

# The Association Between Mid-Life Socioeconomic Position and Health After Retirement—Exploring the Role of Working Conditions

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## Abstract

**Objective:** To explore the role of working conditions in the association between socioeconomic position and health after retirement age using over 20 years follow-up. **Method:** Two Swedish nationally representative Level of Living Surveys (total  $N = 1,131$ ) were used. Ordered logistic regression was used to assess the association between socioeconomic position and health (self-rated health, psychological distress, musculoskeletal pain, circulatory problems, physical and cognitive impairment). The role of physical and psychological working conditions was also assessed. **Results:** Lower socioeconomic position was associated with more adverse physical, but not psychological, working conditions. Physical working conditions partially explained the differences in physical impairment and musculoskeletal pain in old age attributed to socioeconomic position, but not differences in self-rated health, circulatory problems, psychological distress, and cognitive

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impairment. Socioeconomic position was a stronger correlate of health than psychological working conditions alone. **Discussion:** Improving physical working conditions may be important for reducing the influence of socioeconomic position on health after retirement.

### **Keywords**

physical working conditions, psychological working conditions, socioeconomic position, health, old age, after retirement age

As a result of a population aging, with a demographic shift toward a higher proportion of older persons and a lower proportion of working-age individuals, raising the retirement age, in order to compensate for the greater average life expectancy is a probable scenario in several countries (Christensen, Doblhammer, Rau, & Vaupel, 2009). As most individuals spend a significant part of their lives at work, a cause for concern, particularly when working longer, is the potential prolonged exposure to adverse working conditions that might affect health in later life.

Working conditions may contribute to the development of social inequalities in health; there is ample research showing the association between adverse working conditions and poor health (Ahola et al., 2012; Aittomäki, Lahelma, Rahkonen, Leino-Arjas, & Martikainen, 2007; Andel et al., 2012; Molarius et al., 2006). Furthermore, the distribution of adverse work conditions across the working population have been shown to be socially patterned, in that these conditions are more prevalent among persons with a lower educational attainment and among those with a lower occupation-based class (National Board of Health and Welfare, 2009). Persons with lower socioeconomic position more often have poorer health than those with a higher socioeconomic position (Åberg Yngve, 2005; Mackenbach, Kunst, Cavelaars, Groenhouf, & Geurts, 1997; Marmot & Wilkinson, 2006; Marmot et al., 1991; National Board of Health and Welfare, 2009). For example, individuals who hold positions that involve lower qualifications are more likely to be exposed to adverse psychological and physical working conditions such as noise, chemicals, heavy lifting, static load, repetitive/monotonous tasks, and stress that in turn might exacerbate poor health (Siegrist & Theorell, 2006). Further, persons exposed to such conditions will be less able to work until, and after retirement age (National Board of Health and Welfare, 2009; Swedish Government Official Reports [SOU], 2002).

Some have posited that working conditions account at least partially for the association between socioeconomic position and physical health (Aittomäki et al., 2007; Mehlum, Kristensen, Kjuus, & Wergeland, 2008; Warren, Hoonakker, Carayon, & Brand, 2004). Others (Bauer, Huber, Jenny, Muller, & Hämmig, 2009; Rahkonen et al., 2012) have shown that working conditions explain socioeconomic differences in self-rated health. Moreover, socioeconomic position has been suggested to contribute to the differences in the relationship between psychological working conditions and cognition (e.g., Andel et al., 2011). A stressful and physically demanding job is, however, common amongst people of all socioeconomic positions, but unlike most other working conditions, studies suggest that it is more common among higher nonmanual workers in a managerial position (Niedhammer, Chastang, David, & Kelleher, 2008).

Research relating to socioeconomic health differences is typically based on various measures of socioeconomic position, including education, occupation-based social class, and income (Galobardes, Lynch, Davey Smith, 2007; Galobardes, Shaw, Lawlor, Lynch, & Davey Smith, 2006a, 2006b), with results potentially diverging as a function of how socioeconomic position was represented (Galobardes et al., 2007; Hallqvist, Lynch, Bartley, Lang, & Blane, 2004; Karp et al., 2004; Molarius et al., 2006). In the present study education and occupation-based social class are studied as origins of work-related inequalities in health.

