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The current paper elucidates how various types of separate and repeated organizational changes in the workplace affect employee mental health, long-term. Results highlight the need to pay attention to employee mental health during both discrete and repeated, large and small-scale organizational change.

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Organizational change and employee mental health: A prospective multilevel study of the associations between organizational changes and clinically relevant mental distress

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Objective The aim of the present paper was to elucidate the relationship between exposure to separate, multiple or repeated organizational change at both individual- and work-unit level and subsequent clinically relevant mental distress amongst employees two years after change had taken place.

Methods A full panel, prospective design was utilized. Data were collected at two time-points two years apart, by self-administered, online questionnaires. Organizational change was measured by six items pertaining to separate types of change. Mental distress was measured using HSCL-10, with cut-off set to ≥1.85 to identify clinically relevant distress. Baseline sample consisted of 7985 respondents, of whom 5297 participated at follow-up. A multilevel analytic strategy was chosen as data were nested within work-units. Effects associated with exposure to organizational change at both individual- and work-unit level were estimated.

Results *Separate change:* At the individual level, company reorganization [odds ratio (OR) 1.29, 95% confidence interval (CI) 1.01−1.65], downsizing (1.51, 95% CI 1.12−2.03) and layoffs (OR 1.46, 95% CI 1.01−2.12) were prospectively associated with mental distress. At work-unit level, company reorganization (OR 1.46, 95% CI 1.04-2.04) was associated with mental distress, but the statistically significant association diminished when adjusting for the work factors job control, job demands and support. *Multiple changes:* At the individual level, exposure to multiple organizational changes at baseline were associated with mental distress at follow-up (OR 1.75, 95% CI 1.28−2.38). *Repeated change*: At the individual level, exposure to repeated organizational change was associated with mental distress at follow-up (OR 1.84, 95% CI 1.29−2.63).

Conclusions Exposure to organizational changes at the individual level indicated an elevated risk of subsequent clinically relevant mental distress following both separate, multiple and repeated organizational changes. These associations were also present at work-unit level, but diminished when adjusting for certain work factors, indicating a possible mediating effect.

Key terms absenteeism; multilevel analysis; occupational health; organization; presenteeism; prospective study; productivity; psychosocial; sick leave; work environment.

Organizational change is a hallmark of modern work life and widespread throughout all industries (1) but has repeatedly been linked to various mental and somatic health complaints (2–8), sick leave (3, 4, 9), and disability (10, 11). Although the rate of organizational change is increasing in both the private and public sectors (1), and continuous change is seemingly commonplace, prior studies have primarily focused on health effects following discrete organizational change events (12). Less attention has been devoted to the effects of repeated organizational change (13, 14) or multiple organizational changes occurring simultaneously (13, 15). Furthermore, extensive organizational change often affects the whole organization, including its departments, work-units and the individual worker. The majority of prior studies have focused on the effects of exposure at the individual level, not explicitly taking into account the multilevel aspect of extensive organizational changes. The objective of the present study was to elucidate the effects of exposure to various types and patterns of organizational change at both the individual level and work-unit level on employee mental distress. A large and diverse sample of Norwegian employees was studied to determine the prospective associations of exposure to

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various distinctive types and patterns of organizational change with subsequent clinically relevant mental distress. The effects of both separate, co-occurring, and repeated organizational change were examined.

Prior research has primarily focused on health effects following discrete, large-scale, organization-wide changes, such as company restructuring, outsourcing and downsizing (12, 16). Such changes have been associated with detrimental health effects (3, 17), sick leave (3, 4), work disability pension (18), early retirement (19), and mortality also among those who kept their jobs after the downsizing (4). Additionally, some studies have reported that the extent of downsizing (ie, the number of employees laid off), as well as prolonged and repeated organization-wide changes to be related to sick leave and emotional exhaustion (17, 20, 21).

Mental illness is one of the main contributors to the global burden of disease and cause of work disability (22). It is also one of the most costly medical conditions (23, 24) and associated with a heavy economic burden for both the affected individual (25) and society (24, 26, 27). Amongst the diagnosis constituting mental illness, depression is the most costly in total (28), with the indirect costs accounting for over half of total costs (23) and includes lower performance and productivity while at work (presenteeism) (29–31), sick leave compensation (31), disability claims (32) and tax-based production loss (23). Due to the widespreadness of both organizational change and mental distress in contemporary work life, clarifying the link between the two is an urgent matter likely to have a considerable impact on public economy and -health and company sustainability.

