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Pupils' aggressive behaviour towards teachers: identifying protective factors at organizational level examined in a follow-up study

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Abstract

Background Teacher's exposure to pupils' aggressive behaviour is an international phenomenon that requires more attention. This study examined if organizational prevention measures are associated with decreased risk of pupils' aggressive behaviour.

Method 94 public schools in Denmark participated. Questionnaire data about preventive measures at school level were collected in 2018 and outcome data about pupils' aggressive behaviour in form of harassment, threats and violence towards teachers were collected in 2019. In total, 1198 teachers participated in both rounds. The analyses were performed using multivariate logistic regressions with cluster adjusted standard errors to account for cluster effects.

Results The results were mixed. Violence prevention climate perceptions at the management level decreased the risk of pupils' aggressive behaviour, however when adjusting for baseline harassment, threats, and violence the associations became statistically insignificant. Violence prevention climate perceptions at co-worker level statistically significant decreased the risk of pupils' aggressive behaviour in form of violence even when adjusted for baseline violence. Practice and procedures statistically significantly decreased the risk of harassment. The results for conflict management training were mixed, while supervision in case of challenging pupils decreased the risk of harassment, threats, and violence, but none of the associations were statistically significant. Finally, the registration of threats and violence statistically significantly increased the risk of threats and violence at follow-up.

Conclusion This study shows that implementing organizational prevention measures in public schools may reduce the risk of pupils' aggressive behaviour towards teachers. It is, therefore, recommended to implement organizational prevention measures in public schools to reduce the risk of pupils' aggressive behaviour towards teachers.

Keywords Pupils' aggressive behaviour, Registrations, Violence prevention climate, Conflict management training, Supervision

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Introduction

When studying school violence, researchers have mainly focused on peer aggression and school bullying and less on violence directed against teachers [1, 2]. However, there is a growing awareness that aggression and violence directed against teachers are rather common phenomena in schools [3]. For instance, a Finnish study with 215 school teachers found that 33% reported verbal, nonverbal, or physical victimization by students, and a Swedish study among 1230 school teachers found that nearly every third teacher had experienced at least one incident of student-generated teacher victimization during the last 12 months [4]. A study from Canada among 2072 teachers from grades 7 to 11 in 77 schools found that 40.6% of teachers reported victimization (threats, verbal harassment, and physical attacks), and 73.3% reported student-to-teacher aggression [5].

As these examples illustrate, there is a large variation between studies due to different definitions and measurements of pupils' aggressive behaviour being used. Moreover, the studies are conducted in various countries, and the schools may vary in terms of their composition, such as rural areas. Longobardi et al. (2018) conducted a meta-analysis and found a pooled prevalence of 53% for any type of pupils' aggressive behaviour towards teachers reported over the last 2 years; however, the prevalence ranged from 20–75% [6]. Despite these variations between studies, the problem needs more attention so that effective preventive measures can be identified and implemented. Not only is students' aggressive behaviour towards teachers widespread, but there is also data suggesting that the frequency is increasing. A recent survey conducted by the American Psychological Association indicates a rise in instances of threats and physical assaults directed towards teachers by students and parents in the wake of the COVID-19 pandemic [7]. In Denmark, the frequency of pupils' aggressive behaviour towards teachers in the form of both violence and threats has increased from 2012 to 2023 - especially when it comes to threats [8].

Pupils' aggressive behaviour can affect teachers' well-being and health. For instance, studies have found that exposure to pupils' aggressive behaviour is positively associated with burnout [5, 9, 10] and negatively associated with work engagement [11]. Victimized teachers are more likely to change jobs [12, 13] or leave the profession [14]. Additionally, violence against teachers has been found to lead to reduced teaching-related functioning [15], potentially diminishing the quality of teaching and thereby affecting pupils' opportunities to learn and progress.

To prevent such behaviour, teachers emphasize the importance of preventive measures such as enhancing knowledge and skills, implementing preventive policies, procedures, and practices at the school level. Additionally, teachers stress the significance of support in the classroom, open communication and feedback from colleagues, supervision, and establishing agreements on how to address incidents of violence involving both students and teachers [16, 17]. Teachers have also expressed the need for increased support and collaboration from school administrators and parents, as well as additional resources and cultural changes to prevent and manage pupils' aggressive behaviour [18].

Thus, utilizing an organizational approach to improve prevention and management of pupils' aggressive behaviour may be an effective way of preventing pupils' aggressive behaviour [19].

Overall, this indicates that there are several organizational tools that, if implemented, can help reduce the risk of pupils' aggressive behaviour. In the following paragraphs, we will introduce different organizational prevention concepts that we investigated in our study.

