	4.66	4.28	5.25
Married with children at home	6.10	6.65	10.08	Too few	Too few	Too few	Too few	Too few	Too few
Single no children at home	5.25	6.09	6.57	5.23	6.80	7.23	5.28	5.26	5.84
Single with children at home	Too few	Too few	Too few	Too few	Too few	Too few	Too few	Too few	Too few
Sickness absence when aged 60–64									
No	3.52	3.54	4.12	2.87	3.52	4.02	3.89	3.54	4.19
Yes	6.79	6.62	8.43	6.34	6.46	7.98	7.15	6.76	8.87
Disability pension when aged 60–64									
No	4.58	4.82	5.52	4.27	5.02	5.52	4.77	4.70	5.52
Yes	4.24	3.40	5.79	Too few	3.19	5.70	Too few	3.60	5.89

* Exact numbers for cells with < 10 people are not shown. If there are < 10 among either women or men, the numbers for the other sex are also withheld.

Table 3. Crude and mutually adjusted odds ratios (OR) and 95% confidence intervals (CI) of being in paid work aged 66–71, among individuals who lived in Sweden, turned 65 in 2000, 2005, or 2010, and were in paid work at some point when aged 60–64, presented for all, and stratified by sex.

	Cohort 2000 (n = 27,634 women, 28,415 men)		Cohort 2005 (n = 32,905 women, 34,894 men)		Cohort 2010 (n = 51,033 women, 47,498 men)	
	Crude OR (CI)	Adjusted OR (CI)	Crude OR (CI)	Adjusted OR (CI)	Crude OR (CI)	Adjusted OR (CI)
<i>All</i>						
<i>Sex</i>						
Women	Ref	Ref	Ref	Ref	Ref	Ref
Men	1.79 (1.73–1.86)	1.83 (1.76–1.90)	1.64 (1.59–1.69)	1.62 (1.56–1.67)	1.54 (1.50–1.57)	1.55 (1.51–1.59)
<i>Birth Country</i>						
Sweden	Ref	Ref	Ref	Ref	Ref	Ref
Other Nordic	1.17 (1.05–1.30)	1.01 (0.91–1.13)	1.10 (1.01–1.20)	0.93 (0.85–1.01)	1.10 (1.00–1.21)	0.98 (0.89–1.08)
Other EU-27	0.76 (0.69–0.82)	0.84 (0.77–0.92)	0.68 (0.63–0.74)	0.73 (0.67–0.79)	0.77 (0.72–0.82)	0.83 (0.78–0.88)
Rest of World	1.02 (0.87–1.21)	0.84 (0.71–1.00)	0.81 (0.72–0.91)	0.67 (0.59–0.76)	1.04 (0.95–1.15)	0.91 (0.83–1.00)
<i>Educational level</i>						
Elementary	0.44 (0.42–0.46)	0.46 (0.44–0.49)	0.46 (0.44–0.48)	0.47 (0.45–0.49)	0.54 (0.52–0.55)	0.53 (0.51–0.55)
High school	0.53 (0.50–0.56)	0.55 (0.52–0.58)	0.57 (0.55–0.59)	0.58 (0.56–0.60)	0.60 (0.59–0.62)	0.61 (0.59–0.63)
University/college	Ref	Ref	Ref	Ref	Ref	Ref
<i>Type of living area at age 65</i>						
Large city	Ref	Ref	Ref	Ref	Ref	Ref
Medium town	0.74 (0.71–0.78)	0.80 (0.76–0.84)	0.80 (0.77–0.83)	0.85 (0.82–0.88)	0.83 (0.80–0.85)	0.88 (0.85–0.90)
Small town	0.75 (0.71–0.78)	0.85 (0.81–0.89)	0.75 (0.72–0.77)	0.83 (0.80–0.87)	0.79 (0.76–0.81)	0.87 (0.84–0.90)
<i>Family situation at age 65</i>						
Married no children at home	Ref	Ref	Ref	Ref	Ref	Ref
Married with children at home	2.69 (2.23–3.25)	2.02 (1.66–2.46)	2.86 (2.43–3.36)	2.19 (1.85–2.60)	2.91 (2.51–3.39)	2.35 (2.02–2.74)
Single with children at home	2.93 (1.59–5.37)	3.25 (1.71–6.17)	2.18 (1.34–3.53)	1.97 (1.18–3.27)	2.62 (1.79–3.82)	2.20 (1.50–3.24)
Single no children at home	0.89 (0.86–0.93)	0.97 (0.93–1.01)	0.96 (0.92–0.99)	1.03 (1.00–1.07)	1.02 (1.00–1.05)	1.08 (1.05–1.11)
<i>Sickness absence when aged 60–64</i>						
No	Ref	Ref	Ref	Ref	Ref	Ref
Yes	0.67 (0.65–0.70)	0.86 (0.82–0.90)	0.65 (0.63–0.67)	0.88 (0.85–0.91)	0.76 (0.74–0.78)	0.89 (0.87–0.92)
<i>Disability pension when aged 60–64</i>						
No	Ref	Ref	Ref	Ref	Ref	Ref
Yes	0.37 (0.35–0.40)	0.41 (0.39–0.44)	0.31 (0.30–0.33)	0.36 (0.34–0.37)	0.33 (0.32–0.35)	0.36 (0.35–0.38)