Education is arguably the most encompassing measure of socioeconomic position as it bridges parent's socioeconomic position to own adult socioeconomic position and tends to affect a range of life chances and living conditions through the life course (Fors, Lennartsson, & Lundberg, 2009; Galobardes et al., 2007; Monden, 2005). Moreover, level of education is a major determinant of an individual's future occupation (Galobardes et al., 2007). Occupation-based social class, in turn, is a measure partly associated with occupational risks (Monden, 2005) that can have long-lasting effects that may extend beyond retirement (Karp et al., 2004). Studies so far have not attempted to examine socioeconomic position in relation to a comprehensive set of health factors in later life within one study, nor the combined influence of socioeconomic position and working conditions on health after retirement. Hence, the main objective of this study was to explore the role of working conditions in the association between socioeconomic position and health after retirement age using over 20 years follow-up using two measures of socioeconomic position (education and occupation-based social class) and six measures of health (self-rated health, psychological distress, musculoskeletal pain, circulatory problems, physical and cognitive impairment). By including self-reported as well as objective measures of health, we were able

to obtain a uniquely comprehensive picture of these associations. In addition, we explored the contribution of both physical and psychological working conditions to any association between socioeconomic position and health.

## **Method**

### *Data*

We used the Swedish Level of Living Surveys (LNU) from 1968 and 1981 and the Swedish Longitudinal Study of Living Conditions of the Oldest Old (SWEOLD) from 1992, 2002, and 2004. LNU consists of a nationally representative sample of the Swedish population between the ages 15 and 75. SWEOLD, also representative on a national level, is a continuation of the LNU and consists of those participants from the LNU sample who reach age of at least 77 years at the time of SWEOLD data collection. Age of 69 years and above was used in the 2004 survey.

Face-to-face interviews were used for data collection in the 1992 and 2002 surveys. Telephone interviews were used for the 2004 survey. Proxy interviews (a family member or a caseworker who knew the individual well because such a proxy is familiar with the interviewee's health) were conducted if direct interviews were impossible due to poor health or cognition.

For the purposes of this study, a longitudinal data set was constructed resulting in three waves. The first wave was a combination of the 1968 LNU survey and the 1992 SWEOLD survey, the second wave a combination of the 1981 LNU survey and the 2002 SWEOLD survey, and the third wave a combination of the 1981 LNU survey and the 2004 SWEOLD survey, resulting in follow-up times of 21 or more years.

Housewives, unemployed persons, students, or others without gainful employment were excluded because their working conditions could not be assessed.

Due to the selection process for the SWEOLD surveys, 226 people were interviewed both in 2002 and 2004, subsequent the 2004 responses were excluded, if interviewed in 2002. This resulted in a total sample of 1,131 respondents with valid information for at least one health outcome. Ages ranged from 46 to 64 at baseline and from 69 to 88 at follow-up (born between 1904 and 1935); 329 respondents were interviewed in 1968 and 1992; 284 respondents were interviewed in 1981 and 2002, and 518 respondents in the 1981 and 2004 period.

### *Measures of Health*

Self-reported as well as objective measures of health were used.

**Self-Reported Measures.** **Global self-rated health** was assessed using a single item question: *How do you assess your general state of health? Is it good, poor or in-between?*, coded as 0 (good), 1 (in-between) and 2 (poor).

**Psychological distress** was assessed using an index comprising of four items concerning fatigue (general fatigue lasting at least 14 days or occurring in the morning/during the day/in the evening, coded as 3 (four yes answers), 2 (three yes answers), 1 (two yes answers), and 0 (one or no yes answer, as feeling occasionally tired may be considered normal) and three items concerning psychological well-being (having difficulties sleeping, nervous problems, and depression/deep sadness), with each item coded as 0 (No), 1 (yes, mild problems) and 2 (yes, severe problems), resulting in a scale from 0 to 6, with an overall index of psychological distress ranging from 0 (none) to 9 (high score on all seven items).

