



Effectiveness of a workshop-based intervention to reduce bullying and violence at work: A 2-year quasi-experimental intervention study

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ABSTRACT

Introduction: Bullying and violence at work are associated with reduced wellbeing of the victims, but few evidence-based interventions are available to prevent these offensive behaviours. We developed and examined the effectiveness of an intervention aimed at prevention of bullying and violence at work through modifications in psychosocial work environment.

Methods: In accordance with pre-published protocol, employees and supervisors of 12 work units in 3 cities (intervention group A: n = 315; intervention group B: n = 271) received a workshop-based intervention on organizational practices to prevent bullying and violence, including supervisor support, supervisor justice, workplace social capital, and psychological safety and were compared to a reference group (n = 2310) which did not receive the intervention. Latent change score modelling (LCSM) was used to estimate between- and within-individual differences in changes of organizational practices and prevalence of bullying and violence from baseline (2020) to follow-up (2022).

Results: No direct or indirect effects of intervention were observed. Of the potential mediator variables, supervisor support (B = 0.04; 95% confidence interval 0.006, 0.07) and supervisor justice (0.04; 0.01, 0.08) improved in the intervention group B between the measurements and compared to control group, but the result was not replicated in intervention group A. No changes were observed between the measurement points in bullying or violence at work.

Conclusions: No intervention effects on bullying and violence at work were observed. It may be worthwhile to develop the intervention further to focus more on supervisor and co-worker relationships and on psychosocial resources of work team.

1. Introduction

Offensive behaviours, such as bullying and violence at workplace, are associated with various adverse outcomes, including job dissatisfaction, mental disorders, such as anxiety and depression, sleep problems, sickness absence, job turnover intentions, and suicidality (Ervasti et al., 2012; Gillen et al., 2017; Gluschkoff et al., 2017; Houck and Colbert, 2017; Leach et al., 2017; Nielsen et al., 2012, 2016, 2020a, 2020b; Nyberg et al., 2021; Rudkjoebing et al., 2020). Workplace bullying refers to constant and prolonged harassing behaviour from one or more colleagues including supervisors, where the person is unable to defend oneself (Nielsen and Einarsen, 2018). Globally, the prevalence of

bullying varies between 11% and 18% (Nielsen et al., 2010).

The International Labour organization (ILO) defines workplace violence as “any action, incident or behaviour that departures from reasonable conduct in which a person is assaulted, threatened, harmed, injured in the course of, or as a direct result of his or her work” (ILO, 2003; Lanctôt and Guay, 2014). Some occupations have a particularly high risk of violent or threatening situations at work. For example, the proportion of employees having experienced violence is 62% (Liu et al., 2019) in the health care sector and 80% (lifetime prevalence) in teachers (Wilson et al., 2011).

Offensive behaviours tend to cluster with other adverse psychosocial factors at work. These include, for instance, role conflicts, problems in

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the organization of work and work tasks, high job demands, excess workload, insecurity, poor team climate, dissatisfaction with leadership and towards organization (Andersen et al., 2018; Einarsen et al., 2011; Salin, 2003; Van den Brande et al., 2017). In a risk prediction model determining factors associated with a high risk of bullying at work, reports of discrimination, unreasonably high workload, threat of termination of work tasks, feelings of not being understood and accepted within one's team, not being able to trust one's supervisor, and shorter time in current position at baseline were associated with the onset of bullying at follow-up (Ervasti et al., 2023). Another risk prediction model determining factors associated with increasing workplace violence in high-violence risk occupations found that while feelings of haste and hurry were consistently predictive of increased violence in health and social care professionals, other psychosocial predictors varied across occupations (Airaksinen et al., 2023). Psychosocial workplace resources, such as workplace social support, organizational justice and fair leadership practices, may, in turn, alleviate the negative effects of psychosocial risks (Vranjes et al., 2022), as well as the adverse impacts of offensive behaviours (Gluschkoff et al., 2017; Nielsen et al., 2016, 2019, 2020a).

Employers in Finland are mandated to take steps to eliminate workplace bullying and ensure safety at workplaces, but there is a lack of scientific evidence on interventions and actions that would be effective (Gillen et al., 2017; Hill et al., 2015; Lanza et al., 2009; Ziaei et al., 2019). We evaluate the effectiveness of a workplace intervention focusing on prevention of offensive behaviours by structured consultation, development of policies, and developing psychosocial work resources. Based on previous evidence on the risk factor clustering (Andersen et al., 2018; Einarsen et al., 2011; Salin, 2003) and mediating the effects of psychosocial resources (Vranjes et al., 2022), as well as recent evidence from the risk prediction models (Airaksinen et al., 2023; Ervasti et al., 2023), we hypothesized that any effects on offensive behaviours would be accompanied by changes psychosocial work environment. The intervention study protocol was published before intervention implementation (Ervasti et al., 2022).

2. Materials and methods

2.1. Study setting and study sample

The intervention was nested in the Finnish Public Sector (FPS) cohort study with questionnaire surveys every two years in 11 Finnish cities and in 5 health care organizations (Ervasti et al., 2012; Kivimäki et al., 2007). We used a subset of responses from 2020 to 2022 surveys conducted in the 11 cities. The intervention was workshop-based and focused on organizational practices to prevent offensive behaviours. Three cities participated to the intervention. During the intervention implementation, while most work units worked with both phenomena as planned, three work units chose to deal with only workplace bullying, and one only with violence. Thus, we formed two intervention groups based on primary outcome (bullying or violence). The intervention group A consisted of the employees of 11 work units in the three cities, who had responded to the questionnaire at both measurement points and completed the intervention dealing with at least workplace bullying, but partly also violence at work ($n = 315$). Here, the outcome was workplace bullying. The intervention group B consisted of the employees of 9 work units in the three cities, who responded to the questionnaire at both measurement points and completed the intervention dealing with at least violence at work, but partly also workplace bullying ($n = 271$), and the outcome was violence. The participating 12 work units represented the variety of public sector work: units were from childcare to youth services and elderly services, and to museums, libraries, and water-, sports-, public premise-, and transportation services. The control group consisted of five control participants for each intervention participant, matched based on sex, age, and occupational socioeconomic status, and the total number of participants with complete data in the control group

was 2310 (Fig. 1.).