Violence prevention climate

The concept of violence prevention climate focuses on management's policies, practices, and procedures to prevent and manage work-related violence and threats, including the registration of incidents. Workplace violence prevention climate is defined as employees' perceptions of the extent to which organizations have policies, practices, and procedures intended to keep employees safe from violence, threats, and harassment [20–22]. Policies and procedures refer to organizational rules, regulations, and recommendations concerning the prevention of work-related violence and the formal distribution of information regarding prevention. Practices reflect management's enforcement of the policies, including management's responses to incidents of work-related violence [20]. In schools, policies, procedures, and practices can be operationalized in a clear definition of what constitutes pupils' aggressive behaviour, an agreed-upon plan for how to report and handle violent episodes, and a systematic approach for consistent violence prevention. Furthermore, policies, procedures, and practices can be operationalized in recommendations and competencies to prevent pupils' aggressive behaviour, making teachers more likely to anticipate escalating situations so that actions can be taken to prevent them [21].

However, research has found that the influence of co-workers on safety can be significant, sometimes even stronger than the influence from managers [23, 24]. Therefore, the influence of co-workers may directly impact engagement in prevention behaviours, consequently affecting the potential preventive outcomes of implemented policies. A previous study expanded the notion of violence prevention climate to encompass co-workers as well, revealing that a positive violence

prevention climate at the co-worker level reduced the risk of work-related violence and threats [25].

It is assumed that the perception of violence prevention climate at co-worker level can encourage employees to engage in behaviours that minimize the risk of violence, threats, and harassment, such as following rules and recommendations. This assumption is supported by prospective studies that found associations between high levels of violence prevention climate at co-worker level and reduced reporting of violence and threats [25, 26].

However, previous studies on violence prevention climate have been conducted in sectors such as healthcare, prisons, and retail/services [21, 25, 27–29], but as far as we know, not in schools.

Training in conflict management and supervision

Increased focus on employees' skills in managing conflicts can be a useful way to reduce aggressive behaviour. Therefore, training is often the most common preventive measure in violence prevention at work [30, 31]. While training has been found to increase knowledge and confidence among participants, its effects on reducing the number of violent episodes are less consistent [31, 32]. Organizational aspects such as management support might help improve the effects of training on violent episodes. For example, a longitudinal study in four human service sectors found that the effect of conflict management training on the risk of experiencing work-related threats and violence was only present if employees worked in workplaces characterized by active supervisor violence prevention behaviours [33]. Similarly, a qualitative study exploring line managers' violence prevention practices identified that especially positive practices promoting a learning environment that supports continuous violence prevention development seem to be important in how managers can support better workplace safety [34].

However, most studies investigating conflict management training have been carried out in healthcare, elder care or retail [30, 31, 35]. More knowledge about the effects of conflict management training in schools to reduce aggressive behaviour towards teachers is therefore needed.

Previous research has found that employees make judgments about the causes of aggression, which are based on how they attribute the perpetrator's intention. These judgments affect how employees respond to violence and aggression, and the extent to which they tolerate the perpetrator's aggressive behaviour [36, 37]. Clinical supervision can change how employees respond, leading to better problem-solving, improved practice, and ultimately increasing knowledge and self-awareness [38, 39]. Therefore, supervision is often recommended as an effective way to understand and explore employee's response to aggression in clinical settings such as psychiatric wards or emergency wards [36]. However, most studies investigating supervision have been carried out in clinical settings, and more knowledge about the effects of supervision in the case of challenging pupils in schools is therefore needed.

Registrations of violent episodes

Systematic registration of work-related violence and threats is often recommended to assess the actual prevalence of incidents and to identify patterns. In addition, registrations of violent episodes are often required as documentation for insurance processes. Systematic registrations of violent episodes can be a valuable source of information, as they make it possible to determine if episodes are more frequent under certain circumstances and therefore indicate where changes might be necessary. Despite the important role of registration in preventing work-related violence, underreporting is widespread. Lack of registration of violent episodes has, for example, been found in occupations such as emergency departments and psychiatric wards [40, 41]. Reasons for underreporting may include perceptions that registrations are time-consuming, lack of supervisory or coworker support, or various definitions of violence among employees that create uncertainty about what should be reported and what should not [40, 42]. Other reasons for not reporting violent incidents may include thinking that the incident was not serious enough, a perception that violence is "part of the job," a belief that nothing would be done, or fear of being blamed for the incident [43]. For instance, a study among nurses in emergency departments found that violent incidents were not defined as 'violence' if no physical injury was sustained, and therefore the incidents were not reported [37]. Another study among healthcare workers found that reluctance to report violent incidents was due to a lack of clear policies and procedures for reporting and management encouragement to report violent incidents [37, 44]. Thus, a clear reporting policy and management support seem to be associated with better registration of violent episodes.

However, little is known about the extent to which pupils' aggressive behaviour towards teachers is reported to the school's formal reporting system and if systematic reporting has an impact on prevention.

Research questions

On this background, the overall aims of this study were to identify organizational prevention measures at public schools and to investigate if they are associated with a decreased risk of pupils' aggressive behaviour. This led to the following specific research questions:

1. To examine whether violence prevention climate at both the management and co-worker levels is associated with a reduced risk of pupils' aggressive behavior one year later.
2. To examine whether available practices and procedures to prevent and manage pupils' aggressive behaviour is associated with a reduced risk of pupils' aggressive behaviour.
3. To examine whether providing teachers with training in conflict management and supervision for dealing with challenging pupils is associated with a reduced risk of pupils' aggressive behaviour.
4. To examine the extent to which pupils' aggressive behaviour, in the form of violent and threatening incidents, is registered by teachers and to determine if this registration is associated with a reduced risk of pupils' aggressive behaviour.