**Musculoskeletal pain and circulatory problems** was assessed using the question *Have you had any of the following illnesses or ailments during the last 12 months?* The responses were coded as 0 (no), 1 (yes, mild problems) and 3 (yes, severe problems). The score of 3 was used for severe problems based on preliminary analyses indicating that it was about twice as debilitating to have severe problems compared to mild problems than to have mild problems compared to no problems (Meinow, Parker, Kåreholt, & Thorslund, 2006).

**Musculoskeletal pain** was assessed using an index comprising of three items: *shoulder pain, back pain or sciatica, pain in hands, elbows, feet or knees* scored from 0 (none) to 9 (severe on all items).

**Circulatory problems** were assessed using an index comprising of five items: *pain or ache in the chest, thrombus in the heart, myocardial infarction, high blood pressure, and stroke*. Due to the grave nature of *myocardial infarction* and *stroke*, these health problems were weighted higher and coded as 0 (no), 2 (yes, mild problems) and 6 (yes, severe problems.) The aggregated index ranged from 0 (none) to 21 (severe on all items).

**Objective Measures.** **Physical impairment** was assessed using an index comprising of nine tests intended for evaluating specific movements required to perform daily activities. The tests were: to rise from a kitchen chair without using the hands; to pick a pencil up from the floor from a standing position; to reach the right toes with the left hand and vice versa from a sitting position; to touch the right ear lobe with the left hand and vice versa; to lift a one kilogram weight from elbow height to shoulder height; to place the hands palm-down under the thighs; and to rotate the hands with outstretched arms. Performances were coded as 0 = *performed without difficulty*; 1 = *performed*

with difficulty; and 2 = unable to perform. The aggregated index ranged from 0 to 18 (unable to perform on any test).

In 2004, the SWEOLD surveys were done solely by telephone; so tests of physical impairment were not performed. Data from SWEOLD refer only to 1992 and 2002.

**Cognitive impairment** was assessed using an index comprising of an abridged version of the Mini-Mental State Examination (Folstein, Folstein, & McHugh, 1975), previously validated in the SWEOLD data set (Parker, Gatz, & Thorslund, 1996). The test includes registration (immediate repetition of three words: 1 point), orientation (year, month, date, country: 4 points), memory (repeating the previously listed three words: 3 points) and concentration (subtract seven from one hundred five times: to avoid a greater influence from this item, each correct subtraction results in 0.4 points and a maximum of 2 points). The present study reversed values traditionally assigned to this measure, so higher scores indicated greater cognitive impairment. The aggregated index ranged from 0 to 10 (unable to perform on any test).

### Socioeconomic Position

Socioeconomic position was measured by education and occupation-based social class. Along with working conditions, these data were based on self-reports of the current situation at the time of baseline interviews in 1968 and 1981, when respondents were still in the workforce.

**Education** was divided into two categories: *lower education* (mandatory education only, which at most was 6, 7, or 8 years of schooling based on cohort) and *higher education* (more than mandatory education).

The **occupation-based social class measure** applied the Swedish standard for socioeconomic classifications (SEI; Statistics Sweden, 2012a) and was divided into two categories: *manual workers* (unskilled and semiskilled workers, skilled workers, small-scale farmers, and self-employed without employees) and *nonmanual workers* (lower, mid-level, and higher nonmanual workers, large-scale farmers, self-employed professionals with at least one employee and higher civil servants and professionals). Manual workers are usually included in the group with occupations that are of concern for the Swedish Trade Union Confederation, while the other employees are in the group of nonmanual workers.

### Measures of Working Conditions

Physical and psychological working conditions were measured using aggregated indices in which affirmative answers were coded as 1.

**Physical working conditions** were assessed by asking the question: *In your work situation, are you exposed to gas, dust, smoke, noise, and/or heavy lifting?* The index ranged from 0 to 3 (exposed to all items).