Most studies pertaining to the effects of organizational change on mental distress have focused on the individuals' response to change, often not taking into account the context in which change takes place. It is possible that mental distress is influenced both by the individual experience of exposure to change and the shared experience of change in the context in which the individual is embedded (eg, the work unit). Identification of work-related predecessors at both individual- and group level is essential in order to comprehensively elucidate the potentially detrimental effects of organizational change and furthermore to develop targeted interventions in order to prevent such effects. Moreover, measures of change at the group level may reflect how widespread change is within that specific group and clarify the extent to which employees share the perception of change taking place. Finally, group-level constructs should diminish the impact of specific characteristics of individual employees, which may bias estimates if, for instance, individuals that are more concerned about the prospect of change may over-report the occurrence of it.

The mechanisms regarding how exposure to different types and frequencies of organizational change affect employee health are complex and still pending (12). However, to posit potential pathways between organizational change and employee mental health one could draw upon empirically supported theoretical frameworks. One widely applied framework in occupational health psychology is the job demands−control−support model (33, 34), which points to factors in the work environment that may influence employee health. A potential pathway between organizational change and mental distress could be via the effect organizational change has on these factors. For instance, organizational change may require considerable individual and organizational effort to adapt, while existing job demands may remain unchanged or increased, which in total may imply a considerable net increase in job demands. However, organizational changes may also have a more direct effect on employee health, apart from the possible indirect effect on employee health via the work environment. For instance, organizational change may represent and induce job uncertainty and lowered predictability, caused by the change content or in what way or context change is implemented, and may be perceived intrinsically as a threat, causing distress and illness (35, 36).

In sum, there are several potential pathways between exposure to organizational changes and mental distress. The scope of the present study was to examine the total effect of various distinct types and patterns of organizational change on mental distress as well as the direct effect, controlled for central dimensions of the psychosocial work environment known to be associated with employee health, namely job demands, job control, and social support.

Method

Population

The study was a part of the project "The New Workplace: Work, Health and Participation in Working Life", initiated and carried out by the Norwegian National Institute of Occupational Health (NIOH) The study had a full panel design, with two waves of data collected with a two-year interval. Data were collected using a comprehensive online questionnaire covering a wide range of topics, eg, work environment and -organization, somatic and mental health, work ability and background information. All variables were measured at both measurement occasions. Baseline data were collected between 2004 and 2013, with follow-up collected two years after the time of baseline measurement.

The organizations participating in the study contacted the National Institute of Occupational Health in response to information about the project disseminated

through the NIOH's home page or due to a more general wish to conduct a work environment survey. All current employees were invited to participate, including managers. In total 66 organizations located in Norway, including private and public enterprises and public administrations, took part in the study. A wide variety of sectors and types of organizations were represented, eg, municipalities, health care, finance, insurance, education and non-profit organizations.

A total of 15 465 respondents were invited to participate at baseline. In total, 7985 respondents were included in the baseline sample, while 5297 respondents were included in the prospective sample. Mean age at baseline was 44.34 years [standard deviation (SD) 10.6]. Non-response was associated with working in professions requiring formal education of <12 years. Women were less likely to be non-respondents. See table 1 for details.

Dropout was defined as not having completed the outcome measure (HSCL-10) at follow-up. Attrition analysis showed that 33.5% (N=2688) of the respondents participating at baseline did not respond at follow-up. Drop-out was associated with experiencing at least one type of organizational change at baseline, being employed in private sector, working in professions requiring <12 years and between 13−15 years of formal education and high job demands. See table 2 for details.

Table 1. Characteristics of baseline sample and prospective sample. Inclusion criteria was completion of HSCL-10 and all organization-wide and individual-specific change items.

	Invited subjects		Baseline sample		Prospective sample	
	N	%	N	%	N	%
Sex						
Female	8467	54.7	4218	52.8	2842	53.2
Male	6998	45.3	3767	47.2	2455	46.8
Total	15 465		7985		5297	
Missing			7480		10 387	
Age						
29—39			678	8.5	415	7.8
>39—49			2090	26.2	1378	26.0
>49—59			2645	33.2	1797	33.9
>59			2563	32.1	1707	32.2
Total [a]			7985	100	5297	100
Skill level (years)						
>10—12			3862	48.3	2591	49.0
13−15			2000	25,0	1216	23.0
>15			2123	26,6	1490	28.1
HSCL-10						
Above cut-off			974	12.2	615	11.6
Below cut-off			7011	87.8	4682	88.4
Workplace						
Public sector	11 792	76.2	1661	20.2	1095	20.7
Private sector	3673	23.8	6324	79.2	4202	79.3
Organizational change						
Reorganizing			5350	55.0	4429	28.6
Downsizing			2406	15.6	1943	12.6
Layoff			911	9.4	1079	7.02
Partial closure			1236	8.2	1056	6.8
Partial outsourcing			776	5.0	992	6.4
Change of ownership/ aquisition			643	4.2	585	3.8