(Continued)



Table 3. (Continued).

	Cohort 2000 (n = 27,634 women, 28,415 men)		Cohort 2005 (n = 32,905 women, 34,894 men)		Cohort 2010 (n = 51,033 women, 47,498 men)	
	Crude OR (CI)	Adjusted OR (CI)	Crude OR (CI)	Adjusted OR (CI)	Crude OR (CI)	Adjusted OR (CI)
Women						
Birth Country						
Sweden	Ref	Ref	Ref	Ref	Ref	Ref
Other Nordic	1.32 (1.13–1.54)	1.16 (0.99–1.36)	1.10 (0.96–1.27)	0.95 (0.82–1.09)	1.09 (0.95–1.25)	0.97 (0.84–1.12)
Other EU-27	0.86 (0.76–0.97)	0.89 (0.78–1.00)	0.75 (0.67–0.83)	0.75 (0.67–0.84)	0.91 (0.84–0.99)	0.92 (0.84–1.00)
Rest of World	1.30 (0.97–1.75)	1.20 (0.88–1.63)	0.90 (0.72–1.11)	0.81 (0.65–1.02)	1.35 (1.16–1.58)	1.23 (1.05–1.44)
Educational level						
Elementary	0.41 (0.38–0.44)	0.45 (0.41–0.48)	0.41 (0.39–0.44)	0.43 (0.40–0.46)	0.45 (0.43–0.48)	0.46 (0.44–0.48)
High school	0.52 (0.49–0.56)	0.55 (0.51–0.59)	0.56 (0.53–0.59)	0.58 (0.55–0.61)	0.56 (0.54–0.59)	0.58 (0.55–0.60)
University/college	Ref	Ref	Ref	Ref	Ref	Ref
Type of living area at age 65						
Large city	Ref	Ref	Ref	Ref	Ref	Ref
Medium town	0.67 (0.62–0.71)	0.72 (0.67–0.78)	0.73 (0.69–0.77)	0.80 (0.75–0.85)	0.77 (0.73–0.80)	0.85 (0.81–0.89)
Small town	0.66 (0.61–0.70)	0.76 (0.71–0.82)	0.67 (0.64–0.71)	0.78 (0.74–0.83)	0.73 (0.70–0.76)	0.84 (0.81–0.89)
Family situation at age 65						
Married no children at home	Ref	Ref	Ref	Ref	Ref	Ref
Married with children at home	6.16 (2.24–16.94)	4.96 (1.72–14.28)	7.80 (3.15–19.32)	7.34 (2.88–18.73)	7.42 (3.08–17.88)	9.36 (3.83–22.87)
Single with children at home	7.38 (1.85–29.51)	8.80 (2.10–36.94)	15.59 (3.54–68.61)	21.40 (4.71–97.25)	11.50 (2.63–50.27)	12.67 (2.85–56.40)
Single no children at home	1.24 (1.17–1.31)	1.20 (1.14–1.28)	1.34 (1.27–1.40)	1.35 (1.28–1.41)	1.42 (1.37–1.47)	1.45 (1.39–1.50)
Sickness absence when aged 60–64						
No	Ref	Ref	Ref	Ref	Ref	Ref
Yes	0.74 (0.70–0.78)	0.86 (0.81–0.91)	0.70 (0.67–0.73)	0.84 (0.80–0.89)	0.82 (0.79–0.85)	0.87 (0.84–0.90)
Disability pension when aged 60–64						
No	Ref	Ref	Ref	Ref	Ref	Ref
Yes	0.35 (0.31–0.38)	0.39 (0.35–0.43)	0.34 (0.31–0.36)	0.35 (0.33–0.38)	0.37 (0.35–0.40)	0.38 (0.35–0.41)
Men						
Birth Country						
Sweden	Ref	Ref	Ref	Ref	Ref	Ref
Other Nordic	1.07 (0.93–1.23)	0.91 (0.79–1.05)	1.03 (0.92–1.15)	0.92 (0.82–1.03)	1.09 (0.96–1.23)	1.00 (0.87–1.13)
Other EU-27	0.71 (0.63–0.80)	0.79 (0.70–0.90)	0.64 (0.58–0.71)	0.70 (0.63–0.79)	0.67 (0.61–0.74)	0.73 (0.66–0.80)
Rest of World	0.80 (0.66–0.98)	0.73 (0.60–0.90)	0.68 (0.59–0.78)	0.64 (0.55–0.74)	0.83 (0.74–0.93)	0.77 (0.68–0.87)
Educational level						
Elementary	0.43 (0.40–0.45)	0.48 (0.45–0.51)	0.45 (0.43–0.48)	0.51 (0.48–0.54)	0.55 (0.53–0.58)	0.60 (0.57–0.63)