2.2. Ethical approval

In the FPS study, filling up the questionnaire is totally voluntary. The voluntariness was clearly stated in the cover letter of the questionnaire. Filling up the questionnaire was considered as a consent to participate. The FPS study has received ethical approval from the Ethics Committee of the Helsinki and Uusimaa hospital district (HUS/1210/2016). For the current intervention study which utilizes FPS data, additional ethical approval was sought from the Ethical committee of the Finnish Institute of Occupational Health (10/2020; 1/2021). The work units participating to the intervention were defined by the employers. Participation to the intervention took place during work hours and was defined as part of the work tasks. Participation, defined as being present, was thus mandatory. However, active participation, as defined by taking part in the discussions at workshops, was totally voluntary.

2.3. Content of the intervention

The intervention was based on the premise that zero-tolerance to adverse events must be a common goal throughout the organization, from employees to supervisors and top managers. The content of the current intervention applied the experiences and results of previous research and interventions: supervisors can learn to intervene bullying and focusing on organizational practices might be especially effective (Hill et al., 2015; Lanza et al., 2009; Vartia et al., 2016; Vranjes et al., 2022). The specific learning objectives within the intervention were preventive in nature rather than directly dealing with acute bullying cases or other acute crises.

The work units were offered three 2-h workshops for employees from Spring to Autumn in 2022. The first workshop reviewed the definitions of workplace bullying and inappropriate work behaviour, as well as their multiple potential manifestations. Based on a self-assessment of appropriate work behaviours in their work unit, the employees discussed about strengths and weaknesses in their teamwork in their units and chose 1–3 developmental goals. The second workshop dealt with violent encounters with customers, patients, or students. The participants reviewed the preventive procedures of violence in their workplace, shared their experiences of best practices, and discussed ways to prevent violence. The third workshop was for follow-up and update of the themes that were selected in the previous meetings. It included practices and focusing the developmental goals. In the workshops, the work unit worked both individually and as a group. In addition to employee workshops, additional mentoring was offered to the supervisors of the work units from Spring to Autumn in 2022. The COVID-19 pandemic restrictions influenced the implementation, and part of the workshops were implemented as online meetings.

2.4. Measures

Matching of the control participants to the intervention participants was based on register data on sex, age, and occupation. Occupations were classified according to the 2001 International Standard Classification of Occupations (ISCO) into three categories of socioeconomic status (SES): upper non-manual work including managers, administrators, specialists, physicians, and teachers; lower non-manual work including office workers, clerks, customer service and sales workers, and registered nurses; and manual workers including construction, manufacturing, transportation workers, and practical nurses.

Supervisor support was measured with 4-items describing supervisors support, encouragement, rewarding, and trust in employees. The items were summed and averaged and rated on a 5-point Likert-scale, ranging from 1 (I totally disagree) to 5 (I totally agree).

Supervisor justice was measured with a 6-item Relational Justice instrument describing supervisor's fairness, kindness, interaction,

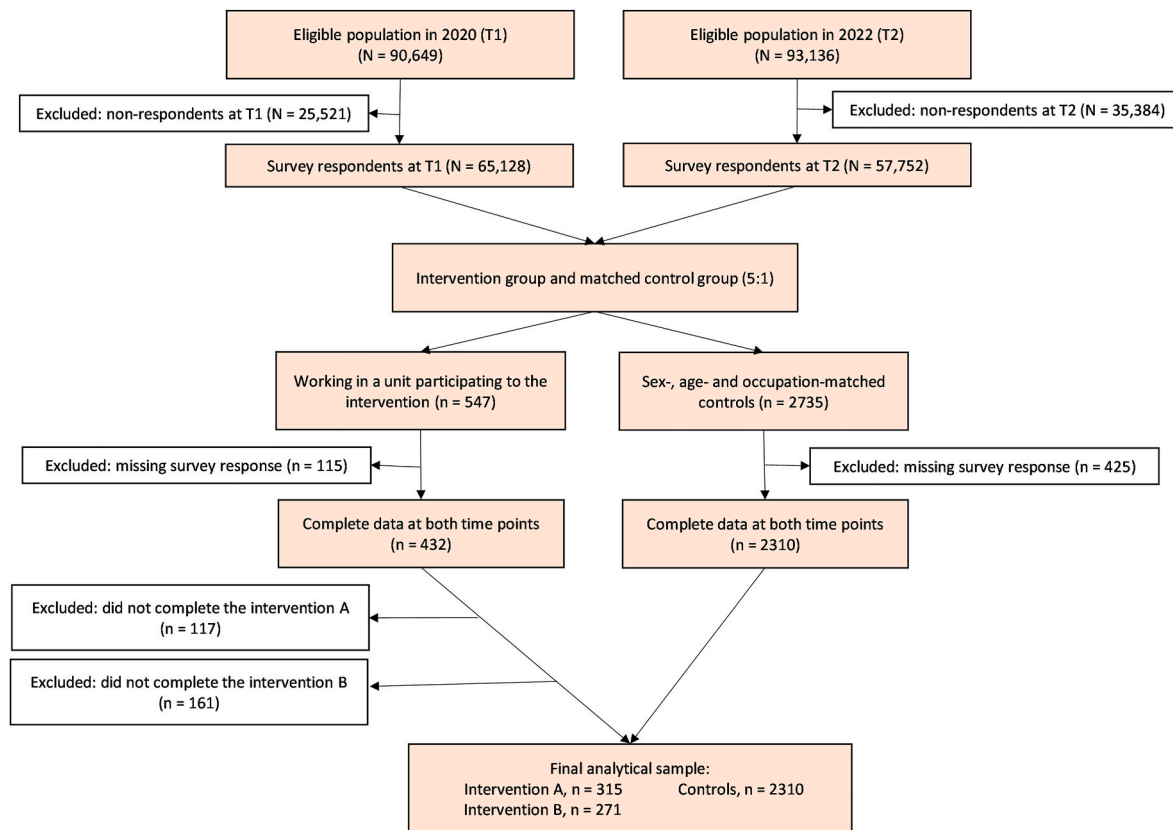


Fig. 1. Flow chart of the study design.

information sharing, respect for the employees, and trustworthiness (Moorman, 1991). The items were summed and averaged and rated on a 5-point Likert-scale, ranging from 1 (I totally disagree) to 5 (I totally agree).

Workplace social capital was measured with validated measure of 8 items describing the combination of team climate (participative safety, support for innovation, task orientation) and supervisory behavior (kindness, consideration, fairness) (Kouvonen et al., 2006).

Work unit psychological safety was measured with 8 items of respect, support, trust, helpfulness and lack of gossip, envy, discrimination, and bullying within the work unit summed and averaged. The items were rated on a 5-point Likert-scale, ranging from 1 (I totally disagree) to 5 (I totally agree).