[a] Total mean (SD) for baseline sample=44.34 (10.56); total mean (SD) for prospective sample 43.87 (10.16)

Variables

Exposure measures. Exposure to organizational change was measured with six items with a dichotomous response ("yes"/"no"). Items pertained to different distinct types of organization-wide changes, inquiring whether the organization in which the employee worked had, within the last 12 months, carried out "reorganization", "downsizing", "lay-offs", partial company closure, "partial company outsourcing" or "change of company ownership/acquisition". The terms "downsizing" and "layoffs" are partly overlapping in referring to letting employees go, but in the current study "downsizing" refers to a temporary termination of contract with the chance of rehiring, while "layoffs" refers to a permanent termination of the job contract.

The work-unit (level two) predictor was constructed as the proportion of employees within each work unit who reported that change had taken place, ie, the proportion of employees within each for unit responding "yes" to the questions pertaining to the organizational changes.

Outcome measure. Clinically relevant mental distress.

Table 2. Non-response analysis and attrition analysis. Non-response defined as not completing HSCL-10 at baseline. Attrition defined as completing HSCL-10 at baseline, but not at follow-up. [OR=odds ratio; CI=confidence interval.]

	Non-response		Attrition	
	OR	95% CI	OR	95% CI
Sex				
Female	0.73	0.67-0.78	0.94	0.85-1.04
Male	1	1	1	1
Age				
29—39	-	-	-	-
>39—49	0.59	0.52-.68	0.77	0.63-0.92
>49—59	0.58	0.51-.66	0.64	0.53-0.77
>59	0.73	0.64-.83	0.73	0.60-0.88
Skill level (years)				
>15	1	1	1	1
13—15	0.97	0.88-1.08	1.45	1.25-1.67
>10—12	1.20	1.09-1.32	1.48	1.28-1.71
Workplace				
Public sector	1	1	1	1
Private sector	0.94	0.85-1.03	1.19	1.05-1.35
HSCL-10				
Above cut-off			1	1
Below cut-off			1.16	0.99-1.35
Work Factors				
Job Demands			1.12	1.03-1.22
Job Control			0.89	0.82-0.96
Social Support			0.94	0.88-1.01
Organization-wide changes				
No change at baseline			1	1
≥1 change at baseline			1.12	1.00-1.25

Mental distress was measured with the ten-item Hopkins Symptom Checklist (HSCL-10) (37), a self-report instrument for assessing symptoms of mental distress (37–39). For each item presented, subjects were to rate their own experiences the last seven days on a four-point Likert-scale, ranging from "1=not at all" to "4=very much". Cronbach's α at baseline and follow-up were 0.86 and 0.87. A cut-off point at a mean score of ≥1.85 was set to identify subjects suffering from clinically relevant mental distress (39–41). By applying this cut-off, clinical depression has been detected with a specificity of 74% as defined by Composite International Diagnostic Interview (CIDI) (42) and the instrument has been utilized in prior population studies (43). The reliability and validity of HSCL-10 has been demonstrated in previous population studies (37, 39).

Potential confounders

Age, sex, and skill level were included in all analyses as potential confounders. Skill level was categorized using the International Standard Classification of Occupations (ISCO-88) (44). We utilized the following three categories: (i) ≤12, (ii) 13−15 and (iii) >15 years of formal education. Age was divided into four categories, (i) 29−39, (ii) >39−49, (iii) >49−59 and (iv) >59 years. Place of employment, ie, whether respondents were employed in private or public sector was also included as a potential confounder in all analyses.

In addition, the psychosocial work factors (i) job demands, (ii) job control and (iii) social support were included to determine the extent to which the effect of organizational change exerted a direct effect, irrespective of these factors. These factors were included as possible confounders or mediators in order to observe whether prospective associations between organizational change and mental distress attenuated upon their inclusion. The work factors were assessed by QPS Nordic (45). Responses on all items were given on a five-point Likert scale, ranging from "1=very seldom or never" to "5=very often or always". A mean score was calculated for all work factors separately. Cronbach's α at T1 was 0.83 for job control, 0.76 for job demands and 0.85 for social support.

