

**The association of changes in work due to Covid-19 pandemic with  
psychosocial work environment and employee health: A cohort study of  
24,299 Finnish public sector employees**

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**What is already known about this subject?**

- Working from home, transfer into new tasks, and team reorganizations have increased due to Covid-19 pandemic, but it is unclear how they may affect perceptions of psychosocial work environment and employee wellbeing.
- Previous studies suggest that organizational changes and restructuring may have adverse effects on employee wellbeing.

**What are the new findings?**

- Our results point to heterogeneous and socially stratified effects of changes at work due to the Covid-19 pandemic
- Working from home slightly improved perceptions of psychosocial work environment as compared to pre-pandemic situation, and as compared to on-site workers during the pandemic.
- Transfer into new work tasks and team reorganizations due to Covid-19 were associated with less favourable changes in perceptions of psychosocial work environment, and a slight decrease in employee health

**How might this impact on policy or clinical practice in the foreseeable future?**

- The differing psychosocial and health-related effects in those working from home and those present at workplace suggest a further occupation-related polarization of working life.
- The wellbeing of workers on the frontline of pandemic seems to be at risk, and should be a focus of Covid-19 exit strategies

## ABSTRACT

**Objectives:** To examine the associations of Covid-19 -related changes in work with perceptions of psychosocial work environment and employee health.

**Methods:** In a cohort of 24,299 Finnish public sector employees, psychosocial work environment and employee wellbeing were assessed twice before (2016 and 2018 = reference period) and once during (2020) the Covid-19 pandemic. Those who reported a change (=‘Exposed’) in work due to the pandemic (working from home, new tasks, or team reorganization) were compared to those who did not report such change (=‘Non-exposed’).

**Results:** After adjusting for sex, age, socioeconomic status, and lifestyle risk score, working from home (44%) was associated with greater increase in worktime control (Standardized Mean Difference (SMD)<sub>Exposed</sub>=0.078; 95% Confidence Interval 0.066, 0.090; SMD<sub>No</sub>=0.025; 0.014, 0.036), procedural justice (SMD<sub>Exposed</sub>=0.101; 0.084, 0.118; SMD<sub>No</sub>=0.053; 0.038, 0.068), workplace social capital (SMD<sub>Exposed</sub>=0.094; 0.077, 0.110; SMD<sub>Non-exposed</sub>=0.034; 0.019, 0.048), less decline in self-rated health (SMD<sub>Exposed</sub>=-0.038; -0.054, -0.022; SMD<sub>Non-exposed</sub>=-0.081; -0.095, -0.067), perceived work ability (SMD<sub>Exposed</sub>=-0.091; -0.108, -0.074; SMD<sub>N</sub>=-0.151; -0.167, -0.136), and less increase in psychological distress (Risk Ratio (RR)<sub>Exposed</sub>=1.06; 1.02, 1.09; RR<sub>Non-exposed</sub>=1.16; 1.13, 1.20). New tasks (6%) were associated with greater increase in psychological distress (RR<sub>Exposed</sub>=1.28; 1.19, 1.39; RR<sub>Non-exposed</sub>=1.10; 1.07, 1.12), and team reorganization (5%) with slightly steeper decline in perceived work ability (SMD<sub>Exposed</sub>=-0.151; -0.203, -0.098; SMD<sub>Non-exposed</sub>=-0.124; -0.136, -0.112).

**Conclusion:** Employees who worked from home during the pandemic had more favourable psychosocial work environment and health, whereas those who were exposed to work task changes and team reorganizations experienced more adverse changes.

## INTRODUCTION

The Covid-19 pandemic has drastically affected work and working environments.(1) Particularly in health care, mental health of the employees has declined.(2, 3) In addition to psychological effects of higher work load, fear of getting sick, and the adverse consequences of lockdowns, there have been many tangible changes in work arrangements. The number of employees working from home has increased drastically, potentially counted as millions of workers globally who at least temporarily have been working from home.(4) A recent review concluded that this massive switch to working from home has required adaptation from both employers and employees.(1) Work has decreased due to lockdowns in some sectors but increased in others, particularly health care. The majority of pre-pandemic studies suggest that organizational downsizing, mergers, and changes may adversely affect health of employees,(5-13) but in some cases also favourable changes have been detected.(14, 15) However, it is unclear how changes caused by Covid-19 pandemic at workplaces may have affected perceptions of psychosocial work environment and employee wellbeing.

We utilized repeat data from three surveys before and during the Covid-19 pandemic to examine whether working from home, assignment into new tasks, and team reorganizations in response to the pandemic were associated with employees' perceptions of psychosocial work environment and health during the pandemic.

## METHODS

### Study design and population

The design is retrospective. Participants were employees of 11 cities from the Finnish Public Sector (FPS) study,<sup>(5-7)</sup> which represented about 22% of Finnish public sector workers. These employees worked in a wide range of occupations from administrative personnel and professional to semi-skilled and unskilled workers. The most common occupations in the Finnish municipal sector were those related to health care, social services, and education, representing nearly 50% of all occupational groups. We used data from surveys in 2016 (n=65 089, response rate 72%), 2018 (n=64 066, response rate 71%), and 2020 (n=65 179, response rate 72%). In every data collection, the survey questionnaire was sent in September to all employees who had been employed in the study organizations for at least six months. We included participants who had responded to all of the three surveys, belonged to only one of the exposure groups (n=32 435), had complete data on exposure and outcome variables (n=31 054), had register-based information on sex, age, and occupation (n=28 564), and consented to linkage of survey and register data (the final analytic sample n=24,299). Ethics approval is from the Ethical Committee of the Helsinki and Uusimaa hospital district (HUS/1210/2016).

### Changes due to Covid-19

In the 2020 survey, we enquired whether the Covid-19 pandemic had caused any changes in the respondent's work. The changes were: 1. the employee was transferred partially or totally into working from home; 2. the employee was transferred to other work tasks within the same

occupation sector or to another occupational sector; and 3. the work unit/ team in which the employee work was reorganized into smaller or larger unit. Each participant could only belong to one group. In all these three changes, employees that reported such a change were compared to those not reporting the change.