(Continued)

Table 3. (Continued).

	Cohort 2000 (n = 27,634 women, 28,415 men)		Cohort 2005 (n = 32,905 women, 34,894 men)		Cohort 2010 (n = 51,033 women, 47,498 men)	
	Crude OR (CI)	Adjusted OR (CI)	Crude OR (CI)	Adjusted OR (CI)	Crude OR (CI)	Adjusted OR (CI)
High school	0.52 (0.49–0.56)	0.55 (0.52–0.59)	0.55 (0.52–0.58)	0.59 (0.55–0.62)	0.63 (0.60–0.65)	0.66 (0.63–0.68)
University/college	Ref	Ref	Ref	Ref	Ref	Ref
Type of living area at age 65						
Large city	Ref	Ref	Ref	Ref	Ref	Ref
Medium town	0.80 (0.76–0.85)	0.87 (0.82–0.93)	0.85 (0.81–0.89)	0.90 (0.85–0.95)	0.87 (0.84–0.91)	0.91 (0.87–0.95)
Small town/rural	0.80 (0.76–0.85)	0.92 (0.86–0.98)	0.79 (0.75–0.84)	0.89 (0.84–0.94)	0.83 (0.79–0.86)	0.90 (0.86–0.94)
Family situation at age 65						
Married no children at home	Ref	Ref	Ref	Ref	Ref	Ref
Married with children at home	1.95 (1.61–2.37)	1.88 (1.54–2.30)	2.07 (1.75–2.44)	1.97 (1.66–2.34)	2.14 (1.84–2.49)	2.08 (1.78–2.44)
Single with children at home	1.89 (0.96–3.75)	2.29 (1.12–4.69)	1.13 (0.66–1.95)	1.06 (0.60–1.86)	1.73 (1.16–2.58)	1.66 (1.11–2.48)
Single no children at home	0.75 (0.70–0.79)	0.78 (0.74–0.83)	0.75 (0.71–0.78)	0.78 (0.75–0.82)	0.78 (0.75–0.81)	0.80 (0.77–0.83)
Sickness absence when aged 60–64						
No	Ref	Ref	Ref	Ref	Ref	Ref
Yes	0.66 (0.63–0.70)	0.85 (0.81–0.90)	1.51 (1.45–1.58)	0.89 (0.85–0.94)	0.77 (0.74–0.80)	0.90 (0.87–0.94)
Disability pension when aged 60–64						
No	Ref	Ref	Ref	Ref	Ref	Ref
Yes	0.37 (0.34–0.40)	0.43 (0.40–0.47)	0.31 (0.29–0.34)	0.36 (0.33–0.38)	0.31 (0.29–0.34)	0.34 (0.32–0.37)



Table 4. Crude and mutually adjusted odds ratios (OR) and 95% confidence interval (CI) of having sickness absence (SA) among those in paid work aged 66–71, in the three cohorts among those who lived in Sweden, turned 65 in 2000, 2005, or 2010, and were in paid work at some point when aged 60–64, presented for all, and stratified by sex.