Statistical analyses

Statistical analyses were run using IBM SPSS Statistics, version 24.0 (IBM Corp, Armonk, NY, USA) and R, version 3.4.4 (R Foundation for Statistical Computing, Vienna, Austria). The level of statistical significance was set to $P<0.05$.

The multilevel analyses were conducted in three steps. In the first step (model 1), analyses were adjusted for age, sex, skill level, year of baseline measurement, number of employees in the work unit and place of employment (private or public sector). The second step (model 2) adjusted for mental distress/HSCL-10 at baseline in addition to the aforementioned, whereas the third step (model 3) also adjusted for the work factors job demands, job control and social support.

As employee responses were nested within work units, we conducted multilevel logistic regressions, or generalized logistic mixed effects regression (GLMER, estimated by the lme4 package in R) to assess prospective associations between exposure and outcome at both the individual- and work-unit level. Multilevel modelling takes into account possible clustering effects in the data, ie, bias due to non-independence of measurements within clusters. Not taking this into account may deflate standard error estimates and increase the risk of Type I error, especially if the intra-class correlation (ie, the correlation of responses within units) is high (46, 47). Intra class-correlations (ICC) reflect the within-group correlation of measurements and the degree to which variance can be explained by between-group differences (48). In the current study, the participating companies were diverse, varying considerably in size, from small, one-unit companies to large companies with many different units across several locations. Therefore, the work unit was used as the cluster variable as employees within work units should have more in common than employees within companies. This notion was supported by the ICC of the organizational change items being higher for work units than for companies (ranging 0.40–0.70 for work units and 0.25–0.52 for organizations).

The individual level predictor was group-mean centered (49, 50), ie, each employees' respective work-unit mean was subtracted from each individual score. Utilizing group-mean centering for the individual-level scores disentangles the effect of the predictor at the different levels by allowing for the predictor at the individual level (level one) and work-unit level (level two) to be uncorrelated. When the predictors at the different levels are uncorrelated, ie, the predictor at the individual level does not vary with the aggregated work-unit level predictor, the effect of the predictor on each level can be considered separately (50). Furthermore, since predictors are uncorrelated, including a group-mean centered individual level predictor in a multilevel analysis does not partial out the effect of the individual level predictor from the effect of the group-level predictor.

As we were interested in estimating the effect of the predictor at both the individual and work-unit level on employee mental distress, following recommendations by Enders & Tofighi (50), group-mean centering was chosen over grand-mean centering.

To model variability, multilevel models utilize random effects, ie, random intercepts and random slopes. In multilevel modelling, a variance parameter can be specified

for the intercept and the regression slope. In (i) a random intercept and random slope model, both the intercept and slope can vary between work-units. In (ii) a random intercept only model, the intercept varies between work-units, while the regression slope is fixed for all level two units, ie, the regression coefficient is the same for all work-units. Both random intercept only models and random intercept and random slope models were tested, and a likelihood ratio test was used to determine whether adding a random slope improved model fit, or whether the more parsimonious random intercept only model was sufficient.

Results

Separate organizational changes

According to the likelihood ratio tests, adding a random slope resulted in a statistically significant improvement only for the model with downsizing as predictor (Chi square=4.606, Chi Df=1, P<0.05). Thus, all other models were run with a random intercept only.

In model 1, at the individual level, all separate, organizational changes were statistically significantly associated with clinically relevant mental distress at follow-up: "reorganization" [odds ratio (OR) 1.50, 95% confidence interval (CI) 1.22−1.83], "downsizing" (OR 1.70, 95% CI 1.32–2.20), "lay-offs" (OR 1.49, 95% CI 1.10–2.01) "partial closure" (OR 1.31, 95% CI 1.00–1.70), "partial outsourcing" (OR 1.52, 1.12–2.06), and "merger/acquisition" (OR 1.50, 95% CI 1.00–2.23). At the work-unit level, the associations were statistically significant for "reorganization" (OR 1.70, 95% CI 1.26–2.30) and "partial outsourcing" (OR 1.90, 95% CI 1.04–3.44). In model 2, adding adjustment for mental distress at baseline, at the individual level, company "reorganization" (OR 1.33, 95% CI 1.06–1.67) and "downsizing" (OR 1.47, 95% CI 1.10–1.97) remained statistically significant, and − for the work-unit level − "reorganization" (OR 1.46, 95% CI 1.04−2.04) was a statistically significant predictor. In model 3, adding psychosocial work factors as predictors, at the individual level company "reorganization" (OR 1.29, 95% CI 1.01–1.65), "downsizing" (OR 1.51, 95% CI 1.12–2.03) and "lay-offs" (OR1.46, 95% CI 1.01–2.12) were statistically significant, whereas at work-unit level no associations remained statistically significant when adjusting for work factors. See table 3 for details.