Method

Study population

The study sample consists of a cohort of schoolteachers from municipal primary and lower secondary schools (grades 0 to 9) in Denmark. The initial survey was conducted between September and December 2018, followed by a follow-up survey a year later, from September to December 2019.

To base the study on a sample representing Danish primary and lower secondary schools as accurately as possible, we invited schools from all five regions of Denmark, including both small and large schools. The selection of schools considered the geographical differences in population, ensuring that more schools were invited from regions with higher populations. Participation in the study was voluntary, and the collected data was treated confidentially. The baseline survey was conducted between September and December 2018, with a follow-up one year later, i.e. from September to December 2019. The teachers' e-mail addresses were obtained from the participating schools. All the participating schools were public schools with pupils from grades 0–9, or a separate school exclusively for younger pupils, but administratively linked to a larger school.

At baseline, a total of 4,935 teachers from 105 schools were invited to participate, and 2,336 filled out the questionnaire (response rate 47.3%). One year later, at follow-up, 94 out of the 105 schools from the baseline survey agreed to participate. The follow-up questionnaire was distributed to 3,883 teachers, out of which 1,830 responded (response rate 47.1%). The final study population for this study included participants who had completed both questionnaires ($n = 1{,}198$). The final response rate in the final sample compared to those invited at baseline was 24.2%. The schools that dropped out at follow-up were comparable to those that completed both rounds in terms of size, location (urban and rural), and number of baseline responses. We found no difference in the distribution of gender and age among the teachers who responded to the baseline survey compared to those teachers who respond to both rounds [45]. The average number of pupils at the schools was 585. Information about the number of pupils at the participating schools was taken from the schools' homepages.

In accordance with the collective agreements between the Danish Teachers' Association and the Association of Municipalities, each school is required to formulate a policy on preventing and managing pupils' aggressive behaviour. The policy will typically include the following three themes: identification, prevention, and management. The three themes will typically result in written guidelines that describe practices and procedures for preventing and managing pupils' aggressive behaviour.

Exposure variables

The questionnaire administered at both time points was identical.

Exposure variables were all obtained from the baseline questionnaire.

Perception of Violence Prevention Climate at the management and at the co-worker levels, as well as Practice and Procedures, were measured using a 6-point response scale ranging from 'very low degree' (5) to 'very high degree' (1), supplemented with 'do not know' (6).

For the current study, respondents who replied 'do know' know' were excluded from the analyses that included the above-mentioned scales.

To categorize the variables into three equal groups, STATA was used to divide the values into tertiles, ensuring that each group represented approximately one-third. The cut points were calculated based on percentile ranks to achieve equal sample sizes within each group.

Thus, we categorize the participants into three groups (low-medium-high). Categorical data are often easier to understand and communicate. It may be easier to explain that one group may have a higher risk compared to other groups, rather than discussing small differences in continuous values [46].

Violence prevention climate at management level

Perception of violence prevention climate was measured at the management level and at the co-worker level. We utilized the Violence Prevention Climate Scale originally developed by Spector et al. (2007) [21]. The Violence Prevention Climate Scale is a validated self-report questionnaire [47–49].

At the management level, it was measured with two items from Kessler's three-factor Violence Prevention Climate scale [20]. We choose one item from the

practices dimension ('My supervisor encourages employees to report threatening or violent incidents') and one item concerning violence prevention policies and procedures ('My supervisor informs employees about management's work to prevent violence and threats'). To cover the supervisors' engagement in prevention, we used an item previously used in safety research [50]. ('My supervisor is committed and active in preventing violence and threats'). We further added an item concerning supervisory support after a violent incident inspired by Vegchel, Jonge, Soderfeldt, Dormann, and Schaufeli [51]('My supervisor provides adequate assistance and support after a threat or violent incident?').

A total sum score, with a possible range of 4–20, was calculated for each participant. We categorized the Violence Prevention Climate at the Management Level scale into three groups based on the scores: low (0–13), medium (14)–(16), and high (greater than 16).

Cronbach's alpha: 0.88.

Violence prevention climate at the co-worker level

Perception of the violence prevention climate at the co-worker level was measured with two items. One item was adapted from the Kessler's three-factor Violence Prevention Climate scale and the text adapted to co-workers. ('My co-workers encourage employees to report threatening or violent incidents'). Additionally, we included an item concerning co-workers's support after a violent incident inspired by Vegchel, Jonge, Soderfeldt, Dormann, and Schaufeli ('My co-workers provide adequate assistance and support after a threat or violent incident').

A total sum score with a possible range of 2 to 10 was calculated for each participant. We categorized the Violence Prevention Climate at the Co-worker Level scale into three groups based on the scores: low (0–8), medium (greater than 8 to 9), and high (greater than 9).

Cronbach's alpha: 0.80.