## Outcomes

*Worktime control* was measured using a standard questionnaire in which the participants were asked to evaluate on a scale from 1 (very little) to 5 (very much) how much they could influence the following aspects of their working time: length, starting and ending times, breaks, and handling of private matters during the workday, scheduling of work shifts, vacations and paid days off, and the taking of unpaid leave.(16, 17)

*Job strain* was measured as a combination of high demands, and low job control.(18, 19) Job demands scale consisted of five items, which considered time pressures and deadlines, lack of time to do what was expected, and work overload. The job control scale combines two concepts, skill discretion (the opportunities of an individual to develop his or her special abilities within the job, six items) and decision authority (individual's abilities to be part of the decision-making process within the organization, three items). These subscales were combined for the analysis. Responses were given along a five-point scale from 5 = strongly agree to 1 = strongly disagree. Job strain was defined as high demands (higher than median score in 2010-2014) and low control (lower than median score in 2010-2014); all other combinations of job demands and job control were assigned to no strain.(20, 21)

*Procedural justice:* The seven-item scale considers whether the decision-making procedures at the workplace are accurate, correctable, consistently applied, and whether the procedures include opinions from the people involved.(22)

*Relational justice:* The six-item scale refers to the quality of treatments employees experience in their interpersonal interactions during the completion of organizational processes.(22) The scale includes items evaluating whether the supervisors use kindness and consideration, are truthful, and can suppress personal biases. The response format was a five-point scale from 5 = strongly agree to 1 = strongly disagree for both justice dimensions.

*Team climate:* The work unit cooperation and interaction was measured using the short version (23) of the Team Climate Inventory (TCI).(24) TCI conceptualizes team climate into four dimensions: participations safety, support for innovation, vision, and task orientation. All dimensions were combined in the analysis. Responses were given on a five-point scale (from 5 = strongly agree to 1 = strongly disagree).

*Workplace social capital:* Social capital was measured with a validated measure comprising 8 items. These items indicate whether people feel that they are respected, valued, and treated as equals at work, rather than feeling that it is all a matter of seniority in their hierarchy. Responses were given on a five-point scale (from 1 = strongly disagree to 5 = strongly agree).(25)

*Psychological distress:* We used the 12-item General Health Questionnaire (GHQ-12) to measure psychological distress (symptoms of depression and anxiety).(26) In GHQ-12, respondents rate the extent to which they are affected by each of the 12 symptoms of distress (0=not at all, 0=as much as usual, 1=slightly more than usual, 1=much more than usual). Participants with a rating of 1 in at least 4 items of the total measure were coded as cases of psychological distress (1=case, 0=non-case).



*Self-rated health:* We used a single-item measure “How do you rate your health?” with response options; 1=poor; 2=fairly poor; 3=average; 4=fairly good; 5=good. The question is widely used and recommended for standard indicator of health in surveys.(27)

*Self-rated work ability:* We used a single-item measure from the Work Ability Index (WAI):(28, 29) “Let’s assume that your work ability at its all-time best would be given 10 points, and 0 points would indicate that you are completely unable to work. How would you score your current work ability?” with response options from 0 to 10. A very strong association between the WAI and the single-item question has been shown, and both the WAI and the single-item question showed similar patterns of associations with sick leave, health, and symptoms.(30)

#### Covariates

Information on sex, age, and occupation were register-based. The occupations were classified according to the 2001 International Standard Classification of Occupations codes (ISCO) and were categorized into three levels of socioeconomic status (SES): high (upper-grade nonmanual worker including managers, administrators, and specialists), intermediate (lower-grade nonmanual workers including office workers, clerks, customer service and sales workers, registered and public health nurses), and low (manual workers including construction workers, manufacturing, transportation workers, and practical nurses).

We also included lifestyle risk factors (smoking, at-risk alcohol use, overweight, and physical inactivity) as possible confounding factors. Smoking was dichotomized into current smoker and non-smoker (including never smokers and ex-smokers).(31) Alcohol use was elicited by questions on weekly consumption. One drink was approximately equivalent to one unit or one glass of alcoholic drink or 12 g of alcohol. Alcohol use was dichotomized into no use or moderate use (a

maximum of 140 g or 11 units for women and 280 g or 23 units for men) versus alcohol use greater than this.(32) Body mass index (BMI = weight in kilograms divided by height in meters squared) was dichotomized as less than 25 (non-overweight) and 25 or more (overweight).(33) Participants were categorized as being physically inactive if they reported <2 metabolic equivalent task hours per day (approximately 30 min of walking) and active if more than this.(34) Lifestyle risk score was calculated as number of risk factors from 0 to 4. All lifestyle factors were self-reported.

### Statistical analysis

We calculated the annual (2016, 2018, 2020) least square (sex-, age-, SES-adjusted) means for employees whose work had changed due to coronavirus in 2020 comparing to those who had not experienced such change (working from home vs. not working from home; new tasks vs. no new tasks; team reorganization vs. no team reorganization).

To determine the change in psychosocial work environment and wellbeing from 2016 to 2018 (2 measures) (i.e., before the emergence of Covid-19) relative to 2020, we applied a repeated-measures linear regression analysis for continuous outcomes, and binomial regression analysis with log link function for binary outcomes, using the generalized estimating equations method with exchangeable correlation structure. This method considers the intraindividual correlation between the measurements. In linear models, outcome variables were standardized:  $(\text{variable} - \text{variable mean in 2016}) / \text{variable sd in 2016}$ . We calculated Standardized Mean Differences (SMD), also known as Cohen's d, and their 95% confidence intervals (CI) by contrasting year 2020 with years 2016 and 2018. In binomial models, we calculated risk ratios (RR) and their 95% CI by contrasting year 2020 with years 2016 and 2018. Analyses were adjusted for sex, age, and SES, and in sensitivity analysis, also for lifestyle risk factors.

To analyse whether the trends differed in 2020 vs. 2016-2018 among those having experienced a change at work in 2020 due to Covid-19, we tested time × group interaction. We performed occupation-specific sensitivity analysis within the largest public sector occupational groups that have particularly been affected by the pandemic: teachers (n=6,314) and nurses (n=2,044). SAS software package (version 9.4; SAS Institute, Inc, Cary, North Carolina) was used for statistical analyses.

## RESULTS

In 2020, a total of 44% of our respondents had been transferred into working from home; 6% reported having had new work tasks; and 5% reported team reorganization as employers' response to Covid-19 pandemic. Employees transferred into working from home were more often men, had a high SES, and lower lifestyle risk factor score compared to those not working from home. Employees transferred into new tasks were slightly younger. Those transferred into new tasks or having experienced a team reorganization were more often women and with intermediate or low SES compared to those who had not been transferred into new tasks or had not experienced a team reorganization. (**Table 1.**)

The annual sex-, age-, and SES-adjusted means of psychosocial work environment and employee health stratified by groups experiencing a change vs. not experiencing the change are illustrated in **Figures 1 and 2**. **Tables 2 and 3** show the SMD/RR of psychosocial work characteristics and employee wellbeing in 2020 compared to 2016-2018 and whether the estimates are different between groups experiencing a change vs. not experiencing the change.