Multiple organizational changes

In model 1, exposure to "one type of organizational change at T1" as opposed to none was statistically significantly associated with clinically relevant mental distress at follow-up for both the individual (OR 1.36, 95% CI 1.07–1.72) and work-unit level (OR 1.98, 1.28–3.06). Exposure to "two or more changes at T1" were statistically significantly associated with clinically relevant mental distress at follow-up only at the individual level (OR 2.12, 95% CI 1.64–2.73). In model 2, associations between exposure to "one type of change at T1" remained statistically significant at both individual level (OR 1.43, 95% CI 1.10–1.85) and work-unit level (OR 1.73, 95% CI 1.06–2.83). Associations also remained significant for exposure to "two or more changes at T1" at the individual level (OR 1.86, 95% CI 1.39–2.49). In model 3, associations remained statistically significant at the individual level for exposure to "one type of change at T1" (OR 1.41, 95% CI 1.07–1.87) and "two or more of changes at T1" (OR 1.75, 95% CI 1.28–2.38). See table 4 for details.

Repeated organizational change

In model 1, exposure to organizational change "both at T1 and T2" were statistically significantly associated with clinically relevant mental distress at follow-up

Table 3. *Separate organizational changes.* Multilevel logistic regressions with clinically relevant mental distress (HSCL-10) at follow-up as outcome. Predictors at the individual level were the reported changes at baseline and predictors at the work-unit level were the proportion of employees in each work unit reporting the respective changes.[OR=odds ratio; CI=confidence interval.] **Bold indicates statistically significant.**

Organizational change	Model 1 [a]				Model 2 [b]				Model 3 [c]			
	Individual-level		Work-unit level		Individual level		Work-unit level		Individual level		Work-unit level	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Reorganization	**1.50**	**1.22–1.83**	**1.70**	**1.26–2.30**	**1.33**	**1.06–1.67**	**1.46**	**1.04–2.04**	**1.29**	**1.01–1.65**	1.41	0.97–2.04
Downsizing [d]	**1.70**	**1.32–2.20**	0.81	0.56–1.18	**1.47**	**1.10–1.97**	0.75	0.50–1.14	**1.51**	**1.12–2.03**	0.66	0.42–1.05
Layoffs [d]	**1.49**	**1.10–2.01**	1.00	0.52–1.91	1.35	0.96–1.92	0.81	0.39–1.70	**1.46**	**1.01–2.12**	0.52	0.23–1.21
Partial closure	**1.31**	**1.00–1.70**	1.55	0.97–2.47	1.16	0.86–1.57	1.44	0.84–2.47	0.98	0.71–1.36	1.42	0.79–2.54
Partial outsourcing	**1.52**	**1.12–2.06**	**1.90**	**1.04–3.44**	1.34	0.94–1.91	1.44	0.74–2.83	1.24	0.84–1.82	1.45	0.69–3.05
Change of ownership/ acquisition	**1.50**	**1.00–2.23**	0.84	0.40–1.77	1.32	0.84–2.08	0.73	0.31–1.68	1.20	0.75–1.93	0.82	0.33–2.01

[a] Adjusted for age, sex, skill level, place of employment, year of baseline

[b] Model 1+ mental distress (HSLC-10) at baseline

[c] Model 2+ and the work factors job demands, job control and social support.

[d] Downsizing pertains to temporary termination of job contract, while layoffs pertains to permanent termination of job contract.