Practice and procedures

To measure practices and procedures for preventing and managing pupils' aggressive behaviour, we developed four items covering practice and procedures. ('Is there a common understanding of what pupils' aggressive behaviour, violence, and threats entail at your school? (identification) - Do teachers receive adequate guidance in preventing and managing violence and threats? (preventing) - Do you have guidelines on how to help and support a teacher who has experienced violence and/or threats? (managing).

For details, see Appendix 1.

A total sum score with a possible range of 4 to20 was calculated for each participant. We categorized the practice and procedures scale into three groups based on the scores: low (0–10), medium (greater than 10 to 12), and high (greater than 12).

Cronbach's alpha: 0.89.

Adequate violence prevention training

To measure if schools provide adequate violence prevention training, we used two single items: 'Do your school offer training in conflict management?' and 'Supervision in case of challenging pupils?' The answers were 'Yes' (1), 'No' (2) or 'Do not know' (3). For the current study, respondents who answered 'do not know' were excluded from the analysis, and only the responses categorized as 1 (Yes) and 2 (No) were used.

Registration

In the survey, teachers were asked if they had been exposed to threats or violence during the last year. If they answered yes, the next question was whether the incidents had been registered. Registration of threats, and violence was measured by the following two questions: 'Have the incidents of threats/violence been registered at your workplace?'

The answers were 'Yes, every incident' (1) 'More than half of the incidents' (2), 'Below half of the incidents' (3), 'No' (4). The scale was dichotomized into 'registered' (response categories 1–3 calculated together) and 'not registered' (response category 4).

Outcome variables– pupils' aggressive behaviour towards teachers

Information about the dependent variables was taken from the follow-up questionnaire.

Based on the definition of work-related violence by Wynne, Clarkin, Cox, and Griffeths (1997), we applied a comprehensive approach and examined various forms of aggressive behaviours including (1) harassment, (2) threats, and (3) physical violence against teachers [52]. All items were measured on a 5-point Likert-scale ranging from never (0) to daily (4).

Harassment

Harassment was measured by 5 items asking about experiencing harassment, such as being called degrading things or subjected to unpleasant practical jokes during class or break or persistent harassment or disturbances in teaching directed towards you as a teacher in the last 12 months. A total sum score, with a possible range of 0 to 20, was calculated for each participant. The scale was then dichotomized into 'not exposed' (0) and 'exposed at least once during the last year' (>0).

Cronbach's alpha: 0.76.

Threats

Threats were measured by 3 items asking about having experienced threats e.g. being threatened with objects, being threatened with beatings, being scolded, or shouted at during the last year. A possible range of 0 to 12, was calculated for each participant. The variable was dichotomized into 'not (0) and 'exposed at least once during the last year (>0).

Cronbach's alpha: 0.74.

Violence

Violence was measured by 11 items asking about having experienced e.g. physically violent behaviours included being hit, being pushed, or being kicked during the last 12 months. A total sum score ranging from 0 to 44 was calculated for each participant. The scale was then dichotomized into 'not exposed' (0) and 'exposed at least once during the last year' (>0).

Cronbach's alpha: 0.93.

Potential confounders

We considered age and gender of teachers as confounders. Information about age and gender was derived from the baseline questionnaire in 2018.

Table 1 Population characteristics, $n=1198$

	n (%)
Gender	
Women	888 (74)
Men	296 (25)
Missing	14 (1)
Age	
≤ 21–30	79 (7)
≤ 31–40	241 (20)
≤ 41–50	445 (37)
≤ 51–60	315 (26)
> 60	98 (8)
Missing	20 (2)
Harassment, follow-up	
Not exposed	427 (36)
Exposed at least once	748(62)
Missing	23(2)
Threats, follow-up	
Not exposed	695 (58)
Exposed at least once	481 (40)
Missing	22 (2)
Violence, follow-up	
Not exposed	688 (57)
Exposed at least once	463 (39)
Missing	47 (4)
Percieved seriouness of threats and violence (median score)	
Threats	2
Violence	3

Other variables

To measure the perceived seriousness of threats and violence, we used two items from the follow-up questionnaire in 2019: 'How serious do you think the most serious acts of threats/violence were in relation to your own safety?'. Responses were on a visual scale from 1 to 10, where 1 indicates "not serious" and 10 indicates "extremely serious."

The entire questionnaire was administered in Danish.

Statistical analyses

Baseline population characteristics were calculated for all outcomes, exposures and potential confounders as number and percentile distribution. Since data did not meet the statistical assumptions of normality and homoscedasticity required for linear regressions [53], we conduct multivariable logistic regression analyses with clustered adjusted standard errors to account for cluster effects. Logistic regression is ideal for studying the association between violence prevention strategies (predictor variables) when the risk of pupils' aggressive behavior is a binary outcome.

We first estimated crude odds ratios (ORs) with 95% confidence intervals (CIs) to assess the associations between violence prevention climate at management and co-worker levels, policies and practices, adequacy of violence prevention training, and recorded incidents of threats and violence measured at baseline and pupils' aggressive behavior (harassment, threats, and violence) measured at follow-up (2019). In Model 1, we adjusted these analyses for gender and age. In Model 2, we further adjusted for baseline measures of pupils' aggressive behavior (harassment, threats, and violence).