**Psychological working conditions** were assessed by asking the question: *Is your work mentally taxing, stressful, repetitious, monotonous, or mentally exhausting?* The index ranged from 0 to 4 (exposed to all items).

All independent variables—except for the measures of socioeconomic position (dichotomous)—were given a linear representation, that is, the likelihood (expressed as beta-coefficients) that a respondent reports poor health increase linearly with each additional unit in indices. If the analyses indicated that a linear representation regarding working conditions was inappropriate (by testing a linear effect in a dummy-coded variable) then for the physical working conditions, the original 0 to 2 categories were assigned to good, and 3 was assigned to poor. For the psychological working conditions, the original 0 to 2 categories were assigned to good, and 3 to 4 were assigned to poor. Specifically, the measure of physical working conditions did not follow a linear progression for psychological distress and musculoskeletal pain (in the models with social class for years 2002 and 2004), and the measure of psychological working conditions for physical impairment, and were therefore dichotomized.

### *Statistical Methods*

Ordered logistic regression was used in the main analyses; covariates were age, sex, and survey year. Unlike binary logistic regressions, ordered logistic regression can analyze outcome variables of more than two categories if they can be ranked (e.g., where poor health outcomes can be expressed in several categories such as good, bad, or in-between). Unlike linear regression there is no assumption of equal step sizes with respect to the outcome. Coefficients from ordered logistic regression correspond to the result of a weighed value of a series of binary logistic regression and can be presented as an overall beta-coefficient. The coefficient gives the change when the independent variable changes by one unit, while all other variables are held constant. The beta-coefficient shows the effect of having a higher value in the dependent variable (e.g., reporting self-rated health as *bad* rather than *in-between*). For variables given dummy representation, the coefficient indicates the difference relative to the reference category (e.g., manual worker compared with nonmanual worker). For independent variables given linear representation, the coefficient indicates the change for each value of the variable.

Results were adjusted for age, sex, and year of SWEOLD data collection in Model I. Models II and III were additionally adjusted for physical (Model II)

and psychological (Model III) working conditions. Since covariation (measured in terms of Spearman's rho) between physical and psychological working conditions was close to zero (0.042), highlighting the difference between the two constructs, adjusting for both measures of working conditions within one model was considered superfluous.

Models II and III also show a change in the beta-coefficient between Model I and Model II or III, expressed as the percentage value reflecting the extent to which physical or psychological working conditions account for the association between socioeconomic position and health. A negative value means that the association between socioeconomic position and health increases when working conditions is controlled for. We might infer from this that nothing of the association is explained and that socioeconomic differences in health would be greater if working conditions were the same.

The interaction between sex and socioeconomic position was not significant for any health outcome whereby the analyses were based on a combined sample of men and women. Similarly, there was no significant interaction between survey year and socioeconomic position except for the association between social class and musculoskeletal pain. Therefore, results are reported separately for 1992 and 2002/2004.

## **Results**

As shown in Table 1, about 26% of the 1992 sample, 40% of the 2002 sample, and 57% of the 2004 sample reported more than mandatory education. This increase is partially attributable to the lower age threshold in 2004 (age 69). The difference between 1992 and 2002, in turn, is due to the actual changes in the proportion of individuals with higher education. Correspondingly, the proportion of manual workers decreased from 64% in 1992 to about 50% in 2002 and 2004. For all three periods, about 50% of the respondents reported they had not been subject to any of the negative aspects of physical working condition, while 5% to 7% reported that they had been subjected to all negative aspects. About 2% to 3% reported having been subjected to all four negative aspects of psychological working conditions. And the proportion of respondents who reported that they had been subjected to adverse physical working conditions noticeably declined over time, from 52% (100% to 48.3%) in 1992 to 42% in 2004. But the proportion of respondents who reported having been subjected to adverse psychological working conditions was greater and increased over time.