Table 4. *Multiple organizational change.* Multilevel logistic regressions with clinically relevant mental distress (HSCL-10) at follow-up as outcome. Predictors at the individual level were the reported changes at baseline and predictors at the work-unit level were the proportion of employees in each work unit reporting the respective changes. [OR=odds ratio; CI=confidence interval.] **Bold indicates statistically significant.**

Organizational change	Model 1 [a]				Model 2 [b]				Model 3 [c]			
	Individual-level		Work-unit level		Individual level		Work-unit level		Individual level		Work-unit level	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
0 change at T1	1		1		1		1		1		1	
1 change at T1	**1.36**	**1.07–1.72**	**1.98**	**1.28–3.06**	**1.43**	**1.10–1.85**	**1.73**	**1.06–2.83**	**1.41**	**1.07–1.87**	1.63	0.95–2.79
≥2 changes at T1	**2.12**	**1.64–2.73**	1.44	0.98–2.12	**1.86**	**1.39–2.49**	1.12	0.73–1.73	**1.75**	**1.28–2.38**	1.00	0.62–1.61

[a] Adjusted for age, sex, skill level, place of employment, year of baseline
[b] Model 1+ mental distress (HSLC-10) at baseline
[c] Model 2+ and the work factors job demands, job control and social support.

Table 5. *Repeated organizational change.* Multilevel logistic regressions with clinically relevant mental distress (HSCL-10) at follow-up as outcome. Predictors at the individual level were the reported changes at baseline and predictors at the work-unit level were the proportion of employees in each work unit reporting the respective changes at baseline.[OR=odds ratio; CI=confidence interval.] **Bold indicates statistically significant.**

Organizational change	Model 1 [a]				Model 2 [b]				Model 3 [c]			
	Individual-level		Work-unit level		Individual level		Work-unit level		Individual level		Work-unit level	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
0 change at T1	1		1		1		1		1		1	
Change only at T1	**1.03**	**0.76–1.41**	**2.13**	**1.29–3.52**	**0.93**	**0.66–1.31**	**2.02**	**1.15–3.56**	**0.91**	**0.63–1.32**	1.79	0.97–3.32
Change only at T2	**1.03**	**0.72–1.49**	1.56	0.82–2.99	**0.94**	**0.62–1.41**	1.47	0.71–3.03	**0.93**	**0.60–1.44**	1.29	0.59–2.82
Changes at T1 and T2	**2.04**	**1.52–2.74**	1.91	1.26–2.89	**1.93**	**1.39–2.70**	1.59	0.99–2.49	**1.84**	**1.29–2.63**	1.37	0.83–2.27

[a] Adjusted for age, sex, skill level, place of employment, year of baseline
[b] Model 1+ mental distress (HSLC-10) at baseline
[c] Model 2+ and the work factors job demands, job control and social support.

for both individual level exposure (OR 2.04, 95% CI 1.52–2.74) and work-unit level exposure (OR 1.92, 95% CI 1.26–2.89). In model 2, the association between exposure to change at "both T1 and T2" remained significant only for the individual level (OR 1.93, 95% CI 1.39–2.70), whereas exposure to "one type of change at T1" was statistically significant for work-unit level (OR 2.02, 95% CI 1.15–3.56). In model 3, the associations between exposure to change at "both T1 and T2" remained statistically significant for the individual level (OR 1.84, 95% CI 1.29–2.63). See table 5 for details.

Discussion

Separate organizational change

Organizational change may affect the organization as a whole, departments, work units and individual employees. Applying multilevel analyses, the current study aimed to elucidate the effects of exposure to various distinct types and patterns of organizational change at both individual- and work-unit level on employee subsequent clinically relevant mental distress. The present results indicate a long-term detrimental effect on employee mental health following exposure to separate, co-occuring or repeated organizational change at either level.

The study demonstrated prospective associations between individual- and work-unit level exposure to certain types of separate organizational changes, eg, company reorganization, and clinically relevant mental distress two years after change had taken place. However, following exposure at the individual level, some statistically significant associations diminished when adjusting for psychosocial work factors, whereas all statistically significant associations diminished at work-unit level when adjusting for these factors. This suggests that the relationship between exposure to organizational change at work-unit level and employee mental distress could be mediated by repercussions in the work environment. However, following exposure on the individual level, associations remained statistically significant for reorganization, downsizing, and layoffs, suggesting health effects that are not derived from changes in demands, control, or support at the individual level. Although much attention has been given to the relationship between organizational change and employee mental health, the mechanisms explaining how and why different types of organizational changes affect employee health are yet largely unknown (12). One potential mechanism could involve how organizational change influences factors in the work environment, and by that employee health. Different types of organizational changes may be associated with distinct changes in the work environment affecting employee health differently. Empirically supported theoretical frameworks such as the demand–control–support model (34), and the

effort–reward model (51) posit how work factors such as job control, job demands, and job security can influence employee health and well-being (52, 53), and prior studies have reported increased job demands, reduced job control (20) and social support (54) following extensive organizational changes, such as company downsizing. If certain types of organizational change is associated with specific changes in the work environment known to affect mental health negatively, this could help explain the different associations between the various types of organizational change and subsequent mental distress, as is indicated in the present results.