Workplace bullying was measured with the following question: “Psychological violence or bullying at work refers to the *constant, repeated* isolation of a member of the working community, belittling one’s work effort, threats, talking behind one’s back or other forms of pressure. Have you been the target of such bullying in the past 12 months? (yes/no) (Xu et al., 2018).

Violence or threat of violence at work was measured with the following question: “Have any of the following violent or threatening confrontations involving clients happened to you over the past 12 months?” (yes/no): 1) Throwing or breaking things; 2) Mental abuse (e.g., verbal threats); 3) Physical violence (e.g., hitting, kicking); 4) Threatening with a weapon (firearm, edged weapon, striking weapon). “Yes” to any kind of violence was coded as 1, and “No” to all was coded as 0.

2.5. Statistical analyses

In the intention-to-treat analyses, we describe the between-group changes that occurred in the intervention groups and in the control group from T1 to T2. The matching of controls to intervention

participants partly failed, and thus we adjusted the models with sex-, age- and socioeconomic status. We applied linear regression analysis for continuous mediator variables, and binomial regression analysis with log link function for binary outcome variables, using the repeated measures generalized estimating equations with exchangeable correlation structure. We calculated least square means for mediator and outcome variables at T1 and T2, mean differences with 95% confidence intervals (CI) for continuous variables by contrasting T2 with T1, and relative risk ratios for binary variables with 95% CI by contrasting T2 with T1.

As the focus of this study was on changes in offensive behaviours from T1 to T2 that the intervention may cause through changes in psychosocial factors from T1 to T2, the multivariate analyses were conducted using the latent change score modeling (LCSM) approach (Ferrer and McArdle, 2010; McArdle, 2009). We studied both the within-individual changes in different variables, the relations between these changes, and between-individual differences in these within-individual changes. That is, we investigated whether the intervention changed the level of mediating variables, and whether the changes in these variables further led to a change (decrease) in offensive behaviours. These analyses were conducted in two phases. First, the latent change factors were created for total scores of psychosocial work characteristics ($\Delta\text{PsySo}_{T2-T1}$), workplace bullying (ΔWB_{T2-T1}), and workplace violence (ΔWV_{T2-T1}). The latent change factors were defined to measure change between two measurement points (T1–T2) with factor loadings fixed to 1 (Ferrer and McArdle, 2010; McArdle, 2009). LCSM defines an observed variable at T2 as the change in observed variable from baseline (T1–T2) and sets the path between the two measurement times at 1. A regression path to the latent change factor from the observed variable at baseline was then added. The latent change factors capture the change in the variables from the baseline measurement to the follow-up measurement time (i.e., intra-individual change), considering the baseline level. The tested LCSM model is

presented in Fig. 2.

The effects of the intervention were investigated by adding the regression paths from the dichotomous intervention variable (intervention = 2 and control = 1) to the latent change factors of psychosocial work characteristics and from the change factors of psychosocial work characteristics further to latent change factors of offensive behaviours. Hypothetically, a statistically significant positive regression coefficient A from the intervention to the change factors of psychosocial work characteristics would indicate that the change in the intervention group is different from the control group. Moreover, statistically significant indirect effects (regression coefficient B) are required to demonstrate mediation. The intervention was not expected to change offensive behaviours directly, but through changes in psychosocial work characteristics, thus ruling out a possible Hawthorne effect.

LCSM was conducted within a structural equation modelling framework and using the Mplus statistical program (version 8) (Muthèn & Muthèn, 1998–2017). We investigated the effects of different psychosocial work characteristics in four separate models. All the models were saturated. The parameters of the models were estimated using maximum-likelihood estimation (ML) with bootstrapping (Efron, 1987; Efron and Tibshirani, 1986). The 95% CI for regression coefficients (Beta, *b*) were based on 1000 bootstrap resamples and we used the default setting for handling missing values in Mplus. The statistical code is available as Web appendix 1.

3. Results

In both intervention and control groups, most (64–72%) participants were women, which aligns with the general sex distribution of the Finnish public sector workers. Due to missing survey responses, the distributions of sex and socioeconomic status differed between the

groups: there were more upper non-manual workers in the intervention groups, and more manual workers in the control group in the final analytical sample despite matching. At baseline, the control participants' perceptions of supervisors and teams were slightly higher than those of the intervention participants. The prevalence of offensive behaviours was higher among the intervention participants than among the controls (Table 1). The intervention implementation is summed up in Web appendix 2. The implementation worked mostly as planned, except for slightly higher emphasis on bullying than violence.

Of the potential mediators, supervisor support (MD = 0.21, 95% CI 0.03, 0.39) and supervisor justice (MD = 0.20, 95% CI 0.04, 0.37) improved in the intervention group B between the measurements, and social capital (MD = -0.04, 95% CI -0.07, -0.006) declined in the control group (Web appendix 3). No changes were observed between the measurement points in outcomes, that is, in bullying or violence at work (Web appendix 4).

3.1. Effects in the intervention group A focusing on workplace bullying

The change in supervisor support from T1 to T2 did not differ between the intervention and control groups ($b = 0.015$; 95% CI -0.017, 0.047), and the intervention had no direct effect on change in workplace bullying ($b = -0.017$; 95% CI -0.016, 0.050). The indirect effect of the intervention via increases in supervisor support to decreases in workplace bullying was also non-significant ($b = 0.002$, 95% CI -0.005, 0.002). However, increase in supervisor support was associated with decrease in workplace bullying ($b = -0.11$; 95% CI -0.16, -0.07) in the entire study population. The baseline level had a significant negative effect both on the changes in supervisor support ($b = -0.50$; 95% CI -0.52, -0.47) and in workplace bullying ($b = -0.62$; 95% CI -0.66, -0.59); that is, the higher the level of bullying or supervisor support at