Working from home during the pandemic

Employees who changed to working from home in 2020 had better worktime control throughout the follow-up. The mean of worktime control was 2.9 in 2016-2018 and 3.0 in 2020 among those working from home in 2020, whereas the corresponding mean in those not working from home was 2.7 throughout the follow-up (**Figure 1, Panel 1A**). Working from home in 2020 was thus associated with a greater increase in worktime control in 2020 compared to corresponding increase among those who did not work from home in 2020 ( $SMD_{Exposed}=0.078$ , 95% CI 0.066, 0.090;  $SMD_{Non-exposed}=0.025$ , 95% CI 0.014, 0.036) (**Table 2**).

Before the pandemic, procedural justice and workplace social capital were slightly higher among employees who did not work from home in 2020 than among those who did (**Figure 1, Panels 1D and 1E**). Working from home in 2020 was associated with a slightly larger increase in procedural justice ( $SMD_{Exposed}=0.101$ , 95% CI 0.084, 0.118;  $SMD_{Non-exposed}=0.053$ , 95% CI 0.038, 0.068) and workplace social capital ( $SMD_{Exposed}=0.094$ , 95% CI 0.077, 0.0110;  $SMD_{Non-exposed}=0.034$ , 95% CI 0.019, 0.048) among employees who worked from home in 2020 compared to those who did not (**Table 2**). The trends in job strain and relational justice were similar between employees who changed to working from home in 2020 and those who did not (**Figure 1, Panels 1B-1C, Table 2**).

Before the pandemic, employees who changed to working from home in 2020 had higher levels of psychological distress before the pandemic. During 2016–2020, 23–25% of those who changed to working from home in 2020 experienced psychological distress. In those who remained on-site, the level of psychological distress increased from 20–23% to 25% in 2020 (**Figure 2, Panel 1A**). In 2020, not working from home was associated with steeper increase in psychological distress compared to working from home ( $RR_{Exposed}=1.06$ , 95% CI 1.02, 1.09;  $RR_{Non-exposed}=1.16$ , 95% CI 1.13, 1.20), and in 2020, the level of psychological distress was similar in both groups. In 2020, working from home was associated with smaller decrease in self-rated health ( $SMD_{Exposed}=-0.038$ , 95% CI -0.054, -0.022;  $SMD_{Non-exposed}=-0.081$ , 95% CI -0.095, -0.067) and in work ability ( $SMD_{Exposed}=-$

0.091, 95% CI -0.108, -0.074;  $SMD_{\text{Non-exposed}} = -0.151$ , 95% CI -0.167, -0.136) compared to employees not working from home. (**Figure 2, Panels 1B and 1C; Table 3.**)

#### Assignment into new work tasks during the pandemic

Worktime control was slightly better throughout the follow-up among employees who were not assigned into new work tasks in 2020 (mean 2.8 vs. 2.7, **Figure 1, Panel 2A**). There was no change in worktime control among employees assigned to new work tasks in 2020 ( $SMD_{\text{Exposed}} = -0.008$ , 95% CI -0.039, 0.024), whereas worktime control increased in 2020 among those not assigned into new tasks ( $SMD_{\text{Non-exposed}} = 0.051$ , 95% CI 0.042, 0.059).

Similar trends were observed also for relational and procedural justice (**Figure 1, Panels 2C and 2D**). There were no changes in justice perceptions among employees assigned to new tasks in 2020, whereas both dimensions of organizational justice slightly increased among employees not assigned into new tasks in 2020 (Relational justice:  $SMD_{\text{Non-exposed}} = 0.084$ , 95% CI 0.071, 0.096; Procedural justice  $SMD_{\text{Non-exposed}} = 0.079$ , 95% CI 0.067, 0.091). No differences between the groups were observed for job strain or workplace social capital. (**Table 2.**)

Before the pandemic, there were no differences in psychological distress between employees assigned into new tasks in 2020 and those not (**Figure 2, Panel 2A**). However, in 2020, a total of 30% of those assigned into new tasks reported psychological distress. The corresponding percentage was 24% for those not assigned into new tasks. Assignment into new work tasks was thus associated with steeper increase in psychological distress compared to those not assigned into new tasks ( $RR_{\text{Exposed}} = 1.28$ , 1.19, 1.39;  $RR_{\text{Non-exposed}} = 1.10$ , 95% CI 1.07, 1.12). No differences between groups were observed regarding self-rated health status or work ability. (**Table 3.**)

### Team reorganization during the pandemic

No differences between employees experiencing team reorganization vs. not were observed for psychosocial work characteristics (**Figure 1, Panel 3A; Table 2**). Psychological distress increased, and self-rated health decreased regardless of team reorganization in 2020 (**Table 3, Figure 2, Panels 3A and 3B**). Team reorganization in 2020 was associated with slightly steeper decrease in work ability compared to employees who did not experience a team reorganization ( $SMD_{Exposed} = -0.151$ , 95% CI -0.203, -0.098;  $SMD_{Non-exposed} = -0.124$ , 95% CI -0.136, -0.112, **Figure 2, Panel 3C, Table 3**.)

### Additional analysis among nurses and teachers

We performed additional analysis among two occupational groups that are both common among public sector, and particularly affected by the Covid-19 pandemic: teachers and nurses. Our data included 6,314 class teachers, subject teachers, and special education teachers. Of them, 61% reported having worked from home in 2020 due to Covid-19 pandemic. In 2020, worktime control slightly improved among teachers working from home, whereas it remained on the same level among teachers who did not work from home. Also job strain increased among teachers working from home, but not among teachers who did not work from home. Social capital, relational and procedural justice increased, and self-rated health and work ability decreased among all teachers irrespective of working from home. (Table S1.)

Our data included 2,044 registered nurses, public health nurses, and practical nurses. Of them, 12 % reported assignment into new work tasks in 2020. For workplace social capital and relational justice, time trends (2016-2020) were statistically significantly different ( $p < 0.001$ ), but the contrast estimates (2020 vs. 2016-2018) were non-significant. Psychological distress increased and

work ability decreased in 2020 among all nurses, irrespective of assignment into new tasks. (Table S2.)