Differences in change content could also help explain why only certain types of organizational change is associated with long-term mental distress. For instance, differences in content may influence how the change is perceived and thus responded to. If the content of an organizational change is perceived as posing a threat to job security (55–57), which may be the case in a downsizing or layoff process where ones job contract may be temporarily or permanently terminated, experiencing such change may be associated with elevated levels of distress. While on the other hand, exposure to organizational changes that consists of elements perceived as opportunities for positive development and growth, eg, a company merger, may not be associated with mental distress. In other words, differences in change content may be associated with differences in change appraisal, which may influence whether change is experienced as straining or not, possibly explaining why some organizational changes are associated with mental distress, while others are not, as was the case in the present study.

In addition, change implementation and process may also influence how organizational change is related to long-term mental distress. It seems reasonable to expect that the manner in which change is undertaken may differ greatly between specific change processes of similar content. Two downsizing processes, for instance, may affect employee health differently as a function of the way and context in which they were implemented. Differences in various aspects in the change process such as the degree to which employees are included in the process, sense of procedural justice, leadership style and information flow could all reflect differences in change implementation, which may affect employee health differently (58−60). Such variations in aspects pertaining to change process may help explain the inconsistent findings related to health effects following organizational changes of similar content (12) and may also help explain why previously reported associations between organizational changes such as company closure and outsourcing and mental distress was not replicated in the current study (12, 61).

Multiple and repeated organizational change

Although recurrent change is a central characteristic of contemporary work life (1) few studies have examined the effects following multiple or repeated organizational changes on employee mental health (12, 13). In the present study, results pertaining to the effects following exposure to multiple organizational changes at the individual level indicated a long-term association with clinically relevant mental distress. A statistically significant association was not present following exposure at work-unit level. In line with prior studies, effects following multiple changes were stronger than for a one-time only exposure to organizational change at baseline (62–65). For exposure to repeated organizational changes, both individual level and work-unit level exposure were statistically significantly associated with clinically relevant distress at follow-up, but associations at work-unit level diminished when adjusting for mental distress at baseline and the psychosocial work factors.

The psychological load of organizational change may be derived not only from exposure to the specific types of change and the accompanying process, but also from the number of different changes, how often they occur, and how long they last. To help explain the stronger effects on health following multiple and repeated changes as opposed to separate changes, one may speculate as to whether the work environment in organizations undergoing multiple or repeated organizational changes could be more strongly affected than in companies undergoing a one-time only, separate change. For instance, there may be an elevated level of uncertainty, increases in workload or decrease in social support in organizations undergoing repeated, extensive changes compared to organizations undergoing a single, distinct change. In addition to affecting the work environment, and by that employee health, multiple or repeated organizational changes could also in itself possess a greater threat to perceived stability and sense of predictability in both the individual employee and the organization than a separate, discrete change. To help explain the stronger effect associated with multiple and repeated changes compared to separate changes in the present study, one could draw upon vulnerability models (63). Vulnerability models posit that the individual can become more vulnerable following repeated exposure to a stressor, as it drains the individual's coping resources and over time could make the individual less capable of coping (66, 67). If exposure to organizational change is perceived as straining, repeated exposures to such changes could have a more adverse impact on health than a one-time exposure as the employee repeatedly has to mobilize effort to cope, which eventually may lead to fatigue and emotional exhaustion.

Previous studies examining the health effects of both separate and repeated organizational changes such as reorganizations, downsizing and layoffs have reported associations with mental distress (68), depressive symptoms (6, 62, 69–72) and symptoms of anxiety (73), as in the present study. In addition, other health-related outcomes such as disability pension (10), increases in sick leave (3, 4) and psychotropic drug use (2) have all been associated with separate organizational changes, such as the aforementioned. However, not all studies reports these negative health effects following change (12). Current results did not identify statistically significantly prospective associations between clinically relevant distress and organizational changes such as partial closure and outsourcing, underlining that organizational change of different scopes may have different effects on employee health based on the various potential mechanisms as mentioned above. Regarding exposure to repeated change, in addition to health effects like heightened levels of mental distress (63, 64, 68) and anxiety (73), effects such as increased job insecurity, role ambiguity and intention to quit (62), higher self-rated workload, lowered job satisfaction (64), reduced trust and turnover intention (74) have been reported. As in the present study, multiple changes have also been associated with stronger effects on employee health than single change (62–64). However, there have also been reports on positive effects of repeated organizational change such as increased resilience and autonomy (74). Thus, the relationship between organizational change and employee health hence is still pending and the various pathways between different types and patterns of change and employee mental distress needs to be examined more in detail.