Table 2 displays results from the main analyses, presented as beta-coefficients. All three models contain the same observations per each outcome. Overall, the results show that low socioeconomic position was associated



**Table 1.** Descriptive Statistics (*n* = 1,131).

Variables	1992 ( <i>n</i> = 329)		2002 ( <i>n</i> = 284)		2004 ( <i>n</i> = 518)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
<b>Self-rated health</b>						
Good	172	56.8	118	41.5	298	57.5
In-between	98	32.3	117	41.2	174	33.6
Poor	33	10.9	28	9.9	44	8.5
<b>Psychological distress</b>						
Minimum		0		0		0
Maximum		9		9		9
<b>Musculoskeletal pain</b>						
Minimum		0		0		0
Maximum		9		9		9
<b>Circulatory problems</b>						
Minimum		0		0		0
Maximum		10		14		13
<b>Physical impairment<sup>1,2</sup></b>						
Minimum		0		0		NA
Maximum		18		18		NA
<b>Cognitive impairment<sup>2</sup></b>						
Minimum		0		0		0
Maximum		10		10		10
<b>Education</b>						
Higher	85	25.8	113	39.8	294	56.8
Lower	244	74.2	171	60.2	224	43.2
<b>Occupation-based social class</b>						
Nonmanual	212	64.4	141	49.6	240	46.3
Manual	117	35.6	143	50.4	278	53.7
<b>Age</b>						
Minimum		77		77		69
Maximum		88		85		87
<b>Sex</b>						
Male	150	45.6	139	48.9	281	54.2
Female	179	54.4	145	51.1	237	45.8
<b>Physical working conditions</b>						
Min (no negative conditions)	159	48.3	161	56.7	299	57.7
Max (all negative conditions)	22	6.7	20	7.0	28	5.4
<b>Psychological working conditions</b>						
Min (no negative conditions)	106	32.2	74	26.1	106	20.5
Max (all negative conditions)	5	1.5	6	2.1	15	2.9

<sup>1</sup>In 2004, the SWEOLD study was done using only telephone interviews; hence no data exist for *physical impairment*.

<sup>2</sup>Minimum means no impairment.

**Table 2.** The Influence of Working Conditions on the Association Between Socioeconomic Position and Health After Retirement Age—Adjusted for Sex and Age. Presented as Beta-Coefficients ( $\beta$ ).

Dependent variable	Model	Socioeconomic position		Working conditions <sup>2</sup>		Change <sup>3</sup> in $\beta$ , %
		Higher <sup>1</sup>	Lower	Physical	Psychological	
<b>Poor self-rated health</b>						
Education ( <i>n</i> = 1,067)	I	0.00	0.43***			
	II	0.00	0.41**	0.05		4.7
	III	0.00	0.46***		0.15**	-7.0
Social class ( <i>n</i> = 1,067)	I	0.00	0.41***			
	II	0.00	0.39**	0.03		4.9
	III	0.00	0.46***		0.16**	-12.2
<b>Psychological distress</b>						
Education ( <i>n</i> = 1,067)	I	0.00	0.15			
	II	0.00	0.17	0.45 <sup>4†</sup>		-13.3
	III	0.00	0.20 <sup>†</sup>		0.25***	-33.3
Social class ( <i>n</i> = 1,067)	I	0.00	0.04			
	II	0.00	0.07	0.44 <sup>4†</sup>		<sup>5</sup>
	III	0.00	0.12		0.25***	<sup>5</sup>
<b>Musculoskeletal pain</b>						
Education ( <i>n</i> = 1,103)	I	0.00	0.20 <sup>†</sup>			
	II	0.00	0.16	0.10 <sup>9</sup>		20.0
	III	0.00	0.23*		0.21***	-15.0
Social class year 1992 <sup>6</sup> ( <i>n</i> = 315)	I	0.00	0.27			
	II	0.00	0.15	0.18		44.4
	III	0.00	0.35 <sup>9</sup>		0.29**	-29.6
Social class years 2002 & 2004 <sup>7</sup> ( <i>n</i> = 788)	I	0.00	-0.14			
	II	0.00	-0.17	0.56 <sup>4*</sup>		<sup>8</sup>
	III	0.00	-0.10		0.17**	<sup>8</sup>
<b>Circulatory problems</b>						
Education ( <i>n</i> = 1,081)	I	0.00	0.30*			
	II	0.00	0.31*	0.02		-3.3
	III	0.00	0.30*		0.002	0.0

