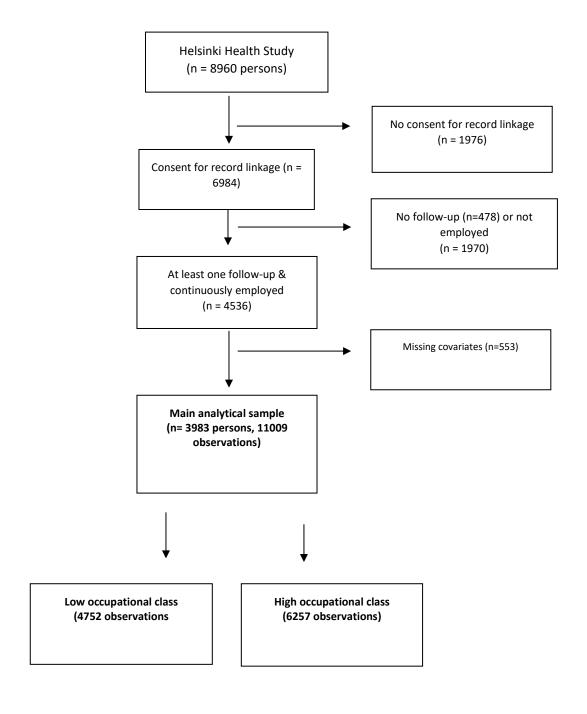
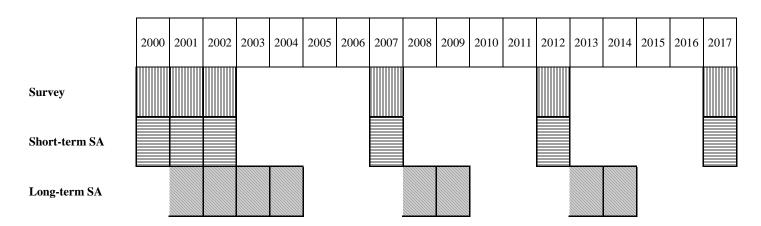
SUPPLEMENTARY MATERIALS



Supplementary figure S1. Flowchart of the study population



Supplementary figure S2. Study design. Years are calendar years

Supplementary Table S1. Within-individual association between acute/subacute and chronic pain, and short-term sickness absence days while using imputations for item missing values. Incidence Rate Ratios, IRRs, and their 95% confidence intervals CI.

Model	All	High Low occupational class class		P-value for occupational class interaction ^a
	IRR [95% CI]	IRR [95% CI]	IRR [95% CI]	
Pain (ref group: no pain)				
Acute or subacute pain	1.12* [1.00,1.24] 1.30***	1.02 [0.87,1.20] 1.23**	1.25** [1.08,1.44] 1.39***	0.039
Chronic pain	1.30 [1.18,1.44]		1.39 [1.20,1.61]	0.150
Health				
Long-standing illness	1.33*** [1.20,1.47]	1.25** [1.07,1.46]	1.40*** [1.22,1.61]	
Common mental disorders	1.53*** [1.40,1.68]	1.59*** [1.39,1.83]	1.56*** [1.37,1.78]	
Working conditions				
Mentally strenuous work	1.02 [0.89,1.16]	0.97 [0.81,1.17]	1.03 [0.85,1.25]	
Physically strenuous work	1.30*** [1.16,1.46]	1.14 [0.94,1.39]	1.31*** [1.13,1.52]	0.316
Low job control	1.05 [0.93,1.18]	1.17 [0.95,1.43]	0.99 [0.86,1.16]	0.250
Number of observations	14670	7916	6754	

Notes: * p < 0.05, ** p < 0.01, *** p < 0.001

Short-term association is measures by SA days in the survey. All models are adjusted for survey wave, marital status, night/shift work and part-time work

Notes on imputations:

First, the patterns of item missingness were explored. Then, based on the explorative analyses, multivariate imputation by chained equations and 20 created data sets were considered as the most appropriate approach. We used all variables in the present study in the imputation model and, in addition, gender, and baseline occupation class as potential predictors. Logarithm converted baseline SA measure was used also as predictor, but no imputed SA values were used as the measure did not consist of any missing values. Imputations were performed in a wide format meaning that the responses from the other waves were used also as potential predictors. We did not impute the missingness for the persons who were non-respondents in a given wave, i.e. no whole wave imputations were used. Logistic or multinomial logistic regression where appropriate were used in the imputations process. STATA's mi impute chained command was used.

a) interaction terms for variables differed in the stratified models included to a single model

Supplementary Table S2. Within-individual association between acute/subacute and chronic pain, and longer-term sickness absence days while using imputations for item missing values. Incidence Rate Ratios, IRRs, and their 95% confidence intervals CI.