Methodological considerations

The present study utilized a prospective design with two-year intervals between measurements, which may have influenced results. The lack of associations between certain types of organizational change and mental distress could be due to the long time-span between measurements not being optimal. Effects may have been present but diminished within the time span between baseline and follow-up. Thus, even though results did not indicate a statistically significant detrimental health effect following certain types organizational changes two years after exposure, a short-term effect could still be present (12).

In addition, the current study used a clinical cut-off as outcome measure. This is a strict criterion, hence, although the aim of the current study pertained to clinical levels of distress, there may be undetected associations of change with sub-clinical levels of distress. To our knowledge, few other comparable studies have applied a clinical cut-off. Furthermore, with depression being one of the leading causes of sick leave and work disability (1, 27) the notion that organizational change efforts may cause mental distress of an intensity that may necessitate medical intervention is of importance. The relationships demonstrated herein highlight the need to take employee mental health into account when initiating and implementing organizational change, especially when multiple, repeated changes are taking place.

Attrition may also affect the results. The attrition analysis indicated that experiencing at least one type of organizational change was associated with drop-out. If subjects dropped out due to the impact of organizational change on mental health, this could affect the internal validity of the study, suggesting an underestimation of effects. In addition, although scoring above HSCL-10 cut-off at baseline was not significantly associated with drop-out at follow-up, it cannot be ruled out that employees already experiencing clinically relevant mental distress, possibly due to organizational change at baseline, were less likely to participate initially, implying a healthy worker effect (75).

Furthermore, a larger part of the sample was employed in public sector and had permanent positions than the general working population of Norway (76). Previous studies have indicated that temporary employment is linked to higher psychological morbidity (77–79), and one may surmise that temporary employees may experience certain types of change as more threatening than permanent employees. Furthermore, employees working in temporary positions in private companies have been reported to experience a higher physical workload than their publicly employed counterparts (80). Hence, effects in the current study could be underestimated due to the large proportion of respondents with a presumably relatively secure work situation.

The analyses of repeated organizational change included measurements of both predictor and outcome at follow-up, hence the temporal separation of predictor and outcome was only partial, meaning the design is only partly longitudinal. However, effects were stronger for experiencing change at both T1 and T2 than for experiencing it only at T1 or only at T2, suggesting these analyses picked up something more than the cross-sectional association of T2 change with T2 mental distress.

All data were collected using questionnaires, hence results could be influenced by self-report bias and common-method variance (CMV) (81, 82). However, a multilevel design should attenuate such bias. Demonstrating an effect at the aggregated work unit level should minimize reporting bias that may occur at the individual level. However, it should be kept in mind that not detecting associations at work-unit level (level two) does not constitute evidence of such reporting bias

at the individual level (level one), since the association between organizational change and employee mental health could be largely an individual level phenomenon, and statistical power at the work-unit level is lower due to fewer observations.

Future perspectives

The prospective associations between certain types and patterns of organizational change and clinically relevant mental distress in the present study underline the need to take into account employee health when planning and implementing extensive, organization-wide changes as this may have long-term adverse consequences for both employees and the organization. In line with prior studies, the present results demonstrate that organizational change is a heterogeneous phenomenon with certain types of changes being more consistently associated with detrimental health effects than other types of change (12) and a more in-depth understanding of the underlying mechanisms as to how exposure to various types of organizational change affects employee health differently is needed. Future research should consider possible mediating or moderating variables in the relationship between exposure to organizational changes and employee health. For instance, organizational change may influence the work environment in ways that may influence employee health, hence mediate the relationship between change and employee health. Prior studies have suggested that psychological and social work factors such as job demands and control (53, 83), job insecurity (57), role conflict and ambiguity (84, 85), leadership (86, 87), and supervisor- and social support (53, 85) may influence employee health and these factors may be affected by change taking place within the organization. Furthermore, organizational and employee characteristics might moderate the relationship between organizational changes and mental health outcomes. Further knowledge of the potential moderating effects of eg, leadership style, employee age, occupation or work organization could give rise to targeted interventions in order to reduce and prevent adverse health effects associated with adverse and costly health outcomes. It remains an important task of future research to further examine under what specific conditions a negative or positive effect occurs.

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