Data was analyzed using STATA software version 15.0 (Stata Corp, College Station, TX, USA).

Results

In Table 1 population characteristics at baseline can be seen. As can be seen, 74% of the teachers were women. Most participants were in the age groups of 41–50 years (37%) and 51–60 years (26%), while a few participants were between 21 and 30 years of age (7%).

Furthermore, 62% of individuals were exposed to harassment at least once during the last year, 41% to threats, and 39% to violence.

The perceived seriousness of threats and violence was 2 for threats and 3 for violence (median score on a scale ranging from 0 to 10).

Table 2 shows the exposure variables in the study. 35.6% of the teachers have received supervision, but only 19.1% have received conflict management training. Regarding registering violence and threats, 51.9% have registered threat incidents, while 57.9% have registered violent incidents.

Table 2 Exposure variables

Violence Prevention Climate at Management Level	
Low (0–13)	302 (25.2)
Medium (14–16)	368 (30.7)
High (> 16)	218 (18.2)
Missing	310 (25.9)
Violence Prevention Climate at the Co-Worker Level	
Low (0–8)	613 (51.2)
Medium (8 < x ≤ 9)	148 (12.4)
High (> 9)	243 (20.3)
Missing	194 (16.2)
Practice and Procedures	
Low (0–10)	455 (38.0)
Medium (10 < x ≤ 12)	164 (13.7)
High (> 12)	253 (21.1)
Missing	326 (27.2)
Adequate Violence Prevention Training	
Supervision	
Yes	427 (35.6)
No	373 (31.1)
Conflict training	
Yes	147 (19.1)
No	623 (89.9)
Registration treats	
Yes	266 (51.9)
No	247 (48.1)
Registation violence	
Yes	309 (57.9)
No	225 (42.1)

Table 3 shows associations between organizational prevention perceptions measures and risk of aggressive behaviour.

From the table, it can be seen that a violence prevention climate at the management level decreased the risk of harassment, threats, and violence. The higher the level of prevention climate at the management level, the greater the preventive effect. However, when adjusting for baseline harassment, threats, and violence, the associations were no longer statistically significant. A violence prevention climate at the co-worker level statistically significantly decreased the risk of pupils' aggressive behaviour in the form of violence.

The availability of practices and procedures significantly decreased the risk of harassment even when adjusting for baseline harassment. The availability of practices and procedures also significantly decreased the risk of threats and violence. However, when adjusting for baseline threats, and violence, the associations were no longer statistically significant. The preventive effects of conflict training are mixed. Supervision in the case of challenging pupils decreased the risk of harassment, threats, and violence. However, none of the associations were statistically significant. Finally, the registration of threats and violence statistically significantly increased the risk of threats and violence at follow-up.

Discussion

Many teachers were exposed to pupils' aggressive behaviour during the last year. 62% were exposed to harassment, 41% to threats, and 39% to violence at least once in the last year. Details about the type of aggressive behaviour and frequency are reported elsewhere [45]. 51.9% have registered threatening incidents, while 57.9% have registered violent incidents.

The study has identified several preventive factors at the organizational level. Violence prevention climate at the management level, as well as among co-workers, and the implementation of practices and procedures to prevent pupils' aggressive behaviour, reduced the risk of teachers being exposed to pupils' aggressive behaviour. However, when adjusting for baseline harassment, threats, or violence, these associations often became statistically insignificant. The availability of Practices and Procedures significantly decreased the risk of harassment even when adjusting for baseline harassment. The effectiveness of conflict training in prevention was mixed, while supervision in dealing with challenging pupils was found to decrease the risk of harassment, threats, and violence. Nevertheless, none of these associations were statistically significant. Lastly, the recording of threats and violence was associated with a statistically significant increased risk of experiencing threats and violence at follow-up. One possible explanation is that higher levels of pupils' aggressive behavior may lead to an increase in incident registrations. In classrooms where aggression is more prevalent, teachers may be more likely to register more incidents, which could be misinterpreted as registration causing an increase in threats. In this scenario, it is the severity of the aggression—not the act of reporting incidents—that drives the frequency of registration.

In the flowing we will discuss the results.

The fact that teachers registered only about half of the threating and violent incidents points to a problem with underreporting. As far as we know, only one study has previously examined the registration of pupils' aggressive behaviour. Moon et al. (2021) found that 81% reported physical assaults and 43% reported theft/property damage. There was no information about threats [54]. The study was conducted with middle and high school teachers, and thus cannot be directly compared with the results from our study. Underreporting is a critical barrier to the appropriate allocation of resources for the prevention of threats and violence in two ways. First, underreporting results in an underestimation of the extent of pupils' aggressive behaviour at schools, indicating less need for prevention and making it difficult to allocate resources for prevention [55]. Second, underreporting hinders the