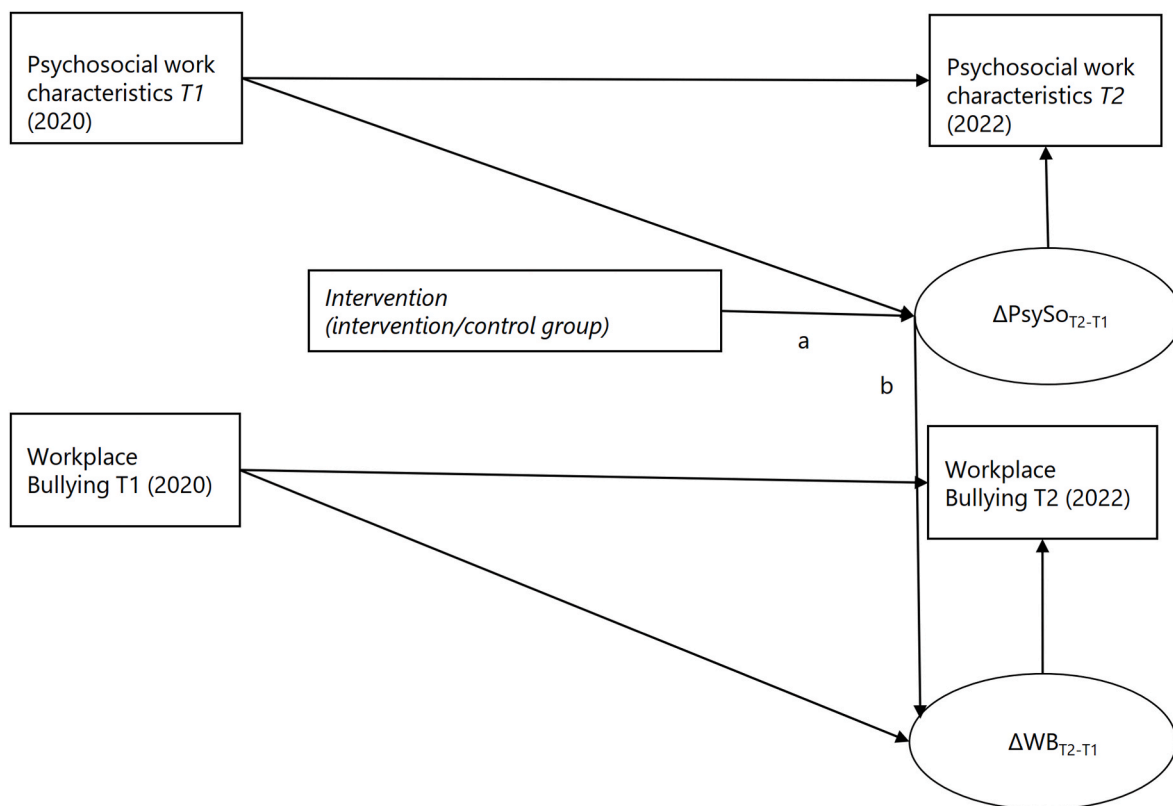


Fig. 2. Hypothesized Latent Change Score Models. The tested models were saturated, but only the hypothesized relations are presented here for readability. Psychosocial work characteristics (PsySo) = Supervisor support, Supervisor justice; Workplace social capital; Work unit psychological safety. $\Delta\text{PsySo}_{T2-T1}$ = change in psychosocial work characteristics between time points 2020 and 2022; ΔWB_{T2-T1} = change in workplace bullying/violence between time points 2020 and 2022. Intervention is dichotomous variable (intervention group = 2, control group = 1).

Table 1
Characteristics of the study population and main variables at baseline (T1).

	Intervention A (n = 312–315)				Intervention B (n = 269–271)				Control C (n = 2238–2310)				Difference A and C		Difference B and C	
	%	N	M	SD	%	N	M	SD	%	N	M	SD	p-value		p-value	
Men	34%	106			28%	75			36%	841						
Women	66%	209			72%	196			64%	1469			0.34		0.005	
<30 years	9%	29			9%	23			8%	181						
30–50 years	51%	159			53%	142			51%	1171						
>50 years	40%	124			38%	103			41%	927			0.69		0.72	
Upper non-manual	30%	96			34%	92			26%	612						
Lower non-manual	19%	61			19%	51			19%	444						
Manual work	15%	46			9%	25			25%	582			0.004		<0.001	
Missing information on occupation ^a	36%	112			38%	103			29%	672						
Supervisor support			3.6	1.0			3.6	1.0				3.9	0.9	<0.001		<0.001
Supervisor justice			3.8	0.9			3.8	1.0				4.0	0.9	<0.001		<0.001
Social capital			3.7	0.8			3.7	0.8				3.9	0.7	<0.001		<0.001
Psychological safety			3.6	0.9			3.6	0.9				3.9	0.8	<0.001		<0.001
Bullying	16%	51							9%	204			<0.001		<0.001	
Violence					57%	155			37%	841			<0.001			

^a Information on occupation is from T1 or T2, where it was available.

T1, less likely we observed a change between the two measurement points.

The change in supervisor justice from T1 to T2 did not differ between the intervention and control groups ($b = 0.022$; 95% CI -0.010, 0.054), nor did the intervention have a direct effect on change in workplace bullying ($b = 0.021$, 95% CI -0.012, 0.054). Moreover, the indirect effect of the intervention via increases in supervisor justice to decreases in workplace bullying was non-significant ($b = -0.003$, 95% CI -0.008, 0.002). However, in the whole study population, increase in supervisor justice was associated with decrease in workplace bullying ($b = -0.14$, 95% CI -0.19, -0.092). The baseline level had a significant negative effect both on the changes in supervisor justice ($b = -0.52$; 95% CI -0.55, -0.49) and in workplace bullying ($b = -0.63$; 95% CI -0.66, -0.59).

The change in workplace social capital from T1 to T2 did not differ between the intervention and control groups ($b = 0.019$; 95% CI -0.014, 0.053), nor did the intervention have a direct effect on change in workplace bullying ($b = 0.020$; 95% CI -0.013, 0.052). The indirect effect of the intervention via increases in workplace social capital to decreases in workplace bullying was also non-significant ($b = -0.004$; 95% CI -0.011, -0.003). Increase in workplace social capital was associated with decrease in workplace bullying ($b = -0.20$; 95% CI -0.24, -0.16) in the whole study population. The baseline level had a significant negative effect both on the changes in workplace social capital ($b = -0.47$; 95% CI -0.51, -0.44) and in workplace bullying ($b = -0.65$; 95% CI -0.68, -0.61).

The change in work unit psychosocial safety from T1 to T2 did not differ between the intervention and control groups ($b = -0.006$; 95% CI -0.040, 0.027), nor did the intervention have a direct effect on change in workplace bullying ($b = 0.008$; 95% CI -0.023, 0.040). The indirect effect of the intervention via increases in work unit psychosocial safety to decreases in workplace bullying was also non-significant ($b = 0.002$; 95% CI -0.007, 0.011). Change in work unit psychosocial safety was related to change in workplace bullying ($b = -0.27$, 95% CI -0.31, -0.24). The baseline level had a significant negative effect both on the changes in work unit psychosocial safety ($b = -0.42$; 95% CI -0.45, -0.38) and in workplace bullying ($b = -0.67$; 95% CI -0.71, -0.64) (Table 2).