	Cohort 2000 (n = 6280 women, 9806 men)		Cohort 2005 (n = 11,017 women, 15,782 men)		Cohort 2010 (n = 20,252 women, 27,246 men)	
	Crude OR (CI)	Adjusted OR (CI)	Crude OR (CI)	Adjusted OR (CI)	Crude OR (CI)	Adjusted OR (CI)
Sex						
Women	Ref	Ref	Ref	Ref	Ref	Ref
Men	1.19 (1.02–1.38)	1.34 (1.15–1.57)	0.96 (0.85–1.07)	1.10 (0.98–1.24)	1.00 (0.93–1.08)	1.11 (1.02–1.21)
Birth Country						
Sweden	Ref	Ref	Ref	Ref	Ref	Ref
Other Nordic	1.25 (0.86–1.81)	1.12 (0.77–1.63)	1.49 (1.15–1.94)	1.26 (0.96–1.64)	2.13 (1.72–2.64)	1.94 (1.56–2.41)
Other EU-27	1.17 (0.84–1.63)	1.10 (0.79–1.54)	1.26 (0.96–1.64)	1.17 (0.89–1.54)	1.43 (1.19–1.71)	1.32 (1.10–1.58)
Rest of World	1.71 (1.02–2.86)	1.46 (0.87–2.47)	2.01 (1.45–2.79)	1.62 (1.16–2.26)	2.07 (1.66–2.58)	1.80 (1.44–2.26)
Educational level						
Elementary	0.95 (0.79–1.13)	0.97 (0.81–1.17)	0.91 (0.79–1.05)	1.00 (0.87–1.16)	1.04 (0.93–1.15)	1.06 (0.95–1.18)
High school	1.02 (0.86–1.22)	1.04 (0.87–1.24)	0.91 (0.80–1.04)	0.96 (0.84–1.09)	0.99 (0.91–1.09)	1.00 (0.91–1.10)
University/college	Ref	Ref	Ref	Ref	Ref	Ref
Type of living area at age 65						
Large city	Ref	Ref	Ref	Ref	Ref	Ref
Medium town	0.68 (0.57–0.81)	0.69 (0.58–0.82)	0.67 (0.59–0.76)	0.70 (0.61–0.80)	0.74 (0.67–0.81)	0.78 (0.71–0.85)
Small town/rural	0.64 (0.53–0.76)	0.64 (0.53–0.77)	0.54 (0.47–0.62)	0.56 (0.49–0.65)	0.70 (0.63–0.77)	0.73 (0.66–0.81)
Family situation at age 65						
Married no children at home	Ref	Ref	Ref	Ref	Ref	Ref
Married with children at home	1.48 (0.87–2.51)	1.27 (0.74–2.18)	1.73 (1.18–2.54)	1.55 (1.05–2.29)	2.18 (1.67–2.84)	1.92 (1.47–2.51)
Single with children at home	0.99 (0.13–7.33)	1.09 (0.15–8.14)	2.63 (0.93–7.38)	2.21 (0.78–6.30)	0.89 (0.33–2.44)	0.76 (0.28–2.08)
Single no children at home	1.26 (1.08–1.47)	1.25 (1.07–1.46)	1.57 (1.40–1.76)	1.48 (1.32–1.66)	1.37 (1.26–1.48)	1.30 (1.20–1.41)
Sickness absence when aged 60–64						
No	Ref	Ref	Ref	Ref	Ref	Ref
Yes	2.00 (1.73–2.31)	2.16 (1.86–2.51)	1.93 (1.73–2.16)	2.11 (1.88–2.37)	2.14 (1.98–2.32)	2.15 (1.98–2.33)
Disability pension when aged 60–64						
No	Ref	Ref	Ref	Ref	Ref	Ref
Yes	0.92 (0.70–1.21)	0.69 (0.52–0.92)	0.69 (0.56–0.86)	0.52 (0.42–0.65)	1.05 (0.87–1.28)	0.83 (0.68–1.01)
Women						
Sweden	Ref	Ref	Ref	Ref	Ref	Ref
Other Nordic	1.59 (0.90–2.78)	1.26 (0.70–2.25)	2.01 (1.36–2.95)	1.60 (1.08–2.37)	2.06 (1.47–2.90)	1.82 (1.29–2.58)

(Continued)

Table 4. (Continued).