Table 3 Associations between exposure variables and pupils' aggressive behaviour

	Harassment			Threats			Violence		
	Unadjusted	Model 1	Model 2	Unadjusted	Model 1	Model 2	Unadjusted	Model 1	Model 2
	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]
Violence Prevention Climate at Management level									
Low	1	1	1	1	1	1	1	1	1
Medium	0.77 [0.56–1.05]	0.80 [0.57–1.11]	0.84 [0.59–1.20]	0.81 [0.58–1.12]	0.86 [0.62–1.20]	0.99 [0.70–1.41]	0.82 [0.63–1.07]	0.83 [0.63–1.09]	0.91 [0.65–1.27]
High	**0.69 [0.47–1.00]**	**0.66 [0.45–0.98]**	0.77 [0.51–1.16]	0.69 [0.47–1.01]	**0.67 [0.46–1.00]**	0.84 [0.55–1.27]	**0.67 [0.45–0.99]**	**0.63 [0.42–0.95]**	0.72 [0.47–1.11]
Violence Prevention Climate at Co-worker level									
Low	1	1	1	1	1	1	1	1	1
Medium	1.07 [0.74–1.53]	1.02 [0.69–1.51]	1.10 [0.76–1.60]	0.96 [0.68–1.36]	0.92 [0.63–1.34]	0.97 [0.65–1.46]	0.79 [0.56–1.11]	0.75 [0.53–1.08]	**0.69 [0.47–1.00]**
High	1.13 [0.81–1.58]	1.01 [0.73–1.39]	1.09 [0.78–1.53]	1.25 [0.87–1.80]	1.15 [0.79–1.67]	1.27 [0.86–1.88]	0.89 [0.63–1.26]	0.80 [0.56–1.14]	0.91 [0.62–1.33]
Practices and procedures									
Low	1	1	1	1	1	1	1	1	1
Medium	1.08 [0.76–1.55]	1.05 [0.73–1.51]	1.22 [0.87–1.71]	0.90 [0.65–1.23]	0.88 [0.64–1.20]	0.84 [0.61–1.17]	1.00 [0.72–1.38]	0.97 [0.70–1.35]	1.00 [0.68–1.46]
High	**0.56 [0.41–0.75]**	**0.54 [0.40–0.73]**	**0.61 [0.45–0.84]**	**0.71 [0.51–1.00]**	**0.71 [0.51–0.99]**	0.84 [0.58–1.21]	**0.64 [0.43–0.96]**	**0.63 [0.42–0.95]**	0.70 [0.43–1.12]
Conflict management training									
No	1	1	1	1	1	1	1	1	1
Yes	0.95 [0.60–1.50]	0.92 [0.57–1.47]	1.04 [0.64–1.69]	1.13 [0.75–1.69]	1.08 [0.71–1.64]	1.13 [0.74–1.74]	0.90 [0.61–1.34]	0.91 [0.61–1.37]	1.14 [0.72–1.80]
Supervision									
No	1	1	1	1	1	1	1	1	1
Yes	0.88 [0.65–1.21]	0.80 [0.57–1.12]	0.84 [0.59–1.19]	0.85 [0.65–1.13]	0.77 [0.58–1.04]	0.88 [0.63–1.22]	0.88 [0.61–1.29]	0.83 [0.56–1.22]	0.90 [0.59–1.36]
Registration of threats									
No				1	1	1	1	1	1
Yes				**2.14 [1.47–3.12]**	**2.18 [1.48–3.22]**	**2.16 [1.47–3.19]**			
Registation of violence									
No							1	1	1
Yes							**1.67 [1.16–2.39]**	**1.62 [1.12–2.33]**	**1.58 [1.10–2.27]**

Bold type: Statistical significant associations ($p > 0.05$)

Model 1: Adjusted for age and gender

Model 2: Adjusted for age, gender and baseline harassment, threats or violence

possibility of building up a truer picture of risks and triggers that led up to an incident of pupils' aggressive behaviour. Accurate and complete surveillance of incidents of pupils' aggressive behaviour is thus a prerequisite for effective intervention.

It was not possible to investigate the reasons for underreporting in this study, however, other studies pointed at a range of practical barriers as well as unclear procedures and definitions. A study found that many victimized teachers perceived school intervention following incidents as ineffective and inadequate, which may have affected motivation to report aggressive incidents. In addition, in a previous study about violence prevention in Danish schools, teachers mentioned that one reason not to report could be that some teachers did not want to make the episode "official" by registering it in an administrative documentation system, as some teachers felt they understood why the pupil had reacted in an aggressive way [17]. Additionally, teachers may view young pupils' aggressive behaviour as a means of "letting off steam" and not as a violent incident. However, such normalization of pupils' aggressive behaviour is questionable because it may lead to regarding aggressive behaviour from pupils as a normal part of the job, which may inhibit the implementation of effective preventive strategies [56]. Another explanations for not registering threats and violence can be fear of reprisal or blame [42], belief that reporting will not lead to any positive changes [57] or teachers may omit registering pupils' aggressive behaviour because they fear that the reporting may damage their relationship with the pupils and parents. Furthermore, teachers might need to experience that reporting results are used to systematically improve violence prevention, i.e. that registration is not only done for administrative and statistical purposes. On the other hand, Moon et al. (2021) pointed out that teachers may report pupils' aggressive behaviour because they will have further contact with the perpetrators, and teachers thus view reporting as a way to deter further incidents [54]. Finally, in this present study teachers tended to view the most threatening and violent incidents as less serious. This could potentially explain the underreporting of threatening and violent incidents. However, more research is needed to understand the factors that influence teachers' decision to report or omit to registering pupils' aggressive behaviour.