3.2. Effects in the intervention group B focusing on violence and threatening situations at work

Supervisor support improved slightly from T1 to T2 in the intervention group B ($b = 0.040$; 95% CI 0.006, 0.074) and compared to the control group. The intervention had no direct effect on change in violence at work ($b = 0.029$; 95% CI -0.003, 0.062). The indirect effect

of the intervention via increases in supervisor support to decreases in violence at work was also non-significant ($b = -0.002$, 95% CI -0.004, 0.000). Increase in supervisor support was associated with decrease in violence at work ($b = -0.046$; 95% CI -0.082, -0.009) in the entire study population. The baseline level had a significant negative effect both on the changes in supervisor support ($b = -0.48$; 95% CI -0.51, -0.46) and in violence at work ($b = -0.50$; 95% CI -0.52, -0.49); that is, the higher the level of violence at work or supervisor support at T1, less likely we observed a change between measurement points.

Supervisor justice improved from T1 to T2 in the intervention group ($b = 0.044$; 95% CI 0.011, 0.078) and compared to control group. The intervention did not have a direct effect on change in violence at work ($b = 0.030$, 95% CI -0.002, 0.063), nor was the indirect effect of the intervention via increases in supervisor justice to decreases in violence at work statistically significant ($b = -0.002$, 95% CI -0.005, 0.000). Increase in supervisor justice was associated with decrease in violence at work ($b = -0.056$, 95% CI -0.093, -0.019) in the entire study population. The baseline level had a significant negative effect both on the changes in supervisor justice ($b = -0.50$; 95% CI -0.53, -0.47) and in violence at work ($b = -0.50$; 95% CI -0.52, -0.49).

The change in workplace social capital from T1 to T2 did not differ between the intervention and control groups ($b = 0.026$; 95% CI -0.010, 0.061), nor did the intervention have a direct effect on change in violence at work ($b = 0.031$; 95% CI -0.002, 0.063). The indirect effect of the intervention via increases in workplace social capital to decreases in violence at work was also non-existent ($b = -0.001$; 95% CI -0.004, 0.001). Irrespective of the intervention, increase in workplace social capital was associated with decrease in violence at work ($b = -0.058$; 95% CI -0.093, -0.022). The baseline level had a significant negative effect both on the changes in workplace social capital ($b = -0.45$; 95% CI -0.48, -0.41) and in violence at work ($b = -0.50$; 95% CI -0.52, -0.49).

The change in work unit psychosocial safety from T1 to T2 did not differ between the intervention and control groups ($b = 0.003$; 95% CI -0.032, 0.039), nor did the intervention have a direct effect on change in violence at work ($b = 0.029$; 95% CI -0.004, 0.061). There was no indirect effect of the intervention via increases in work unit psychosocial safety to decreases in violence at work ($b = 0.000$; 95% CI -0.002, 0.002). Increase in work unit psychosocial safety was related to decrease in violence at work ($b = -0.056$, 95% CI -0.089, -0.023) in the entire population. The baseline level had a significant negative effect both on the changes in work unit psychosocial safety ($b = -0.40$; 95% CI -0.43, -0.37) and in violence at work ($b = -0.50$; 95% CI -0.52, -0.49) (Table 3.).

Table 2
Summary of the associations and effects of the intervention A. Latent change score modelling.

	<i>b</i>	95% CI	SE	P
MODEL 1^a				
Direct effect of intervention (T2-T1)				
Δ Supervisor support	0.015	-0.017, 0.047	0.020	0.443
Δ Bullying	0.017	-0.016, 0.050	0.020	0.388
Indirect effect of intervention				
Intervention → Δ Supervisor support → Δ Bullying	-0.002	-0.005, 0.002	0.002	0.450
Associations and changes in time among the whole study population				
Δ Supervisor support → Δ Bullying	-0.113	-0.155, -0.070	0.026	<0.001
Supervisor support at T1 → Δ Supervisor support	-0.495	-0.523, -0.486	0.017	<0.001
Bullying at T1 → Δ Bullying	-0.623	-0.660, -0.585	0.023	<0.001
MODEL 2^b				
Direct effects of the intervention (T2-T1)				
Δ Supervisor justice	0.022	-0.010, 0.054	0.019	0.26
Δ Bullying	0.021	-0.012, 0.054	0.020	0.30
Indirect effects of the intervention				
Intervention → Δ Supervisor justice → Δ Bullying	-0.003	-0.008, 0.002	0.003	0.27
Associations and changes in time among the whole study population				
Δ Supervisor justice → Δ Bullying	-0.143	-0.185, -0.092	0.026	<0.001
Supervisor justice T1 → Δ Supervisor justice	-0.518	-0.549, -0.487	0.019	<0.001
Bullying at T1 → Δ Bullying	-0.625	-0.663, -0.589	0.023	<0.001
MODEL 3^c				
Direct effects of the intervention (T2-T1)				
Δ Workplace social capital	0.019	-0.014, 0.053	0.020	0.35
Δ Bullying	0.020	-0.013, 0.052	0.020	0.32
Indirect effects of the intervention				
Intervention → Δ Workplace social capital → Δ Bullying	-0.004	-0.011, 0.003	0.004	0.36
Associations and changes in time among the whole study population				
Δ Workplace social capital → Δ Bullying	-0.202	-0.241, -0.163	0.024	<0.001
Workplace social capital at T1 → Δ Workplace social capital	-0.471	-0.505, -0.437	0.020	<0.001
Bullying at T1 → Δ Bullying	-0.646	-0.684, -0.609	0.023	<0.001
MODEL 4^d				
Direct effects of the intervention (T2-T1)				
Δ Psychological safety at workplace	-0.006	-0.040, 0.027	0.021	0.76
Δ Bullying	0.008	-0.023, 0.040	0.019	0.66
Indirect effects of the intervention				
Intervention → Δ Psychological safety at workplace → Δ Bullying	0.002	-0.007, 0.011	0.006	0.76
Associations and changes in time among the whole study population				
Δ Psychological safety at workplace → Δ Bullying	-0.272	-0.307, -0.236	0.021	<0.001
Psychological safety at workplace at T1 → Δ Psychological safety at workplace	-0.471	-0.451, -0.383	0.020	<0.001
Bullying at T1 → Δ Bullying	-0.674	-0.711, -0.636	0.023	<0.001

Note: Intervention is dichotomous variable (intervention group = 2, control group = 1). *b* = Standardized coefficients of the saturated model; Δ = change in variable between time points 2020 and 2022; 95% CI = lower and upper boundaries of the 95% confidence interval for the regression coefficient.

