

Work-related threats and violence in human service sectors: The importance of the psycho-social work environment examined in a multilevel prospective study

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Abstract.

BACKGROUND: Threats and violence at work are major concerns for employees in many human service sectors. The prevention of work-related violence is a major challenge for employees and management.

OBJECTIVE: The purpose of this study was to identify prospective associations between psycho-social work environment and work-related threats and violence in four high risk human service sectors.

METHODS: Questionnaire data was collected from 3011 employees working at psychiatric wards, in the elder sector, in the Prison and Probation Service and at Special Schools. Associations between psycho-social work environment and work-related violence and threats were then studied using a one-year follow-up design and multilevel logistic regression analyses.

RESULTS: The analyses showed that quantitative demands, high emotional demands, low level of influence over own work-situation, low predictability, low rewards at work, low role clarity, many role conflicts, many work-family conflicts and low organizational justice had statistically significant associations with high levels of work-related threats. Furthermore, high emotional demands, low predictability, low role clarity, many role conflicts, many work-family conflicts, low supervisor quality and low support from nearest supervisor had statistically significant associations with high levels of work-related violence. Finally, across the four sectors both similar and different associations between psycho-social work environment and work-related violence and threats were found.

CONCLUSION: The results of the study underline the importance of including the psycho-social work environment as a supplement to existing violence prevention methods and interventions aimed at reducing work-related violence and threats.

Keyword: Workplace violence, workplace threats, risk factors, structural level

1. Introduction

Work-related threats and violence refers to violence or threats perpetrated by a patient/client/pupil/prisoner and directed at personnel. Furthermore, the

act must take place in working hours and at the workplace. Studies have shown that 61–76% of employees working in human service sectors report exposure to work-related violence over the last 12 months, while 39% report exposure during the last week [1–5].

Threats and violence at work are a major concern for employees in many occupations [6–9]. Especially employees in human service sectors (e.g health care staff, teachers, social workers, police, prison

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guards) have an increased risk of becoming victims of work-related violence [10, 11]. In Denmark some of the most hazardous occupations are prison guards and police, nurses, geriatric staff, social workers and teachers [12].

Some surveys indicate small increase in frequency of work-related violence (1–2%) despite several attempts and recommendations to protect employees from work-related violence [12, 13]. The lack of effective prevention may be due to the complexity of multiple risk factors. This complexity involves a wide array of possible venues for interventions and outcomes, which poses methodological challenges.

Workplace violence is a growing concern for society and results in millions of lost workdays and lost wages [14] and many employees in these occupations regard work-related violence as a serious work environment problem [15, 16]. For instance, one study among psychiatric nurses found that 27.5% considered violence to be a problem at their work [16]. It is important that the problem of work-related violence is focused upon the structural level and regarded as a work environment issue and not an individual problem [17].

Therefore, insights into risk factors for work-related violence and supplementing recommendations are needed. Identifying workplace risk factors for violence can provide a basis for designing intervention programmes that supplement existing methods aimed at preventing or reducing the frequency of work-related violence and threats. On this background, this study examined the associations between psycho-social work environment and work related threats and violence in four high risk sectors.

1.1. Psycho-social work environment and work related violence

Viitasara & Menckel (2002) have presented a model for analysis of work-related violence and threats consisting of three levels: the individual, the situational and the structural level [17]. In their model, work-related threats and violence can be regarded as an end point in long-term processes with origins in the underlying situational and structural factors. Even though work-related violence occurs in a specific situation, the structural factors are present in time and space in every violent situation. The present study builds upon their model and focuses on the model's structural level; namely the importance of the psycho-social work environment as a risk factor for work-related threats and violence. Employees in the

health care sector apply themselves as instruments to achieve a supporting and non-aggressive milieu and good care outcomes, which entails that they are affected by their environment. Thus, it is important that the work environment is functional, supportive and effective.

Preventive strategies can operate at the individual, situational and the structural level. The literature on work-related violence and threats has identified several risk factors such as gender, age, work-experience, working time and occupations [10, 12] at the individual level. Also, specific situations are found to be risky. For instance, employees who are in close contact with patients, setting limits for patients' behaviour, and frequently doing physical patient handling are at higher risk of work-related violence than other employees in the same setting [18]. Psychological theories of aggression assert that the occurrence of aggression can seldom be reduced to one single factor, but is more likely to be influenced by several factors simultaneously. Work-related violence and threats stem from the interplay of a wide range of personal, situational and social factors and must be understood within the framework of the general social context in which they occur [19]. Thus, work-related violence is a complex phenomenon, and there is no single explanation for why some employees are exposed to work-related violence and others not [20].

The staff's performance in the form of burn-out or engagement are related to several structural factors (for instance demands, role conflicts, social support) in the work environment [21]. Thus, theoretical explanations as well as empirical data support the integration of the psycho-social work environment into research on work-related threats and violence. The theoretical explanation for linking work-related violence with psycho-social work environment is that a poor psycho-social work environment increases the risk of work-related strain and burn-out, which in turn decreases job performance and the motivation to perform well at work [22]. Poor performance (i.e., low quality of care, long waiting times, treatment errors and mistakes) is likely to result in a higher risk of exposure to workplace violence, as has been shown in a number of studies [23–26], presumably by generating feelings of frustration and aggression in patients [27, 28].