## DISCUSSION

In this study, we examined how changes made at Finnish public sector workplaces in response to Covid-19 pandemic were associated with a range of outcomes related to psychosocial work environment and employee wellbeing. Overall, the effect sizes of changes in psychosocial factors and wellbeing in the exposed compared to the non-exposed employees (in terms of employers' response to the pandemic) were small,<sup>(35)</sup> albeit statistically significant. We found that working from home was associated with slight improvements in psychosocial work environment in 2020. Working from home was also associated with smaller increase in psychological distress, and smaller decrease in self-rated health and work ability. Assignments into new work tasks and team reorganizations, in turn, were associated with no change in psychosocial work environment. Assignment into new work tasks was associated with increased psychological distress, and team reorganization was associated with decreased work ability.

Our results point to heterogeneous and socially stratified effects of changes at work during the Covid-19 pandemic. Those working from home have gained more flexibility in working time arrangements, and somewhat surprisingly, also evaluate other aspects of psychosocial work environment in a slightly more positive manner than before the pandemic. It thus seems that, at least in the rather short timespan from March to September in 2020 (i.e., from the beginning of the pandemic to the 2020 survey), the worries of declining trust and cooperation between employees<sup>(1)</sup> were not fulfilled. Working from home seemed to buffer against the negative changes in well-being observed among those with new work tasks or team reorganizations. This finding is in agreement with earlier studies on the health benefits of worktime flexibility.<sup>(36-40)</sup> However, working from home did seem to increase job strain among teachers, a result that was not evident from main analysis including all occupations, and which demonstrated heterogeneity in working from home - related outcomes across occupations.



Working from home is not possible in many occupations. Covid-19 forced employers to make many work rearrangements, and these rearrangements have particularly affected employees in on-site jobs. Employees were assigned into new tasks, particularly to tasks directly related to the pandemic. Many public sector employees from different sectors were transferred into health care sector, and in health care sector from non-urgent treatment to Covid-19-related tasks. This placed many of our study participants who reported being assigned into new tasks to front line of the battle against Covid-19. Against this background, our finding that these employees experience more psychological distress seems unsurprising. Our results also corroborated earlier results of mental distress among health care workers.(2, 3) Team reorganizations, in turn, have been found to increase the risk of adverse health outcomes also in previous studies.(9, 11) The reorganizations reported in our study were directly related to the pandemic, and thus may have caused worry and anxiety reflected in work ability.

The strengths of the study include nearly 25,000 participants representing a wide variety of public sector occupations measured at three time points during four years with validated measures of psychosocial work environment and employee wellbeing. Our study has also limitations. Our data included only Finnish public sector employees, so generalizability to private sector is uncertain. The final analytic sample included 75% of those participants who responded to all three surveys. Part of those who dropped out were those who died, retired, or changed employer during the 4-year follow-up and thus were no longer eligible to re-surveys. Selection bias may have affected our estimates, although the response rate among those employed in the target organizations and thus eligible to this study was relatively high throughout the follow-up (71–72%). We collected latest data in September 2020 when the pandemic had lasted about seven months in Finland. It is possible that as the pandemic prolonged and in countries more severely affected by the pandemic, more extreme outcomes will be detected in later studies. Our grouping of employees to groups of changes due to Covid-19 and measures of psychosocial work environment and health, although based on validated measures, were self-reported and thus subject to reporting bias. Finally, residual

confounding is possible due to unmeasured covariates including length of commute time and substance abuse.

Employees who worked from home during the pandemic perceived their psychosocial work environment and health as better than those with on-site jobs. Their perceptions of psychosocial work environment even improved during the pandemic, and their health was less affected by the pandemic. Employees who experienced work task changes and team reorganizations had less favourable perceptions compared to those with no change in work or team structure during the pandemic, and their health was more affected by the pandemic.

## FIGURE LEGENDS

**Figure 1.** Sex-, age- and SES-adjusted means (error bars represent 95% confidence intervals) in psychosocial work environment factors in 2016, 2018, and 2020 stratified by **(1A-1E) working from home in 2020** (=Exposed) and not working from home in 2020 (=Non-exposed); **(2A-2E) new work tasks in 2020** (=Exposed) and no new tasks in 2020 (=Non-exposed); and **(3A-3E) team reorganization in 2020** (=Exposed) and no reorganization in 2020 (=Non-exposed).

**Figure 2.** Sex-, age- and SES-adjusted means (error bars represent 95% confidence intervals) in wellbeing factors in 2016, 2018, and 2020 stratified by **(1A-1E) working from home in 2020** (=Exposed) and not working from home in 2020 (=Non-exposed); **(2A-2E) new work tasks in 2020** (=Exposed) and no new tasks in 2020 (=Non-exposed); and **(3A-3E) team reorganization in 2020** (=Exposed) and no reorganization in 2020 (=Non-exposed).

**Table 1.** Descriptive characteristics of participants by changes made at work due to Covid-19 in 2020.  
Frequency (percentage)

	<b>Working from home (n=10683)</b>	<b>Not working from home (n=13616)</b>	<b>P for difference</b>
<b>Sex</b>			
<b>Men</b>	2651 (25)	2708 (20)	
<b>Women</b>	8032 (75)	10908 (80)	<0.001
<b>SES</b>			
<b>High</b>	8029 (75)	4605 (34)	
<b>Intermediate</b>	2310 (22)	41331 (30)	
<b>Low</b>	344 (3)	4878 (36)	<0.001
<b>Mean age (SD)</b>	50.6 (8.6)	50.7 (9.2)	0.40
<b>Mean number of lifestyle risk factors (SD)</b>	0.83 (0.77)	0.98 (0.83)	<0.001
	<b>New tasks (n=1527)</b>	<b>No new tasks (n=22772)</b>	
<b>Sex</b>			
<b>Men</b>	165 (11)	5194 (23)	
<b>Women</b>	1362 (89)	17578 (77)	<0.001
<b>SES</b>			
<b>High</b>	402 (26)	12232 (54)	
<b>Intermediate</b>	691 (45)	5752 (25)	
<b>Low</b>	434 (29)	4788 (21)	<0.001
<b>Mean age, SD</b>	49.5 (9.6)	50.8 (8.9)	<0.001
<b>Mean number of lifestyle risk factors (SD)</b>	0.90 (0.80)	0.92 (0.81)	0.46
	<b>Team reorganization (n=1147)</b>	<b>No team reorganization (n=23152)</b>	
<b>Sex</b>			
<b>Men</b>	214 (19)	5145 (22)	
<b>Women</b>	933 (81)	18007 (78)	0.0045
<b>SES</b>			
<b>High</b>	508 (44)	12126 (52)	
<b>Intermediate</b>	333 (29)	6110 (26)	
<b>Low</b>	306 (27)	4916 (22)	<0.001
<b>Mean age, SD</b>	51.0 (8.7)	50.7 (9.0)	0.18
<b>Mean number of lifestyle risk factors (SD)</b>	0.91 (0.78)	0.92 (0.81)	0.90

**Table 2.** Psychosocial work characteristics during Covid-19 pandemic versus before. Years 2016 and 2018 are contrasted to 2020. SMD=Standardized Mean Difference\*, RR=Risk Ratio\*\*, CI=Confidence Interval. Model 1 is unadjusted; Model 2 is adjusted for sex, age, and SES, and Model 3 is adjusted as Model 2 + lifestyle risk factors.