(continued)

**Table 2. (continued)**

Dependent variable	Model	Socioeconomic position		Working conditions <sup>2</sup>		Change <sup>3</sup> in $\beta$ , %
		Higher <sup>1</sup>	Lower	Physical	Psychological	
Social class (n = 1,081)	I	0.00	0.35**			
	II	0.00	0.37**	0.05		-5.7
	III	0.00	0.35**		0.02	0.0
Physical impairment						
Education (n = 518)	I	0.00	0.27			
	II	0.00	0.18	0.18†		33.3
	III	0.00	0.30 <sup>9</sup>		0.34 <sup>4</sup>	-11.1
Social class (n = 518)	I	0.00	0.26			
	II	0.00	0.16	0.18†		38.5
	III	0.00	0.28 <sup>9</sup>		0.34 <sup>4</sup>	-7.7
Cognitive impairment						
Education (n = 1,005)	I	0.00	0.47***			
	II	0.00	0.45***	0.05		4.3
	III	0.00	0.45***		0.10†	4.3
Social class (n = 1,005)	I	0.00	0.45***			
	II	0.00	0.44***	0.03		2.2
	III	0.00	0.42***		0.09 <sup>9</sup>	6.7

Notes:

<sup>1</sup>Reference category.

<sup>2</sup>Linear representation unless stated otherwise.

<sup>3</sup>Formula:  $1 - (\beta \text{ Model II or } \beta \text{ Model III}) / \beta \text{ Model I}$ .

<sup>4</sup>Work conditions are dichotomized.

<sup>5</sup>Practically no differences between manuals and nonmanuals were observed, hence no change in  $\beta$  not presented

<sup>6</sup>Results from 1992 only, as differentiated from 2002 and 2004.

<sup>7</sup>Results from 2002 and 2004 in combination as differentiated from 1992.

<sup>8</sup>Negative correlation between occupation-based social class and musculoskeletal pain, thus no change in beta presented.

<sup>9</sup> $p < .11$ . † $p < .10$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

Model I: Shows the association between socioeconomic position and health, adjusted for sex, and age.

Model II: As model I, additionally adjusted for physical working conditions.

Model III: As model I, additionally adjusted for psychological working conditions.

with poor health across the outcomes, but for the association between occupation-based social class and musculoskeletal pain in 2002 and 2004. That is, those with a low socioeconomic position reported slightly more health problems than those with a high socioeconomic position. The results also demonstrate strong direct associations, after adjusting for socioeconomic position, between psychological working conditions and poor self-rated health, psychological distress and musculoskeletal pain, and to cognitive impairment though a weaker association for the latter (Model III). Adjusting for socioeconomic position, the results show direct associations between physical working conditions and musculoskeletal pain in 2002 and in 2004; psychological distress, and physical impairment.

Generally, the influence of working conditions on the association between socioeconomic position and poor health in old age was quite small. The strongest working-condition influence was on the association between socioeconomic position and physical impairment and musculoskeletal pain. When adjusting for physical working conditions (Model II), the association between education and physical impairment decreased from 0.27 in Model I to 0.18 in Model II. The association between occupation-based social class and physical impairment decreased from 0.27 to 0.16. The corresponding change in the beta-coefficient was 33.3% (education) and 38.5% (occupation-based social class). Similar patterns were discerned regarding musculoskeletal pain, where the association to education decreased 20.0%, when adjusting for physical working conditions. In turn, the difference between former manual workers and nonmanual workers decreased 44.4% in 1992. But the impact from physical working conditions on the association between occupation-based social class and musculoskeletal pain was only observable in 1992.

The analyses revealed that the influence of psychological working conditions consistently explained little, if any, of the association between socioeconomic position and health in general. Rather, the results indicated that the association between socioeconomic position and health in old age would be stronger if psychological working conditions would be similar for those with lower socioeconomic position versus higher socioeconomic position. This is because respondents with a higher socioeconomic position had worse psychological working conditions than respondents with a lower socioeconomic position.