^a Model 1: Mediation via supervisor support.

^b Model 2: Mediation via supervisor justice.

^c Model 3: Mediation via workplace social capital.

^d Model 4: Mediation via work unit psychosocial safety.

Table 3
Summary of the associations and effects of the intervention B. Latent change score modelling.

	<i>B</i>	95% CI	SE	P
MODEL 1^a				
Direct effects of the intervention (T2-T1)				
Δ Supervisor support	0.040	0.006, 0.074	0.021	0.056
Δ Violence	0.029	-0.003, 0.062	0.020	0.138
Indirect effects of the intervention				
Intervention → Δ Supervisor support → Δ Violence	-0.002	-0.004, 0.000	0.001	0.185
Associations and changes in time among the whole study population				
Δ Supervisor support → Δ Violence	-0.046	-0.083, -0.009	0.022	0.039
Supervisor support at T1 → Δ Supervisor support	-0.483	-0.511, -0.456	0.017	<0.001
Violence at T1 → Δ Violence	-0.503	-0.521, -0.486	0.011	<0.001
MODEL 2^b				
Direct effects of the intervention (T2-T1)				
Δ Supervisor justice	0.044	0.011, 0.078	0.020	0.029
Δ Violence	0.030	-0.002, 0.063	0.020	0.124
Indirect effects of the intervention				
Intervention → Δ Supervisor justice → Δ Violence	-0.002	-0.005, 0.000	0.002	0.110
Associations and changes in time among the whole study population				
Δ Supervisor justice → Δ Violence	-0.056	-0.093, -0.019	0.022	0.013
Supervisor justice T1 → Δ Supervisor justice	-0.503	-0.534, -0.472	0.019	<0.001
Violence T1 → Δ Violence	-0.504	-0.521, -0.486	0.011	<0.001
MODEL 3^c				
Direct effects of the intervention (T2-T1)				
Δ Workplace social capital	0.026	-0.010, 0.061	0.021	0.231
Δ Violence	0.031	-0.002, 0.063	0.020	0.120
Indirect effects of the intervention				
Intervention → Δ Workplace social capital → Δ Violence	-0.001	-0.004, 0.001	0.001	0.310
Associations and changes in time among the whole study population				
Δ Workplace social capital → Δ Violence	-0.058	-0.093, -0.022	0.021	0.007
Workplace social capital T1 → Δ Workplace social capital	-0.447	-0.480, -0.414	0.020	<0.001
Violence at T1 → Δ Violence	-0.503	-0.520, -0.485	0.011	<0.001
MODEL 4^d				
Direct effects of the intervention (T2-T1)				
Δ Workplace psychological safety	0.003	-0.032, 0.039	0.021	0.875
Δ Violence	0.029	-0.004, 0.061	0.020	0.144
Indirect effects of the intervention				
Intervention → Δ Workplace psychological safety → Δ Violence	0.000	-0.002, -0.002	0.001	0.883
Associations and changes in time among the whole study population				
Δ Workplace psychological safety → Δ Violence	-0.056	-0.089, -0.023	0.020	0.005
Workplace psychological safety T1 → Δ Workplace psychological safety	-0.401	-0.432, -0.370	0.019	<0.001
Violence at T1 → Δ Violence	-0.503	-0.520, -0.485	0.011	<0.001

Note: Intervention is dichotomous variable (intervention group = 2, control group = 1). *b* = Standardized coefficients of the saturated model; Δ = change in variable between time points 2020 and 2022; 95% CI = lower and upper boundaries of the 95% confidence interval for the regression coefficient.

^a Model 1: Mediation via supervisor support.

^b Model 2: Mediation via supervisor justice.

^c Model 3: Mediation via workplace social capital.

^d Model 4: Mediation via work unit psychosocial safety.

4. Discussion

We were unable to demonstrate any direct or indirect effects on the intervention to our outcome variables, that is, to bullying or violence at work. For intervention group B, we observed a slight increase in supervisor support and justice. This was not replicated in intervention group A. The reason for lack of effect in group A is probably not related to intervention contents as such as the variance in implementation was rather small, but rather to differences in work units within the intervention groups A and B. It may be that the role of supervisors was more active in employee workshops in intervention group B than in group A. However, we are unable to demonstrate this with the current study and study protocol.

A systematic review of interventions to prevent workplace bullying found very low-quality evidence that organizational or individual-level interventions would prevent bullying (Gillen et al., 2017). While this study also failed to show any direct or indirect effects to bullying, we did demonstrate that positive changes to supervisory behaviour and on team climate were associated with decreased bullying. This finding is congruent to recent longitudinal studies which found that psychosocial work environment characteristics, particularly those related to team climate and leadership, are associated with the onset of bullying (Ervasti et al., 2023; Rudkjoebing et al., 2022; Vranjes et al., 2022). Moreover, the finding that a higher prevalence of bullying at baseline was associated with less changes in bullying over time emphasizes the policy of zero-tolerance to bullying, and at least partly, explains why intervention effects are hard to demonstrate.

A systematic review of education and training interventions to prevent violence towards health care workers found them likely ineffective, although they may increase knowledge and positive attitudes (Geoffrion et al., 2020). Another systematic review concluded that educational interventions based on workshop format did improve the perceived ability to deal with violence (Kumari et al., 2022). While this intervention also failed to show any direct or indirect effects on prevalence of workplace violence, the intervention did slightly improve supervisory behaviour.

The baseline prevalence of workplace psychosocial resources was lower and the prevalence of bullying and violence at workplace was higher among the intervention participants than among the controls. This was expected, as the employer representatives were likely to select work units with existing challenges to participate in intervention. Our modelling showed that when the initial level of either the adverse psychosocial work characteristics or bullying and violence at work was higher, fewer changes were observed over time. This persistence of existing psychosocial problems may have partially contributed to the lack of intervention effects, as offensive behaviours were more prevalent among the intervention participants than among the control participants.

We then examined whether the mediation hypothesis based on previous research could be supported by our observational data (Airaksinen et al., 2023; Andersen et al., 2018; Berlanda et al., 2019; Einarsen et al., 2011; Ervasti et al., 2023; Salin, 2003; Vranjes et al., 2022). A consistent finding irrespective of intervention or control group status was observed: improvements in psychosocial factors were accompanied with decreased bullying and violence at work. This would suggest that our original hypothesis was correct, but the magnitude of the change in psychosocial factors would need to be substantially larger than achieved by this intervention to generate significant reduction in bullying and violence.