	Cohort 2000 (n = 6280 women, 9806 men)		Cohort 2005 (n = 11,017 women, 15,782 men)		Cohort 2010 (n = 20,252 women, 27,246 men)	
	Crude OR (CI)	Adjusted OR (CI)	Crude OR (CI)	Adjusted OR (CI)	Crude OR (CI)	Adjusted OR (CI)
Other EU-27	0.96 (0.58-1.59)	0.99 (0.58-1.69)	1.17 (0.78-1.75)	1.05 (0.70-1.58)	1.54 (1.21-1.96)	1.42 (1.11-1.81)
Rest of World	2.26 (0.92-5.54)	1.94 (0.76-4.95)	1.41 (0.68-2.90)	1.08 (0.52-2.25)	1.85 (1.27-2.69)	1.66 (1.14-2.43)
<i>Educational level</i>						
Elementary	0.79 (0.59-1.07)	0.90 (0.66-1.22)	0.83 (0.66-1.04)	0.99 (0.79-1.25)	0.93 (0.79-1.10)	1.02 (0.86-1.20)
High school	0.83 (0.63-1.11)	0.89 (0.66-1.18)	0.89 (0.73-1.08)	0.98 (0.80-1.19)	0.87 (0.76-0.99)	0.90 (0.78-1.03)
University/college	Ref	Ref	Ref	Ref	Ref	Ref
<i>Type of living area at age 65</i>						
Large city	Ref	Ref	Ref	Ref	Ref	Ref
Medium town	0.74 (0.56-0.98)	0.79 (0.60-1.05)	0.56 (0.46-0.68)	0.60 (0.49-0.73)	0.75 (0.65-0.86)	0.81 (0.70-0.94)
Small town	0.54 (0.40-0.74)	0.61 (0.44-0.84)	0.49 (0.39-0.61)	0.53 (0.43-0.67)	0.67 (0.57-0.77)	0.73 (0.62-0.85)
<i>Family situation at age 65</i>						
Married no children at home	Ref	Ref	Ref	Ref	Ref	Ref
Married with children at home	2.89 (0.37-22.73)	3:18 (0.40-25.41)	Too few	Too few	Too few	Too few
Single with children at home	Too few	Too few	2.19 (0.29-16.83)	2.49 (0.32-19.38)	Too few	Too few
Single no children at home	1.60 (1.25-2.03)	1.46 (1.15-1.87)	2.08 (1.75-2.48)	1.88 (1.58-2.25)	1.73 (1.53-1.95)	1.59 (1.41-1.80)
<i>Sickness absence when aged 60-64</i>						
No	Ref	Ref	Ref	Ref	Ref	Ref
Yes	2.29 (1.80-2.92)	2.51 (1.96-3.20)	1.89 (1.59-2.25)	2.01 (1.68-2.40)	2.07 (1.83-2.34)	2.02 (1.79-2.29)
<i>Disability pension when aged 60-64</i>						
No	Ref	Ref	Ref	Ref	Ref	Ref
Yes	0.43 (0.22-0.85)	0.33 (0.17-0.64)	0.63 (0.45-0.86)	0.49 (0.35-0.67)	1.04 (0.79-1.36)	0.85 (0.65-1.12)
<i>Men</i>						
<i>Birth Country</i>						
Sweden	Ref	Ref	Ref	Ref	Ref	Ref
Other Nordic	1.14 (0.71-1.84)	1.07 (0.65-1.75)	1.23 (0.86-1.75)	1.06 (0.74-1.52)	2.18 (1.66-2.87)	2.00 (1.52-2.65)
Other EU-27	0.95 (0.63-1.44)	1.19 (0.78-1.82)	1.33 (0.93-1.91)	1.28 (0.89-1.83)	1.30 (0.99-1.72)	1.20 (0.91-1.59)
Rest of World	1.29 (0.71-2.37)	1.32 (0.70-2.49)	2.27 (1.57-3.30)	1.85 (1.26-2.71)	2.20 (1.68-2.89)	1.88 (1.42-2.48)
<i>Educational level</i>						
Elementary	1.04 (0.83-1.30)	1.04 (0.82-1.32)	0.97 (0.81-1.17)	1.02 (0.84-1.23)	1.13 (0.99-1.30)	1.13 (0.98-1.29)
High school	1.16 (0.92-1.45)	1.16 (0.92-1.45)	0.94 (0.79-1.13)	0.95 (0.79-1.14)	1.12 (0.99-1.27)	1.11 (0.98-1.26)
University/college	Ref	Ref	Ref	Ref	Ref	Ref
<i>Type of living area at age 65</i>						
Large city	Ref	Ref	Ref	Ref	Ref	Ref
Medium town	0.64 (0.52-0.79)	0.64 (0.51-0.79)	0.76 (0.64-0.90)	0.78 (0.66-0.93)	0.73 (0.65-0.83)	0.76 (0.67-0.86)

(Continued)

Table 4. (Continued).