Model	All	High occupational class	Low occupational class	p- value for the occupational class interaction ^a
	IRR [95% CI]	IRR [95% CI]	IRR [95% CI]	
Pain (ref group: no pain)				
Acute or subacute pain	1.13* [1.03,1.24]	1.10 [0.96,1.27]	1.18* [1.04,1.34]	0.443
Chronic pain	1.25*** [1.14,1.37]	1.22** [1.06,1.40]	1.30*** [1.14,1.47]	0.571
Health				
Long-standing illness	1.11* [1.01,1.22]	1.22** [1.06,1.41]	1.01 [0.89,1.16]	0.071
Common mental disorders	1.00 [0.92,1.10]	1.07 [0.93,1.22]	0.95 [0.84,1.06]	
Working conditions				
Mentally strenuous work	1.12 [1.00,1.26]	1.19* [1.02,1.40]	1.03 [0.85,1.24]	0.182
Physically strenuous work	1.15** [1.04,1.28]	1.06 [0.88,1.27]	1.19* [1.04,1.36]	0.272
Low job control	1.10 [0.98,1.22]	1.08 [0.88,1.32]	1.11 [0.98,1.26]	
Number of observations	9225	4988	4237	

Notes: * p < 0.05, ** p < 0.01, *** p < 0.001

Long-term association is measures by SA days in the two years after the survey year. All models are adjusted for survey wave, marital status, night/shift work and part-time work

b) interaction terms for variables differed in the stratified models included to a single model

Supplementary Table S3. Within-individual association between multisite pain and sickness absence days while using imputations for item missing values.

Incidence Rate	Ratios,	IRRs, and	their 95%	confidence	e intervals (CI.
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Pain	All	High Cow occupational class class		p- value for the occupational class interaction ^a
	IRR [95% CI]	IRR [95% CI]	IRR [95% CI]	
Short-term association				
Pain (ref group: no pain)				
One pain location	1.24*** [1.12,1.36]	1.11 [0.96,1.29]	1.37*** [1.20,1.58]	0.009
Two pain locations	1.33*** [1.17,1.50]	1.31** [1.09,1.58]	1.37*** [1.14,1.64]	0.600
Three or more pain locations	1.15 [1.00,1.32]	1.08 [0.87,1.34]	1.24* [1.02,1.51]	0.346
No of observations	14670	7916	6754	
Long-term association				
Pain (ref group: no pain)				
One pain location	1.16** [1.06,1.27]	1.14 [1.00,1.31]	1.22** [1.08,1.38]	0.562
Two pain locations	1.22*** [1.09,1.36]	1.21* [1.01,1.43]	1.22** [1.05,1.42]	0.764
Three or more pain locations	1.33*** [1.17,1.51]	1.19 [0.96,1.48]	1.47*** [1.25,1.74]	0.234
No of observations	9225	4988	4237	

Notes: * p < 0.05, ** p < 0.01, *** p < 0.001All models adjusted for CMDs, long-standing illness, physical and mental work environments, job control, survey wave, marital status, night/shift work, part-time work

a) interaction terms for variables differed in the stratified models included to a single model

Supplementary table S4. Transitions in sickness absence

Time 0 (wave t) SA None % (n) 1.9 % (n) 10 or more % (n) 70 (a) (2082) None 51 (1064) 34 (705) 15 (313) 100 (2082) 1-9 days 26 (742) 48 (1399) 26 (747) 100 (2088) 10 days or more 13 (266) 33 (687) 54 (1103) 100 (2056) Proportion of participants with at least one observation in which no Servational class 51 (2018) 58 (1245) Baseline high occupational class 58 (1245) 58 (1245) Baseline high occupational class 58 (1245) 68 (2692) Baseline high occupational class 57 (1497) 52 (2000) Baseline high occupational class 52 (2000) 65 (1195) Proportion of participants with at least one observation with 10 SA degree 52 (2000) Baseline high occupational class 52 (2000) Baseline high occupational class 10 (30 (30 (30 (30 (30 (30 (30 (30 (30 (3	SA – short-term					
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Proportion of participants with at least one observation in which no SA SA	10 days or more	13 (266)	33 (687)	54 (1103)	100 (2056)	
Single S	Total	29 (2072)	40 (2791)	31 (2163)	100 (7026)	
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	Baseline high occupational class				• •	
					79 (1252)	

Supplementary table S5. Pain change variables and subsequent sickness absence (Incidence Rate Ratios, IRRs, and their 95% confidence intervals CI).

Pain	Short-term a	ssociation	Long-term association		
	IRR	95% CI	IRR	95% CI	
Stable no pain	1		1		
Stable pain	1.19***	1.09-1.30	1.37***	1.25-1.50	
Decreasing pain ^a	0.99	0.92-1.08	1.16**	1.06-1.26	
Increasing pain ^b	1.39***	1.28-1.51	1.48***	1.36-1.60	
No of observations	4944		4122		

Notes: * p < 0.05, ** p < 0.01, *** p < 0.001

Negative binomial regression with GEE (exchangeable correlation structure). Outcomes were SA days in 2007, 2012 and 2017 for the short-term association and SA days in 2008-9 and 2013-14 for the long-term association. Adjusted for lagged SA (the SA days in the period before, log transformed), marital status, occupational class, part-time work, night/shift-work, long-standing illness, common mental disorders and working conditions.

- a) i.e. from chronic pain to acute/subacute pain or no pain, or from acute/subacute to no pain
- b) i.e. from no pain to acute/subacute or chronic pain, or from acute/subacute pain to chronic pain