## **Discussion**

With a follow-up period of over 20 years, this study explored to what extent working conditions during working years contributed to the association between socioeconomic position and health after retirement age in Sweden. To this end, the influence of physical as well as psychological working

conditions and two measures of socioeconomic position and six measures of health were assessed.

The results indicated that physical working conditions account for substantial portions of the association of socioeconomic position with physical impairment and musculoskeletal pain in old age. This suggests that any influence of socioeconomic position on these outcomes may at least partially be due to more adverse physical working conditions in low socioeconomic position.

These results match well with previous research based on the employed population. For example, those with lower education often have jobs that expose them to physical factors that can contribute to load-induced injury, such as heavy physical labor, monotonous, nonergonomic movement patterns, and noise (National Board of Health and Welfare, 2009; Siegrist & Theorell, 2006; Swedish Work Environment Authority, 2010).

In contrast, psychological working conditions consistently explained very little of socioeconomic health inequalities among the old. Rather, the reverse relationship was observed, whereby respondents with a high socioeconomic position during their working years were more likely to have been exposed to harmful psychological working conditions. While this result is aligned with previous research, which reported that stressful, psychologically demanding jobs are more common among persons with a higher socioeconomic position (National Board of Health and Welfare, 2009; Niedhammer et al., 2008), other studies reported that persons in lower socioeconomic positions are particularly susceptible to stress-related problems due to work situations that combine high demands, low degrees of autonomy, and insufficient support (National Board of Health and Welfare, 2009; Siegrist & Marmot, 2004). Unlike persons in high socioeconomic positions, these persons have no control over their work situations (National Board of Health and Welfare, 2009; Siegrist & Marmot, 2004).

Given the limited influence of psychological working conditions, the present study may have disregarded dimensions of working conditions, poor health or both, which are more likely to influence the association between socioeconomic position and health in old age. A reduction in the relative number of industrial workers in Sweden did not occur until the late 1970s (Brante, Andersen, & Korsnes, 2001). This might indicate that respondents to the 1968 and 1981 surveys were more frequently employed in some form of industry that commonly involved heavy labor, nonergonomic working positions, and loud noise. With this in mind, the present study's results might reflect working conditions of that time. For respondents with lower socioeconomic positions, heavy physical labor often characterized working conditions that led to load-induced disorders such as musculoskeletal pain and physical impairment.

However, a considerable proportion of the workforce is still exposed to the adverse effects from physical work conditions in Sweden (Swedish Work Environment Authority, 2010). Physical load, which affects muscles and joints, is the single most common cause of work-related problems such as musculoskeletal damage. Construction workers, loggers, and farmers still run a serious risk of such disorders (Swedish Work Environment Authority, 2010). Moreover, because manufacturing has declined in importance over the past few decades (due to automation and international outsourcing) and because the service and care sectors have expanded, female workers (e.g., health care assistants, nursing auxiliaries, and till operators) have become increasingly susceptible to these load-induced disorders (Swedish Work Environment Authority, 2010).

Even though the results only show influence of physical work conditions on the association between socioeconomic position and two out of the six measures of health, one cannot dismiss the notion that an individual either has to their disposal health-promotive resources or is subject to health-damaging exposures during his or her working life depending on socioeconomic position. Hence, there can be no doubt that working conditions impinge on health in old age when accounting for the results showing direct associations between working conditions and health among the old, in general, and between the psychological working conditions and health in particular.

Whereas earlier studies were based on persons still active in the workforce, this study, with its extensive follow-up period (more than two decades separates the survey of socioeconomic position and working conditions on the one hand, and health outcomes on the other), provides unique insight into how former working conditions affected the association between socioeconomic position and states of health in old age.

In applying a comprehensive approach by including several self-reported and objective measures of health, this study sheds new light on the exposure to adverse physical working conditions as one reason for socioeconomic differences in physical impairment and musculoskeletal pain in later life.