4.1. Strengths and limitations

There is an urgent need to identify effective and practical ways to reduce offensive behaviours in public sector workplaces. This study sought to evaluate a structured intervention aimed at reducing these harmful phenomena. The LCSM approach enabled us to investigate

whether improvements in psychosocial work environment led to decreases in bullying and violence, and whether this developmental relationship differed between the intervention and control groups thus ruling out a possible Hawthorne effect.

A limitation of this study is that it was impossible to randomly assign participants to the intervention or to the control group. Thus, this was a quasi-experiment. Due to missing survey responses, the intervention groups were not as large as we had planned (Ervasti et al., 2022). However, we were able to increase the size of the control group to obtain higher statistical power. The matching of the control group failed due to missing survey responses at T2, and thus intervention groups differed from the control group with respect to sex and socioeconomic status. In the intention-to-treat analyses, we thus adjusted the models for sex, age, and socioeconomic status. As we failed to demonstrate direct or indirect effects to our outcomes, we considered adjustments of the LCS-models unnecessary.

The lower levels of psychosocial resources and higher levels of offensive behaviours in the intervention groups compared to the controls at baseline could have introduced bias in the estimates through scale ceiling- or roof-effects. However, as there was more room for change in the hypothesized direction in the intervention groups than there was in the control group, the potential bias, if anything, would result in an overestimation of the intervention effect. Our results pointing to null effect, suggesting that this bias is an unlikely explanation for our findings.

Women face offensive behaviours more often than men. This is partly explained by gendered public sector occupations; women work more often in education, health, and social care with high prevalence of human interactions. As these sectors are large, most of the public sector employees are women. Consequently, it is unclear whether the results are generalizable to men and male-dominated workplaces. The study was conducted in Finland, a Nordic welfare state with high participation to trade unions and legislation on occupational safety. Future research is needed in other settings as well.

Furthermore, the two-year gap between the measurements might have been too long from the baseline to intervention implementation. However, with the rather long time before T2 measurement, we had enough time to implement parts of the intervention workshops at a post-pandemic time. The participants in the control group were expected to be exposed to "care as usual", i.e., to the anti-bullying and anti-violence procedures that the HR of the target organizations offered as a standard procedure. The intervention is seen as supplementing and as a development to standard procedures and tools. It is also possible that the time from intervention implementation to T2 measurement was too short for the changes to occur. Lastly, the content of the intervention was tailored to meet the needs of the participating work units which limits the generalizability of the findings.

4.2. Conclusions

No effects on bullying and violence at work were observed. Irrespective of the intervention, improvements in supervisor support and justice, work unit social capital, and psychological safety, were associated with decreased bullying and violence. It may thus be worthwhile to develop the intervention further to focus more on supervisor and co-worker relationships and on psychosocial resources.

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Declaration of competing interest

None declared.

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.socscimed.2023.116318>.