	Cohort 2000 (n = 6280 women, 9806 men)		Cohort 2005 (n = 11,017 women, 15,782 men)		Cohort 2010 (n = 20,252 women, 27,246 men)	
	Crude OR (CI)	Adjusted OR (CI)	Crude OR (CI)	Adjusted OR (CI)	Crude OR (CI)	Adjusted OR (CI)
Small town	0.67 (0.54–0.83)	0.65 (0.52–0.82)	0.58 (0.48–0.70)	0.60 (0.49–0.72)	0.72 (0.63–0.82)	0.74 (0.65–0.84)
<i>Family situation at age 65</i>						
Married no children at home	Ref	Ref	Ref	Ref	Ref	Ref
Married with children	1.30 (0.75–2.25)	1.20 (0.69–2.09)	1.68 (1.14–2.48)	1.53 (1.03–2.27)	2.13 (1.63–2.78)	1.91 (1.46–2.51)
Single with children	1.20 (0.16–9.07)	1.31 (0.17–9.96)	2.81 (0.84–9.34)	2.07 (0.61–7.05)	1.00 (0.37–2.75)	0.86 (0.31–2.38)
Single no children at home	1.14 (0.93–1.40)	1.10 (0.89–1.35)	1.24 (1.06–1.46)	1.20 (1.02–1.41)	1.12 (1.00–1.26)	1.08 (0.96–1.22)
<i>Sickness absence when aged 60–64</i>						
No	Ref	Ref	Ref	Ref	Ref	Ref
Yes	1.90 (1.59–2.28)	1.97 (1.63–2.38)	1.97 (1.71–2.29)	2.17 (1.86–2.52)	2.23 (2.00–2.47)	2.22 (2.00–2.47)
<i>Disability pension when aged 60–64</i>						
No	Ref	Ref	Ref	Ref	Ref	Ref
Yes	1.15 (0.85–1.55)	0.89 (0.65–1.22)	0.76 (0.56–1.02)	0.55 (0.41–0.75)	1.07 (0.81–1.41)	0.80 (0.61–1.06)

Those with sickness absence when aged 60–64 were slightly less likely to be in paid work when aged 66–71 in all three cohorts among both women (OR range 0.84–0.87) and men (range OR 0.85–0.90). Those with any disability pension when aged 60–64 were substantially less likely to be in paid work when aged 66–71 (OR range women 0.35–0.39; men 0.36–0.43).

Associations with having sickness absence aged 66-71

Among those in paid work after age 65, men were more likely to have sickness absence than women in the 2000 cohort (1.34, 1.15–1.57), although this was not significant in the 2005 cohort (1.10, 0.98–1.24), and only just significant in the 2010 cohort (1.11, 1.02–1.21).

Women who were born in “other Nordic countries” were more likely to have sickness absence after age 65 in all cohorts. This was insignificant in the 2000 cohort, while the effect size increased slightly between the other two cohorts (2005 1.60, 1.08–2.37; 2010 1.82, 1.29–2.58). For men, being born in the “rest of the world” was associated with a higher risk in the 2005 and 2010 cohorts (2005 1.85, 1.26–2.71; 2010 1.88, 1.42–2.48), but not in the 2000 cohort. There were no significant associations between educational level and sickness absence among those in paid work after age 65.

Having had sickness absence when aged 60–64 was associated with at least a doubled risk of sickness absence after age 65 among both women and men, in all three cohorts. On the other hand, having any disability pension when aged 60–64 was by far the strongest predictor of not having sickness absence after age 65 among both women and men who remained in paid work.

Discussion

In this population-based longitudinal cohort study of all who turned 65 in 2000, 2005, or 2010, we found that the proportion in paid work after 65 increased over time, while the proportion with sickness absence after age 65 increased only marginally from the 2000 to 2010 cohorts. Being a man, having high education, being born in Sweden, living in a large city, and having no prior sickness absence or disability pension was associated with being in paid work after age 65. Among those in paid work after age 65, being born in the “Nordic countries outside Sweden” for women, and in “EU-27 outside the Nordic countries” or in “the rest of the world” for men, and living in a large city, having prior sickness absence, and no prior disability pension was associated with having sickness absence.

We found that the sickness absence rates when aged 60–64 were higher in the 2005 cohort than the 2010 cohort, and, for women, also higher in the 2005 cohort than in the 2000 cohort. This is in line with the general trend of SA rates in all ages in Sweden during that time, although the reasons for this trend

are not well understood (The Swedish Social Insurance Agency, 2020). The decline in DP from the 2005 to 2010 cohort could be due to that stricter criteria for granting DP were introduced in 2008 (The Swedish Social Insurance Agency, 2020).