	Working from home					New tasks					Team reorganization				
	Exposed		Non-exposed		Group*time	Exposed		Non-exposed		Group*time	Exposed		Non-exposed		Group*time
	SMD	95% CI	SMD	95% CI		SMD	95% CI	SMD	95% CI		SMD	95% CI	SMD	95% CI	
<b>Worktime control 2020 vs. 2016-2018</b>															
Model 1	0.076	0.065, 0.087	0.014	0.004, 0.024	<0.001	-0.011	-0.040, 0.018	0.044	0.036, 0.051	<0.001	0.003	-0.032, 0.037	0.042	0.035, 0.042	0.041
Model 2	0.078	0.066, 0.090	0.026	0.015, 0.037	<0.001	-0.007	-0.039, 0.024	0.051	0.042, 0.060	<0.001	0.011	-0.026, 0.047	0.049	0.040, 0.057	0.057
Model 3	0.078	0.066, 0.090	0.025	0.014, 0.036	<0.001	-0.008	-0.039, 0.024	0.051	0.042, 0.059	<0.001	0.010	-0.026, 0.047	0.048	0.040, 0.057	0.059
<b>Relational justice 2020 vs. 2016-2018</b>															
Model 1	0.088	0.071, 0.105	0.066	0.052, 0.081	0.069	0.010	-0.033, 0.053	0.080	0.06, 0.091	0.008	0.067	0.019, 0.115	0.076	0.064, 0.087	0.54
Model 2	0.094	0.076, 0.111	0.067	0.052, 0.083	0.054	0.013	-0.033, 0.059	0.084	0.071, 0.096	0.013	0.073	0.022, 0.124	0.079	0.067, 0.091	0.65
Model 3	0.093	0.076, 0.110	0.068	0.052, 0.084	0.069	0.013	-0.033, 0.059	0.084	0.071, 0.096	0.013	0.072	0.022, 0.112	0.079	0.067, 0.091	0.67
<b>Procedural justice 2020 vs. 2016-2018</b>															
Model 1	0.113	0.097, 0.129	0.072	0.058, 0.086	<0.001	0.025	-0.016, 0.067	0.094	0.083, 0.105	<0.001	0.069	0.021, 0.117	0.090	0.080, 0.101	0.57
Model 2	0.101	0.084, 0.118	0.053	0.038, 0.068	<0.001	0.016	-0.028, 0.060	0.079	0.067, 0.090	0.003	0.045	-0.006, 0.097	0.075	0.064, 0.087	0.48
Model 3	0.101	0.084, 0.118	0.053	0.038, 0.068	<0.001	0.016	-0.028, 0.060	0.079	0.067, 0.091	0.004	0.046	-0.005, 0.097	0.076	0.064, 0.087	0.50
<b>Workplace social capital 2020 vs. 2016-2018</b>															
Model 1	0.087	0.072, 0.103	0.032	0.019, 0.046	<0.001	0.017	-0.023, 0.058	0.058	0.048, 0.068	0.16	0.016	-0.032, 0.064	0.057	0.048, 0.068	0.17
Model 2	0.094	0.078, 0.110	0.033	0.019, 0.048	<0.001	0.025	-0.020, 0.068	0.063	0.051, 0.074	0.25	0.021	-0.030, 0.072	0.062	0.051, 0.074	0.21
Model 3	0.094	0.077, 0.110	0.034	0.019, 0.048	<0.001	0.025	-0.019, 0.069	0.063	0.051, 0.075	0.26	0.020	-0.031, 0.071	0.063	0.051, 0.074	0.20
	RR	95% CI	RR	95% CI	Group*time	RR	95% CI	RR	95% CI	Group*time	RR	95% CI	RR	95% CI	Group*time

**Job strain 2020 vs. 2016-2018**

Model 1	1.06	1.01, 1.10	1.02	1.00, 1.05	0.27	1.03	0.96, 1.11	1.03	1.01, 1.06	0.92	1.05	0.95, 1.16	1.03	1.01, 1.05	0.74
Model 2	1.05	1.01, 1.10	1.05	1.01, 1.07	0.38	1.04	0.96-1.13	1.05	1.02-1.07	0.89	1.06	0.96, 1.18	1.05	1.02, 1.07	0.65
Model 3	1.06	1.01, 1.11	1.04	1.01, 1.07	0.37	1.04	0.96-1.13	1.05	1.02-1.07	0.89	1.07	0.96, 1.18	1.05	1.02, 1.07	0.63

\* SMD >0 indicates an increase between 2020 and 2016-2018; SMD <0 indicates a decrease between 2020 and 2016-2018.

\*RR >1 indicates increased risk of job strain between 2020 and 2016-2018.



<b>Model</b>	-0.091	-0.108	-0.151	-0.167,	<0.001	-0.162	-0.207,	-0.123	-	0.26	-0.151	-0.203,	-0.124	-	0.013
<b>3</b>		-0.074		-0.136			-0.115		0.135,			-0.098		0.136,	
									-0.110					-	
														0.112	

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\* SMD >0 indicates an increase between 2020 and 2016-2018; SMD <0 indicates a decrease between 2020 and 2016-2018.

\*RR >1 indicates increased risk of psychological distress between 2020 and 2016-2018.