The baseline surveys, when the studied populations was in working ages, where conducted in 1968 and 1981. In Sweden the situation for the labor force regarding work place safety and regulations of the work conditions were comparable to that in most of the developed countries (Blau & Kahn, 1996; Smulders, Kompier, & Paoli, 1996). This makes it likely that our findings about work conditions would be similar to other developed countries.

As with any research, results from this study should be interpreted with caution on three points. First, a comparison of older individuals with varying socioeconomic position can be a somewhat hazardous enterprise. Selective

survival (Markides & Machalek, 1984), that is the systematic difference between survivors and nonsurvivors, might have affected the present study in that the analyses only apply to survivors. Many factors are related to the probability of living into old age (e.g., good health, healthy lifestyles, and a higher socioeconomic position). Such selection might have affected the association between socioeconomic position and poor health among the old in this study by underestimating it. Thus, selective survival is not a phenomenon that is specific to this study; it is a phenomenon that affects all studies of the life and health of older persons. It has been shown that the health gap persists into old age despite selective survival (Fors et al., 2008; Karp et al. 2004).

Second, while LNU and SWEOLD were nationally representative surveys with low nonresponse rates, it is plausible that the actual health of the old is worse than reported in the health data used in this study, because it was not possible to conduct interviews with the most frail (selective nonresponse). In population studies, nonresponses are often related to poor health and results from surveys of the old are thus particularly susceptible. Including information from proxy interviews, when such were available, partially compensated for this loss. But we cannot eliminate the possibility of less reliable data when including proxy interviews. But findings from a review of self and proxy responses studies suggests that proxy responses are of no worse quality than direct responses (Moore, 1988). Rather, by ignoring proxy interviews, the nonresponse rate would increase and make respondents appear healthier than the group they are meant to represent. In addition, this would exclude many of the oldest old (Kelfve, Thorslund, & Lennartsson, 2013).

Third, by measuring socioeconomic position from only one point during the period of occupational activity, one cannot fully eliminate the possibility of social mobility that in turn might alter results in one direction or another. But the effect of social mobility may be minimal considering the age span in the present study's population (ages 46–64 at baseline). Finally, due to the nature of the analyses, socioeconomic position was measured dividing education and occupation-based social class into just two categories (lower and higher education and manual and nonmanual workers). Such a crude categorization may have resulted in loss of significant information. Socioeconomic position is not a matter of poor health for the disadvantaged and good health for everyone else. Rather, the society is based on a multilayered socioeconomic hierarchy that follows a social health gradient, whereby health declines the lower down the hierarchy one goes (Marmot et al., 1991). Consequently further research, based on more comprehensive information on socioeconomic position, may reveal more significant health differences among the old.

## **Conclusion**

The influence of working environment on health is substantial and may grow in the younger generations in parallel with the growth of total time spend working, owing to a raised retirement age (Statistics Sweden, 2012b). Sickness-related reduced work capacity is strongly associated with the nature of the work a person has or has had, which is reflected in socioeconomic differences that exist between groups of individuals. The results of this study show that individuals with lower socioeconomic position during their years in the workforce develop problems with musculoskeletal pain and physical functional impairment in later life—partially due to physical working conditions. The presence of heavy physical load, high demands, and cutbacks are cited among the reasons for not staying at work until retirement age (SOU, 2002). Since musculoskeletal pain and physical impairment increase with age (Ahacic & Kåreholt, 2010), we can expect the presence of a higher proportion of older workers to lead to an increase in the number of people with such complaints. If changes in working life are reflected in greater disparities in working conditions, then socioeconomic differences associated with poor health between occupational groups might also increase.

Investing in measures that promote healthier working conditions to create conditions that resemble those for occupational groups with a low incidence of sickness absenteeism and debilitating physical and psychological impairment is particularly urgent. Going forward, such investments might have positive effects on health and medical care costs. They might narrow the socioeconomic difference gap, and hopefully encourage the working-age population to stay active in the workforce until, and after age 65.

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