In continuation of the claim mentioned earlier that accurate and complete surveillance of incidents of pupils' aggressive behaviour is a prerequisite for effective intervention, it seems paradoxical that the registration of threatening and violent incidents increased the risk of being exposed to threats and violence during follow-up. This paradox might be a result of the complex dynamics introduced by the registration as found in other sectors [58]. Initially, the increased risk for pupils' aggressive behaviour may reflect a combination of better reporting and thus increased visibility of the problem. Over time, as the school adjusts and begins to use the registration (e.g., collected data) for targeted interventions, the expected long-term outcome may a reduction in the risk for pupils' aggressive behaviour. Thus, the initial increase in incidents is a transitional phase that should lead to more effective prevention and reduction of pupils' aggressive behaviour in the long run.

The preventive effect regarding prevention climate at the management level contribute to the existing literature on violence prevention climate [21, 25, 28, 29]. Even though not all associations were statistically significant, the risk estimates all point in the same direction: the higher the level of violence prevention at the management level, the lower the risk for pupils' aggressive behaviour. This could be attributed to the active commitment of management in the form of clear prevention policies and formal programs [28], which may enhance employees' recognition of the importance of preventing pupils' aggressive behaviour. Such recognition could positively impact teachers' efforts to reduce such behaviour by following guidelines and improving their ability to identify situations that may trigger pupils' aggressive behaviour. The preventive effect of management's commitment to prevention was found in a study that observed a decrease in pupils' aggressive behaviour when school administration takes corrective or preventive actions, leading to a reduced risk of pupils' aggressive behaviour [59]. Furthermore, we found that practice and procedures decrease the risk of pupils' aggressive behaviour, especially the risk of harassment. Consistent practice and procedures to prevent and manage pupils' aggressive behaviour can ensure that pupils' aggressive behaviour towards teachers is managed uniformly, shifting the responsibility from individual teachers to the workplace level. According to Vroom's expectancy theory [60], well-defined policies, procedures, and practices to prevent pupils' aggressive behaviour can help employees see the connection between compliance with prevention measures and improved safety behaviour even when faced with multiple and potentially conflicting goals [61]. Additionally, providing access to counseling and support can help establish a safe and supportive climate in schools.

Interesting violence prevention climate at co-worker level statistically significant decreased the risk for pupils' aggressive behaviour in form of violence. Gadegaard et al. (2015) found that, although in most cases a violence prevention climate at the management level had the greatest preventive effect, in the Prison and Probation service, violence prevention climate among co-workers had the greatest preventive effect [25]. One explanation may be a strong social identity among employees that influence safety behaviour [23] and in the study, a strong social

identity among teachers [62]. A strong group identity will create pressure to follow common rules which can lead to a uniform approach to the pupils. A uniform approach may provide pupils with a sense of stability, which can be especially important for children who have difficulty dealing with changes or uncertainty.

We found that conflict management training showed mixed results. Even though several reviews have found that staff training is associated with positive outcomes in de-escalating potential violent situations, some studies have found the opposite effect [30, 31]. There are several factors that can influence the effectiveness of conflict management training. The effectiveness of conflict management training may depend on the design of the training and how well the conflict management training was implemented at the participating schools, but we have no information on this.

Supervision in dealing with challenging pupils was found to decrease the risk of harassment, threats, and violence. Even though the associations were statistically in-significant, the risk estimates indicate that supervision in dealing with challenging pupils decreased the risk of harassment, threats, and violence. Supervision may involve changes in didactic practices, improved problem-solving skills [38] and increased understanding of pupils' challenges, which can enhance the teacher-pupil relationship. A positive teacher-pupil relationship reduces students' externalizing behaviours, such as aggression, bullying, and disciplinary issues, and foster more positive perceptions of the school climate among teachers [63–66].

The results of this study indicate that preventing pupils' aggressive behaviour is a complex issue that requires a multi-level organizational approach [67–69]. This complexity is further highlighted in a qualitative study where teachers shared their experiences with violence and provided recommendations at individual, school, community, and societal levels. Teachers indicated a need for more support and involvement from school administrators and parents, as well as more effective policies, resources, and cultural changes [19].

Finally, our results should provide impetus for future research in other occupational sectors.

Social workers, bus drivers, service workers, and others can also be exposed to violence and threats at work. Furthermore, implementation of practices and procedures, conflict management training and the school context in which they are applied require careful consideration. For instance, it may be important to involve teachers' expertise and knowledge. Such participatory process can enhance teachers' ownership of the intervention, thereby ensuring commitment to the practice and procedures [70]. Future research should explore these dynamics further to develop more effective strategies for protecting teachers from pupils' aggressive behaviour.