Our results indicate that educational level is associated with working past age 65, and birth country is associated with both working past age 65 and with having sickness absence when working past age 65. This reinforces raised concerns about whether raised retirement ages will contribute to widened health and social inequalities in later life (Halleröd, 2016; Majer et al., 2011). Since educational level is associated with remaining in paid work, as shown by our research and others (Fisher et al., 2016), and also inversely associated with morbidity and sickness absence (Bambra, 2011; Piha et al., 2010; Stirbu et al., 2010), there is a risk that educational level and morbidity interact to exacerbate potential inequalities, such that those with lower education are both at higher risk of morbidity and sickness absence, which may compound their risk of leaving the labor market at or before traditional retirement age.

We also found differences in both working past age 65 and sickness absence after age 65 by birth country. Previous research has also shown inequalities at older ages in morbidity (Folkhälsomyndigheten, 2019) and labor market participation (Flood & Mitrut, 2010) by birth country. It is possible that there are also interaction effects here, where the effects of morbidity on work ability or work participation are exacerbated by birth country. It is also possible, given that we found slightly higher sickness absence rates among those born in outside EU-27 among men in 2005 and 2010, and among women in 2010, that those groups are more likely to work after the age of 65 with various kinds of morbidity that impair the work capacity, than other groups, potentially due to low pension accruals in this group (Flood & Mitrut, 2010). This may indicate that they are more likely to work due to a financial need rather than enjoyment than other groups, although further research is needed to determine if this is actually the case. It is important to keep these aspects of inequality in mind and ensure that the expansion of work at higher ages does not lead to widened inequalities.

There were fewer significant associations between the sociodemographic factors and having sickness absence after the age of 65 than of being in paid work. This is partly due to the smaller cohort (those that were in paid work vs. all who turned 65 during a specific year) leading to wider CIs. However, in some cases, e.g., related to educational level, the non-significance was also due to ORs being very close to 1. This suggests that sociodemographic differences in working after age 65 are larger than sociodemographic differences in sickness absence among those working beyond 65, which is in line with findings from a previous prospective study of sickness absence after the age of 65 (Farrant et al., 2017b). This finding indicates that the health selection of working after the age of 65 years is similar in different sociodemographic groups.

Also, there were no major differences in the association between sociodemographic factors and working after age 65 between the three cohorts. There were some differences between the cohorts regarding birth country, but overall our results suggest that there have not been substantial changes in how sociodemographic factors are associated with being paid work after age 65 between the three cohorts.

Farrants et al. (2017b) found that sociodemographic differences in general were larger in the 2005 cohort than the 2000 cohort of people turning 65, indicating that health selection effects might become less severe as working after 65 years becomes more common. However, in this study we found that although the proportion with sickness absence increased (very) marginally between the cohorts, we did not find successively larger sociodemographic differences in sickness absence after age 65 in the three cohorts, with one exception: birth country. Being born in the “Nordic countries except Sweden” was associated with a successively higher risk of sickness absence by birth cohort among women, and being born in the “EU-27 outside the Nordic countries” or in the “rest of the world” was associated with a successively higher risk of sickness absence among men. The differences in results may be due to improved analyses regarding three aspects: prior sickness absence or disability pension were included in the analysis; analyses have been adjusted; the base cohorts were here followed up for one more year; and we added an additional cohort (for the year 2010).

Men were slightly more likely to have sickness absence after the age of 65, contrary to findings on populations below 65 (Allebeck & Mastekaasa, 2004; Beemsterboer et al., 2009). This could indicate that health selection is stronger among women than men. However, the strength of the associations between prior sickness absence and disability pension, and being in paid work after 65, were of similar magnitudes among women and men, which speaks against this.

There were some factors where the associations were in the same direction for both being in paid work and having sickness absence after age 65, such as having disability pension when aged 60–64 and living in a medium-sized town or small town/rural being negatively associated both with being in paid work and with having sickness absence after age 65. For other factors, the associations for having paid work after 65 and having sickness absence among those who were in paid work were in the opposite directions, such as having sickness absence before age 65 and being born outside EU-27, which were negatively associated with being in paid work and positively associated with having sickness absence after 65, although birth country was only significant in the 2010 cohort. The reasons for these differences need further investigations.