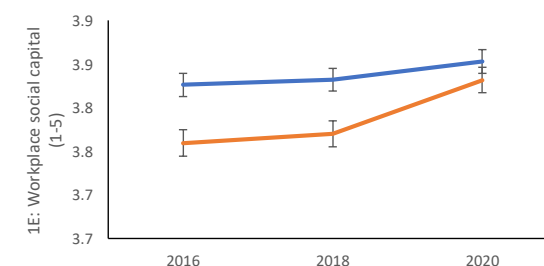
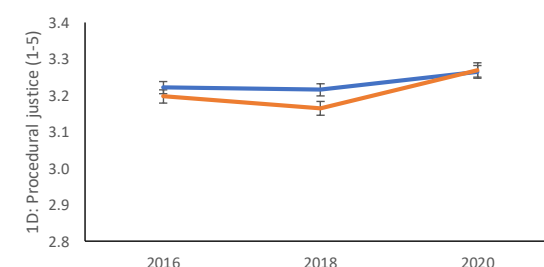
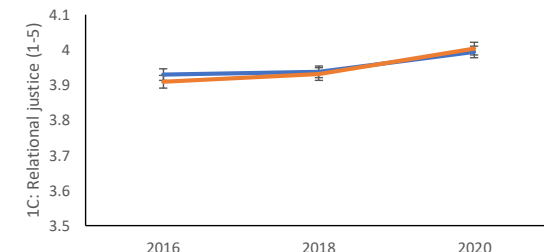
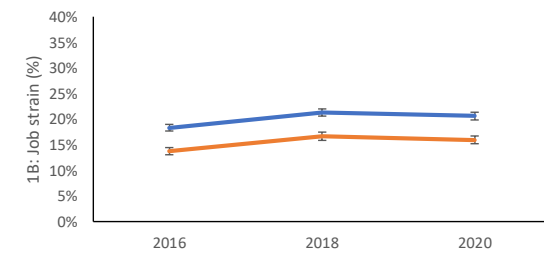
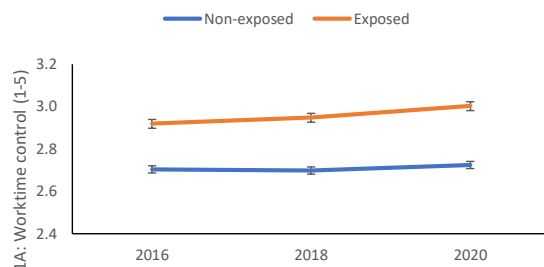
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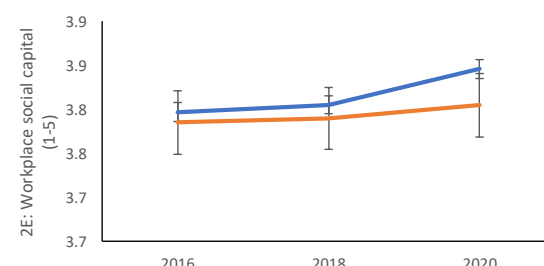
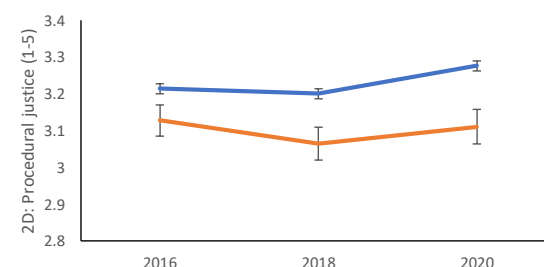
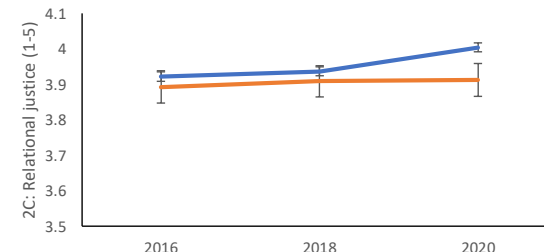
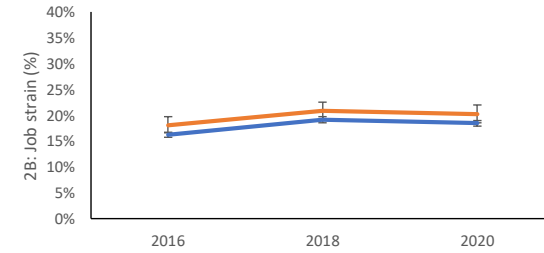
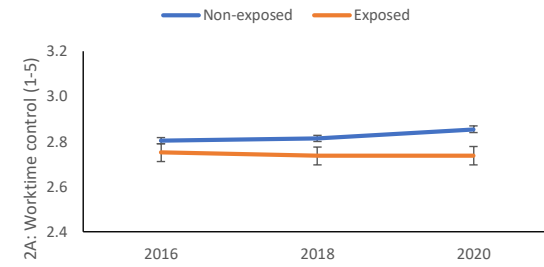
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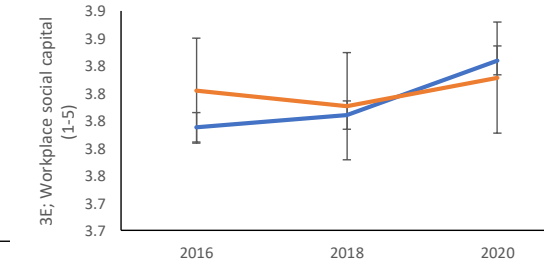
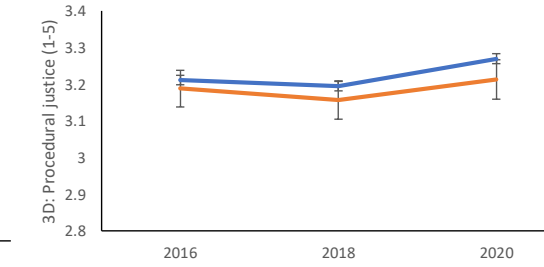
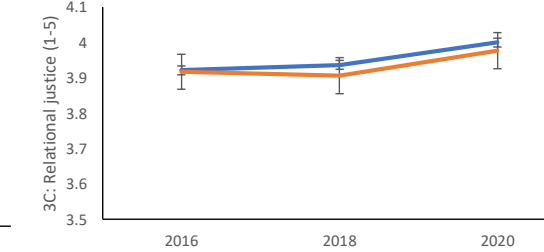
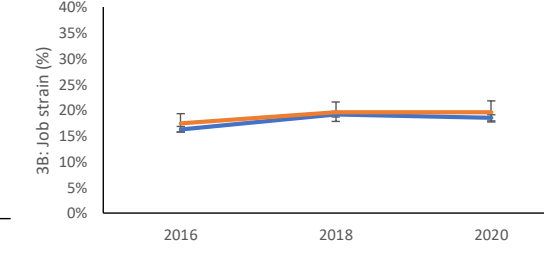
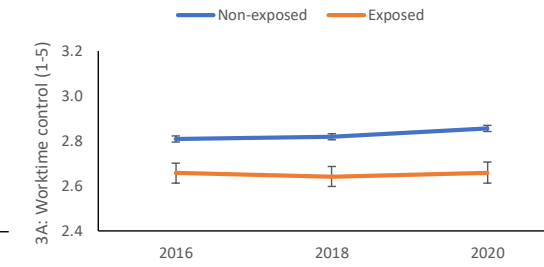
Working from home in 2020 due to COVID-19 pandemic