References

- Airaksinen, J., Pentti, J., Seppälä, P., Virtanen, M., Ropponen, A., Elovainio, M., et al., 2023. Prediction of violence or threat of violence among employees in social work, healthcare and education: the Finnish Public Sector cohort study. *BMJ Open* 13, e075489.
- Andersen, L.P., Høgh, A., Biering, K., Gadegaard, C.A., 2018. Work-related threats and violence in human service sectors: the importance of the psycho-social work environment examined in a multilevel prospective study. *Work* 59, 141–154.
- Berlanda, S., Fraizzoli, M., Cordova, F., Pedrazza, M., 2019. Psychosocial risks and violence against teachers. Is it possible to promote well-being at work? *Int. J. Environ. Res. Publ. Health* 16.
- Efron, B., 1987. Better bootstrap confidence intervals. *J. Am. Stat. Assoc.* 82, 171–185.
- Efron, B., Tibshirani, R., 1986. Bootstrap methods for standard errors, confidence intervals, and other measures of statistical accuracy. *Stat. Sci.* 1, 54–75.
- Einarsen, S., Hoel, H., Zapf, D., Cooper, C.L., 2011. The concept of bullying and harassment at work: the European tradition. In: Einarsen, S., Hoel, H., Zapf, D., Cooper, C.L. (Eds.), *Bullying and Harassment in the Workplace: Developments in Theory, Research, and Practice*. Taylor & Francis Group, Boca Raton, Fla, USA.
- Ervasti, J., Kivimäki, M., Pentti, J., Salmi, V., Suominen, S., Vahtera, J., et al., 2012. Work-related violence, lifestyle, and health among special education teachers working in Finnish basic education. *J. Sch. Health* 82, 336–343.
- Ervasti, J., Pentti, J., Seppälä, P., Ropponen, A., Virtanen, M., Elovainio, M., et al., 2023. Prediction of bullying at work: a data-driven analysis of the Finnish public sector cohort study. *Soc. Sci. Med.* 317, 115590.
- Ervasti, J., Seppälä, P., Olin, N., Kalavainen, S., Heikkilä, H., Aalto, V., et al., 2022. Effectiveness of a workplace intervention to reduce workplace bullying and violence at work: study protocol for a two-wave quasi-experimental intervention study. *BMJ Open* 12, e053664.
- Ferrari, E., McArdle, J.J., 2010. Longitudinal modeling of developmental changes in psychological research. *Curr. Dir. Psychol. Sci.* 19, 149–154.
- Geoffrion, S., Hills, D.J., Ross, H.M., Pich, J., Hill, A.T., Dalsbø, T.K., et al., 2020. Education and training for preventing and minimizing workplace aggression directed toward healthcare workers. *Cochrane Database Syst. Rev.* 9, CD011860.
- Gillen, P.A., Sinclair, M., Kernohan, W.G., Begley, C.M., Luyben, A.G., 2017. Interventions for prevention of bullying in the workplace. *Cochrane Database Syst. Rev.* 1, CD009778.
- Gluschkoff, K., Elovainio, M., Hintsa, T., Pentti, J., Salo, P., Kivimäki, M., et al., 2017. Organisational justice protects against the negative effect of workplace violence on teachers' sleep: a longitudinal cohort study. *Occup. Environ. Med.* 74, 511–516.
- Hill, A.K., Lind, M.A., Tucker, D., Nelly, P., Daraiseh, N., 2015. Measurable results: reducing staff injuries on a specialty psychiatric unit for patients with developmental disabilities. *Work* 51, 99–111.
- Houck, N.M., Colbert, A.M., 2017. Patient safety and workplace bullying: an integrative review. *J. Nurs. Care Qual.* 32, 164–171.
- ILO, 2003. Code of Practice on Workplace Violence in Services Sectors and Measures to Combat This Phenomenon. International Labour Office, Geneva.
- Kivimäki, M., Lawlor, D.A., Davey Smith, G., Kouvonen, A., Virtanen, M., Elovainio, M., et al., 2007. Socioeconomic position, co-occurrence of behavior-related risk factors, and coronary heart disease: the Finnish Public Sector study. *Am. J. Publ. Health* 97, 874–879.
- Kouvonen, A., Kivimäki, M., Vahtera, J., Oksanen, T., Elovainio, M., Cox, T., et al., 2006. Psychometric evaluation of a short measure of social capital at work. *BMC Publ. Health* 6, 251.
- Kumari, A., Sarkar, S., Ranjan, P., Chopra, S., Kaur, T., Baitha, U., et al., 2022. Interventions for workplace violence against health-care professionals: a systematic review. *Work* 73, 415–427.
- Lancôt, N., Guay, S., 2014. The aftermath of workplace violence among healthcare workers: a systematic literature review of the consequences. *Aggress. Violent Behav.* 19, 492–501.
- Lanza, M.L., Rierdan, J., Forester, L., Zeiss, R.A., 2009. Reducing violence against nurses: the violence prevention community meeting. *Issues Ment. Health Nurs.* 30, 745–750.
- Leach, L.S., Poyser, C., Butterworth, P., 2017. Workplace bullying and the association with suicidal ideation/thoughts and behaviour: a systematic review. *Occup. Environ. Med.* 74, 72–79.
- Liu, J., Gan, Y., Jiang, H., Li, L., Dwyer, R., Lu, K., et al., 2019. Prevalence of workplace violence against healthcare workers: a systematic review and meta-analysis. *Occup. Environ. Med.* 76, 927–937.
- McArdle, J.J., 2009. Latent variable modeling of differences and changes with longitudinal data. *Annu. Rev. Psychol.* 60, 577–605.
- Moorman, R.H., 1991. Relationship between organizational justice and organizational citizenship behaviors: do fairness perceptions influence employee citizenship? *J. Appl. Psychol.* 76, 845–855.
- Muthén, L.K., Muthén, B.O., 1998–2017. *Mplus User's Guide*, eighth ed. Muthén & Muthén, Los Angeles, CA.
- Nielsen, M.B., Christensen, J.O., Finne, L.B., Knardahl, S., 2020a. Workplace bullying, mental distress, and sickness absence: the protective role of social support. *Int. Arch. Occup. Environ. Health* 93, 43–53.
- Nielsen, M.B., Einarsen, S.V., 2018. What we know, what we do not know, and what we should and could have known about workplace bullying: an overview of the literature and agenda for future research. *Aggress. Violent Behav.* 42, 71–83.
- Nielsen, M.B., Harris, A., Pallesen, S., Einarsen, S.V., 2020b. Workplace bullying and sleep - a systematic review and meta-analysis of the research literature. *Sleep Med. Rev.* 51, 101289.
- Nielsen, M.B., Hetland, J., Matthiesen, S.B., Einarsen, S., 2012. Longitudinal relationships between workplace bullying and psychological distress. *Scand. J. Work. Environ. Health* 38, 38–46.
- Nielsen, M.B., Indregard, A.M., Overland, S., 2016. Workplace bullying and sickness absence: a systematic review and meta-analysis of the research literature. *Scand. J. Work. Environ. Health* 42, 359–370.
- Nielsen, M.B., Indregard, A.R., Krane, L., Knardahl, S., 2019. Workplace bullying and medically certified sickness absence: direction of associations and the moderating role of leader behavior. *Front. Psychol.* 10, 767.
- Nielsen, M.B., Matthiesen, S.B., Einarsen, S., 2010. The impact of methodological moderators on prevalence rates of workplace bullying. A meta-analysis. *J. Occup. Organ. Psychol.* 83, 955–979.
- Nyberg, A., Kecklund, G., Hanson, L.M., Rajaleid, K., 2021. Workplace violence and health in human service industries: a systematic review of prospective and longitudinal studies. *Occup. Environ. Med.* 78, 69–81.
- Rudkjøbing, L.A., Bungum, A.B., Flachs, E.M., Eller, N.H., Borritz, M., Aust, B., et al., 2020. Work-related exposure to violence or threats and risk of mental disorders and symptoms: a systematic review and meta-analysis. *Scand. J. Work. Environ. Health* 46, 339–349.
- Rudkjøbing, L.A., Hansen, Å.M., Rugulies, R., Kolstad, H., Bonde, J.P., 2022. Work-unit measures of psychosocial job stressors and onset of bullying: a 2-year follow-up study. *Int. Arch. Occup. Environ. Health* 95, 117–130.
- Salin, D., 2003. Ways of explaining workplace bullying: a review of enabling, motivating and precipitating structures and processes in the work environment. *Hum. Relat.* 56, 1213–1232.
- Van den Brande, W., Baillien, E., Vander Elst, T., De Witte, H., Van den Broeck, A., Godderis, L., 2017. Exposure to workplace bullying: the role of coping strategies in dealing with work stressors. *BioMed Res. Int.* 1019529, 2017.
- Vartiainen, M., Olin, N., Kalavainen, S., Joki, M., Pahkin, K., 2016. *Katkaise Kiusaamisen Kierre. Epäasiallisen Kohtelun Nollatoleranssin Vahvistaminen Työpaikalla*. Juvenes Print - Suomen yliopistopaino, Helsinki.
- Vranjes, I., Notelaers, G., Salin, D., 2022. Putting workplace bullying in context: the role of high-involvement work practices in the relationship between job demands, job resources, and bullying exposure. *J. Occup. Health Psychol.* 27, 136–151.
- Wilson, C.M., Douglas, K.S., Lyon, D.R., 2011. Violence against teachers: prevalence and consequences. *J. Interpers. Violence* 26, 2353–2371.
- Xu, T., Magnusson Hanson, L.L., Lange, T., Starkopf, L., Westerlund, H., Madsen, I.E.H., et al., 2018. Workplace bullying and violence as risk factors for type 2 diabetes: a multicohort study and meta-analysis. *Diabetologia* 61, 75–83.
- Ziaei, M., Massoudifar, A., Rajabpour-Sanati, A., Pourbagher-Shahri, A.M., Abdolrazaghnejad, A., 2019. Management of violence and aggression in emergency environment; a narrative review of 200 related articles. *Adv. J. Emerg. Med.* 3, e7.