That neither sickness absence rates among those who worked beyond 65 nor associations between sociodemographic factors and sickness absence after 65 increased between the cohorts despite the large increase in numbers and proportion with paid work indicate that there may be a health potential to extend

working lives, and that there are many in all sociodemographic groups who retire with good health. However, the extent of this hypothesized work capacity is unknown, and it is also unknown whether further increases of the pension age will mean that sociodemographic inequalities in sickness absence will emerge resembling those found in younger age groups (Allebeck & Mastekaasa, 2004).

Our finding that sickness absence and disability pension before age 65 are differently associated with having sickness absence after age 65 is particularly notable. It may be that those who remain in paid work having had prior sickness absence and disability pension are different in the ways in which they continue working, related to extent (full- or part-time) of sickness absence or disability pension, type of work (blue/white-collar), sector (public/private), branch of industry, employed/self-employed, and working conditions, and that this influences their ability to keep working with the morbidity that lead to their previous sickness absence or disability pension. It may also be that their patterns or severity of morbidity differ, which might influence their future sickness absence. Since sickness absence is granted for temporary work incapacity and disability pension is granted for permanent work incapacity, it seems likely that the morbidity among those with sickness absence led to less severe or more recurrent work incapacity, that might prevail after aged 65, whereas those with disability pension had more long-standing health problems that might lead to them withdrawing completely from the labor market when their health deteriorates. This should also be studied further, both regarding extent and duration of previous sickness absence and disability pension as well as regarding type of diagnoses.

Implications for policy

Our finding that the proportion who had sickness absence after age 65 and the strength of the associations between prior sickness absence or disability pension and being in paid work after the age of 65 were very similar in all three cohorts indicates that despite a large increase in labor market participation, health selection does not seem to have increased to such a large extent. This indicates that there may be a health potential for further increases of the retirement age. However, this potential may not be evenly distributed, as shown by the differences by sociodemographic factors (such as educational level and birth country) and prior morbidity we found in both working past 65 and in having sickness absence past 65. The possibilities to remain in paid work with different health conditions need to be strengthened in order to avoid increasing health and income inequalities when raising the retirement age.

Strengths and limitations

The main strengths of this study is that it includes the entire population of Sweden that turned 65 years in 2000, 2005, or 2010 via microdata linked at individual level from two nationwide registers of good quality (Ludvigsson et al., 2016, 2019), the longitudinal design, including data for 12 years for the same individuals both before and after the standard retirement age, for not only one but three different cohorts from different periods, no loss to follow-up, administrative data (no self-reports hampered by possible recall bias), the access to detailed data, and the large cohorts, allowing for several sub-group analyses.

Limitations are that we may have unmeasured confounding from work-related factors. Sickness absence and disability pension are measured as fairly crude binary indicators; future studies should include sickness absence or disability pension by diagnosis groups, of different extents (e.g., full- vs. part-time), and different lengths. Since we excluded those not in paid work when aged 60–64, we probably have a health selection effect in our cohorts, as those with poorer health might not be in paid work even at age 60. It can be seen as both a strength and a limitation that only sickness absence spells > 14 days were included as, e.g., short-term infections were excluded. We also did not include information on occupation (e.g., blue- vs. white-collar occupations). This is an important factor that future research should address.

Conclusions

There were substantial sociodemographic differences in paid work after age 65, relating to education and birth country: however, when it comes to sickness absence among those in paid work, the differences in education were attenuated while those regarding birth country remained. Sickness absence and disability pension when aged 60–64 are associated with both paid work after 65, and among those in paid work, with sickness absence when aged 66–71: sickness absence is negatively associated with working past 65, and positively associated with having sickness absence after 65, whereas disability pension is negatively associated with both. This shows that work incapacity is related in different and complex ways to future work and work capacity at higher ages, and needs to be studied further.

Data availability statement

These data cannot be made publically available due to privacy regulations. According to the General Data Protection Regulation, the Swedish law SFS 2018:218, the Swedish Data Protection Act, the Swedish Ethical Review Act, and the Public Access to Information and Secrecy Act, these type of sensitive data can only be made available for specific purposes,

including research, that meets the criteria for access to this type of sensitive and confidential data as determined by a legal review. Readers may contact Professor Kristina Alexanderson (kristina.alexanderson@ki.se) regarding the data.

Ethics approval

The project was approved by the Regional Ethical Review Board in Stockholm (document no. 2007/762-31, 2009/1917-32, 2016/1533-32).

Informed consent

In this observational study, based on population-based de-identified register microdata, informed consent was not applicable.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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