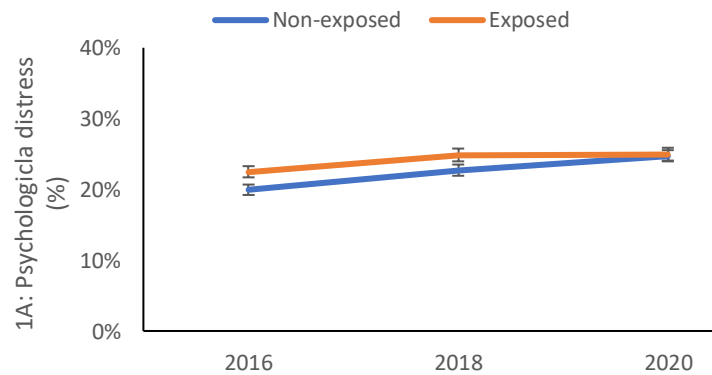
New work tasks in 2020 due to COVID-19 pandemic



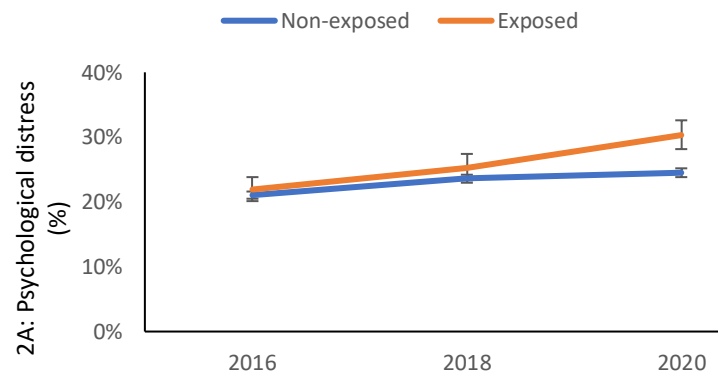
Team reorganization in 2020 due to COVID-19 pandemic



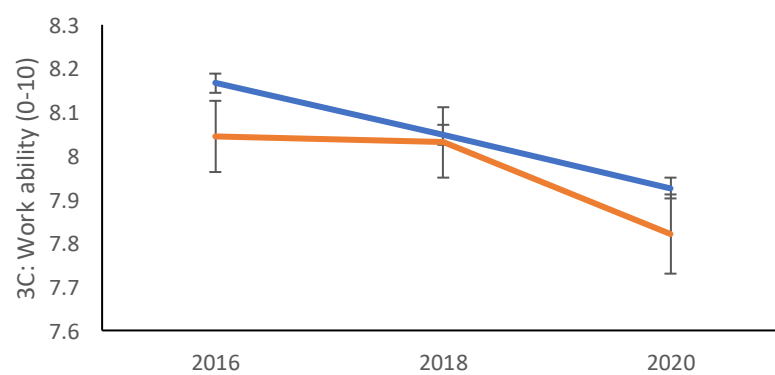
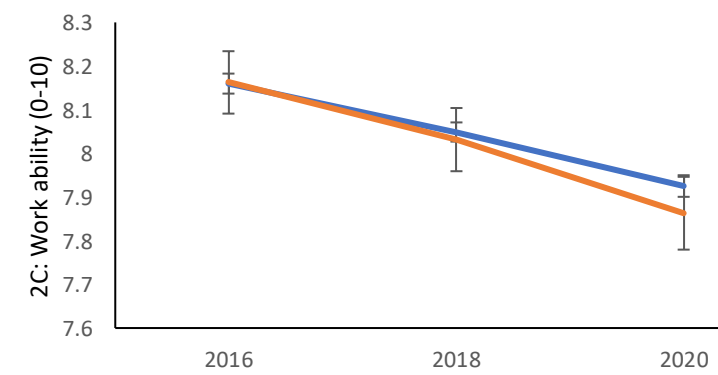
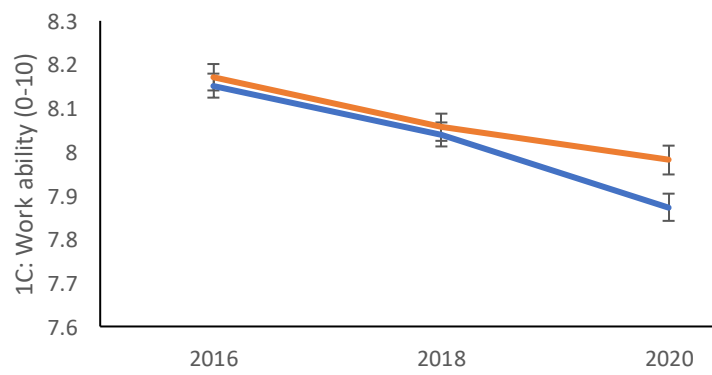
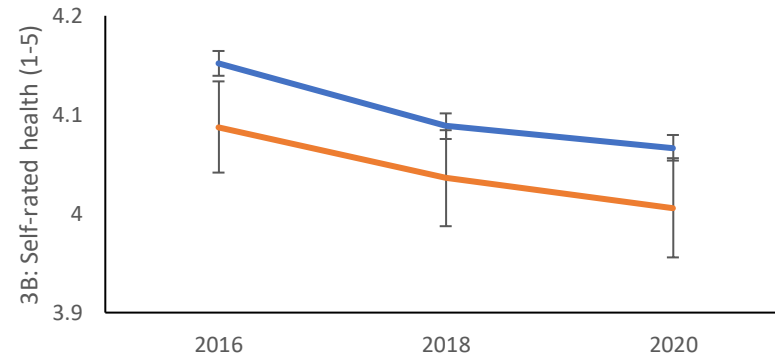
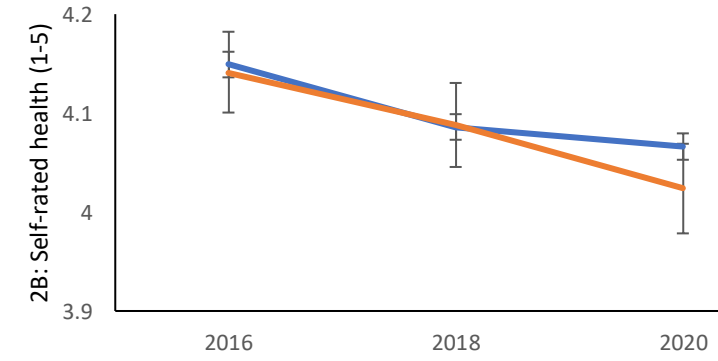
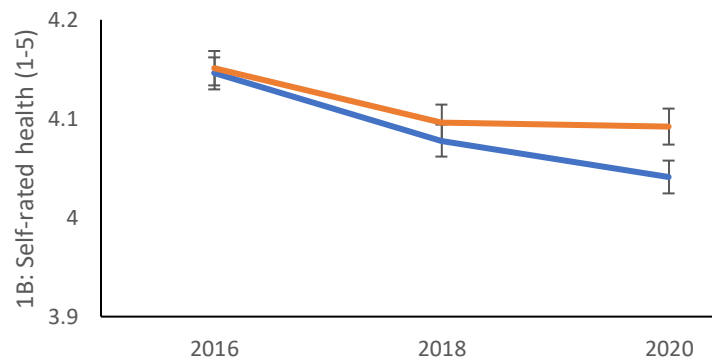
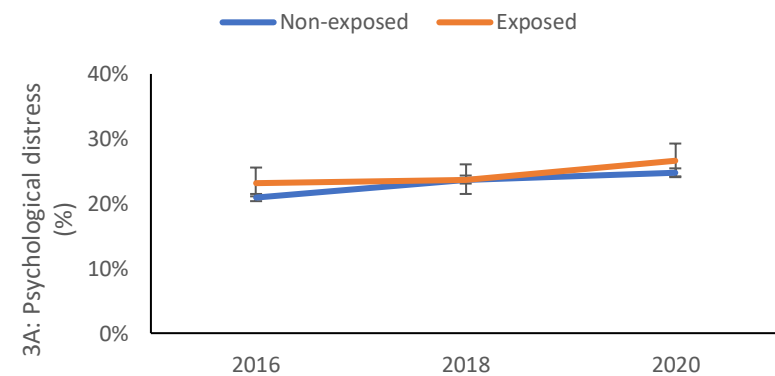
Working from home in 2020 due to COVID-19 pandemic