Additionally, many of the associations identified in this study suggest that organizational measures can effectively reduce students' aggressive behavior towards teachers; however, some associations were not statistically significant. This lack of significance is likely attributable to insufficient statistical power. Consequently, it is essential for future studies to replicate these analyses with a larger sample size.

Strengths and limitations

The study has several strengths. The study is based on a longitudinal design that includes different types of public schools (small, large, located in both small and big cities), and the sample size is rather large. The response rate was relatively high, with 47% responding in the first round and 52% in the second round, which is above average for most organizational surveys [71]. A significant strength of the study lies in the longitudinal design, which allows for statistical adjustment for baseline exposure, unlike in cross-sectional studies. Additionally, the teachers were recruited from 94 schools, which could be identified and thus we could include cluster adjusted standard errors to account for cluster effects. Finally, the questions about exposure to pupils' aggressive behaviour are extensive and detailed, reducing the risk of false negative answers.

However, the results of the present study should also be considered in light of some potential limitations. First, the sample of schools in this study is not representative of schools in Denmark because several school managers decided not to participate, and we cannot rule out the risk of selection bias at the school level. Nevertheless, we invited more than 100 schools to participate in the study, and teachers from 94 schools answered both questionnaire rounds. Furthermore, it is a limitation that there is a relatively high dropout rate in the study, which may raise concerns about selection bias. This should be considered when interpreting the results. However, there are no differences in gender and age between those who responded at baseline and those participating in both rounds. 360 respondents were lost at follow-up that may have reduced the statistical power of the study. A larger sample size could have strengthened the analysis and improved the ability to detect smaller effects.

One could claim that the only characteristics of the teachers we adjusted for are gender and age. We did consider adjusting for school size and location. However, we have previous examined this and found no association [45]. Additionally, we lack a clear definition of when schools should be classified as local or metropolitan. However, an economic equalization scheme between rich and poor municipalities ensures that the economic conditions for running a school are fairly similar across all

municipalities in Denmark. Furthermore, we do not have information on the specific classes that teachers referred to when they reported exposure to pupils' aggressive behaviour during the last year.

At the individual level, if only employees with an interest in the topic responded (i.e. those who were most exposed to pupils' aggressive behaviour), this could also have induced potential selection problems, which may reduce the external validity of the findings. On the other hand, the distribution of gender and age of our population of teachers corresponds to that of the members of the Danish Teacher Association, representing 96% of all teachers in Denmark. Previous studies using data collected from questionnaires have shown that although certain characteristics were related to those who initially chose to participate and especially to those who participated in follow-ups, this did not have a large influence on the relative risk estimates measured in the studies, which is reassuring for the generalizability of the results of this study [72, 73]. Finally, several associations do not remain statistically significant when adjusting for baseline harassment, threats, and violence. This means that the greatest risk of being exposed to harassment, threats, or violence is that the teachers have previously been subjected to these actions. This knowledge would not have been obtained with a cross-sectional study. Furthermore, most of the associations point in the same direction. However, recent recommendations encourage researchers not to draw conclusions solely based on statistically significant results but rather to consider the size and direction of the estimates [74].

Conclusion

The frequency of teachers reporting pupils' aggressive behaviour is high and a problem for many teachers. This study shows that implementing organizational prevention measures in public schools can reduce the risk of pupils' aggressive behaviour towards teachers. This can be achieved by creating a violence prevention climate at the management level and co-worker level and implementing practices and procedures to prevent and manage pupils' aggressive behaviour.

Results from this study indicate that school principals can reduce the risk of teachers experiencing aggressive behaviour from pupils by actively participating in preventive initiatives. These initiatives include promoting the reporting of violent incidents, informing teachers about school management's efforts to prevent violence and threats, and providing adequate assistance and support after a threat or violent incident.

Implementing preventive practices, policies, and procedures at the organizational level could thus be measures for promoting a safe work environment for teachers. However, their implementation and the context in which they are applied require careful consideration.

Abbreviations

OR Odds ratio
CI Confidence interval

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40359-025-02564-9.

Supplementary Material 1

Author contributions

LPA, TNW and BA did substantial contributions to conception and design. LPA and TNW collected the data. LPA and TNW made the analysis and interpretation of data. LPA drafted the article. TNW and BA revised the article critically for important intellectual content. LPA, TNW and BA read the final manuscript and approved the version to be published.

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Data availability

To protect the privacy of students and ensure the confidentiality of the data, the datasets used and analysed during the study are not publicly available but can be gained from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

All methods were carried out in accordance with relevant guidelines and regulations (declaration of Helsinki). Use of the data was carried out under the same conditions and with the same purpose as collected. Participation in the study was voluntary and collected data were treated confidentially. The study was approved by the Danish Data Protection Agency prior to collecting the data. According to Danish Law (Act on Research Ethics Review of Health Research Projects), available at: www.nvk.dk/english/ act- on- research, questionnaire and register-based studies require neither approval by ethical or scientific committees. The collected information was only used if the participant had given informed consent by ticking off a box with the following text at the beginning of the questionnaire: "I have been informed that I can receive a copy of my own answers and can have them deleted if I wish, and hereby agree to participate in the survey." and chose to press "submit" after finishing the questionnaire.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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