New work tasks in 2020 due to COVID-19 pandemic



Team reorganization in 2020 due to COVID-19 pandemic



Year

Year

Year

## SUPPLEMENTAL MATERIAL

**Table S1.** Psychosocial work characteristics and employee wellbeing during Covid-19 pandemic versus before in **teaching occupations (n=6,314)**. Years 2016 and 2018 are contrasted to 2020. SMD=Standardized Mean Difference, RR=Risk Ratio, CI=Confidence Interval. Models are adjusted for sex, age, SES, and lifestyle risk score.

	Working from home Exposed (n=3874)		Non-exposed (n=2440)		Group*time
	SMD/RR	95% CI	SMD/RR	95% CI	
<b>Worktime control</b>					
2016, 2018	1		1		
2020	<b>0.028</b>	<b>0.011, 0.046</b>	-0.018	-0.041, 0.005	<0.001
<b>Job strain</b>					
2016, 2018	1		1		
2020	<b>1.24</b>	<b>1.14-1.35</b>	1.04	0.95-1.14	0.007
<b>Relational justice</b>					
2016, 2018	1		1		
2020	<b>0.069</b>	<b>0.040, 0.099</b>	<b>0.074</b>	<b>0.037, 0.110</b>	0.063
<b>Procedural justice</b>					
2016, 2018	1		1		
2020	<b>0.087</b>	<b>0.056, 0.117</b>	<b>0.088</b>	<b>0.051, 0.125</b>	0.43
<b>Workplace social capital</b>					
2016, 2018	1		1		
2020	<b>0.050</b>	<b>0.024, 0.076</b>	<b>0.059</b>	<b>0.025, 0.094</b>	0.32
<b>Psychological distress</b>					
2016, 2018	1		1		
2020	1.01	0.95-1.07	1.04	0.96-1.12	0.64
<b>Self-rated health</b>					
2016, 2018	1		1		
2020	<b>-0.036</b>	<b>-0.063, -0.009</b>	<b>-0.045</b>	<b>-0.079, -0.011</b>	0.75
<b>Work ability</b>					
2016, 2018	1		1		
2020	<b>-0.106</b>	<b>-0.135, -0.076</b>	<b>-0.124</b>	<b>-0.162, -0.086</b>	0.76

**Table S2.** Psychosocial work characteristics and employee wellbeing during Covid-19 pandemic versus before in nursing occupations (n=2,044). Years 2016 and 2018 are contrasted to 2020. SMD=Standardized Mean Difference, RR=Risk Ratio, CI=Confidence Interval. Models are adjusted for sex, age, SES, and lifestyle risk score.

	New tasks Exposed (n=246)		Non-exposed (n=1798)		Group*time
	SMD/RR	95% CI	SMD/RR	95% CI	
<b>Worktime control</b>					
2016, 2018	1		1		
2020	-0.021	-0.107, 0.065	0.014	-0.017, 0.045	0.37
<b>Job strain</b>					
2016, 2018	1		1		
2020	1.15	0.96, 1.37	<b>1.14</b>	<b>1.06, 1.23</b>	0.62
<b>Relational justice</b>					
2016, 2018	1		1		
2020	0.056	-0.068, 0.179	0.044	-0.001, 0.089	0.001
<b>Procedural justice</b>					
2016, 2018	1		1		
2020	<b>-0.147</b>	<b>-0.268, -0.027</b>	-0.016	-0.059, 0.028	0.12
<b>Workplace social capital</b>					
2016, 2018	1		1		
2020	0.062	-0.052, 0.176	0.008	-0.032, 0.049	0.002
<b>Psychological distress</b>					
2016, 2018	1		1		
2020	<b>1.55</b>	<b>1.27-1.89</b>	<b>1.30</b>	<b>1.20-1.41</b>	0.22
<b>Self-rated health</b>					
2016, 2018	1		1		
2020	-0.021	-0.120, 0.079	<b>-0.094</b>	<b>-0.133, -0.055</b>	0.40
<b>Work ability</b>					
2016, 2018	1		1		
2020	<b>-0.122</b>	<b>-0.233, -0.011</b>	<b>-0.176</b>	<b>-0.221, -0.132</b>	0.67