At the structural level, empirical data also supports the integration of the psycho-social work environment with research on work-related threats and violence. Studies have found a positive relation between victims of work-related violence and

elements of the psycho-social work environment, such as low levels of influence on their own work, quantitative demands, high emotional demands, poor utilisation of their resources, role conflicts, and low supervisor and co-worker support [29–36]. However, the results are difficult to apply as recommendations, as the studies have several major limitations. First, mono sectors approaches make it difficult to generalize the results, because the psycho-social work environment varies according to type of sector [37–40]. It can be discussed whether the associations between psycho-social work environment and work-related violence found at for example psychiatric wards or in elder care, may be generalized to other sectors [29, 33]. Thus, sector differences appear to be an important factor to study [41]. Second, the cross sectional nature of the studies fails to exclude that for instance high level of emotional demands or low levels of influence may be the consequence and not risk factor of violence at work. So far, only one follow-up study has examined the prospective association between psycho-social work environment and work-related violence and found associations between low quality of team work, high levels of time pressure and increased risk of work-related violence [42]. Finally, the studies do not take into account that employees, and thus their psycho-social work environment, are clustered within workplaces [43]. In sum, these limitations highlight the need for research that uses a follow-up design, compares different sectors and uses multi-level analysis.

1.2. Work-related threats

Threats and violence are mutually associated, as threats of violence often present as an antecedent for work-related violence [19] and the underlying mechanism between work environment and violence and work environment and threats may be identical. For instance, Glomb (2003) found that prior to an aggressive incident, individuals were more likely to have engaged in less severe violent behaviors [44]. Also, Dupre & Barling (2006) found that psychological aggression toward supervisors was positively associated with physical acts of aggression directed toward supervisors [45]. Furthermore, the health consequences of threats of violence may be as serious as those of direct exposure to violence. For instance, a study found that violence and threats at work had a significant impact on the health of the victims one year after exposure [7]. As threats are more frequently than violence [5], important information about

prevention of work-related violence can be achieved by identifying associations between work environment and threats.

Therefore, it is important to identify associations between psycho-social work environment and both work-related threats and violence.

1.3. The present study

The purpose of the present study is to investigate the associations between the psychosocial work environment and work-related threats and violence. The study uses a one-year follow-up design to investigate the associations in four human service sectors characterized by a high risk of violence and threats.

The specific purposes of the study are:

1. To identify associations between psycho-social work environment and violence in four high risk sectors.
2. To identify associations between psycho-social work environment and threats in four high risk sectors.
3. To identify similarities and differences across the four sectors with regard to prospective associations between psycho-social work environment and violence and threats.

2. Method

2.1. Procedure and participants

The study population consists of a cohort established in 2010 with one-year follow-up [5]. The study population was employed in the following settings: Different types of public psychiatric wards (open wards, acute wards, secure wards), the elder care sector, at special schools (schools for pupils with diagnosis' such ADHD, Autism) and in prison and probation services. The sectors were chosen because previous research in Denmark has found that these sectors have high frequencies of work-related violence and threats [12].

Participants working in psychiatric wards, elder care sector and at special schools received and filled out paper-and-pencil questionnaires during a planned meeting at the worksite. Invited participants were employees in jobs with client contact and who had no more than three weeks of absence at the time of survey distribution. As the purpose of the study was to analyze the associations between work

environment and violence at work, the last criterion was to ensure that employees were sufficiently aware of the present working environment. Two of the research team members attended the meetings and the completed questionnaires were returned to the researcher at the end of the meeting. Employees, who did not participate in the meeting, received a questionnaire and a prepaid/stamped envelope to be returned directly to the researchers.

A web-based questionnaire was used for participants in the Prison and Probation Services – a decision made by top management. It was stated in the cover letter of the questionnaire, that participation in the study was voluntary and that the data would be treated confidentially.

The participants were recruited using convenience sampling. The workplaces were all public workplaces and they were contacted in formal ways by meetings with the top managerial level in the municipality (elder sector) or county (psychiatric wards). Hereafter local leaders were assembled and invited to participate. Special Schools are organized somewhat differently, therefore, each school was directly approached. PPS was contacted formally by meetings with the top managerial level. Three municipalities and one county were not able to participate. With regard to the PPS all the staff was included in the project and all invited special schools participated.

The baseline sample consisted of 5477 persons: Psychiatry (N=930/response rate: 85%), Special Schools (N=758/response rate: 91%), Eldercare (N=966/response rate: 80%), and Prison and Probation services (N=2823/response rate: 60%). Eligible for follow-up were employees still at the same work-site, still in jobs with client contact and with no more than three weeks' absence at the time of survey distribution. A one-year follow-up was chosen because research has shown that a too long or short time span between baseline and follow up increases the risk of recall errors [46]. Furthermore, in relation to psycho-social work environment and mental health a one-year follow-up is recommended [47]. Altogether, 3584 participated in the follow-up study with an overall follow-up response rate of 65%. However, for the current study, we excluded the administrative staff (e.g. non-uniformed personnel) from the Prison and Probation service, because they represented many different occupations including consultants, cooks, teachers, priests, cleaners and nurses. We considered their psycho-social work environment to be too heterogenic to pool the different occupations together even though they all

more or less have contact with prisoners. Hence, the final follow-up study sample consists of 3011 persons: Psychiatry (N=698/response rate: 75%), Special Schools (N=535/response rate: 71%), Eldercare (N=610/response rate: 63%), and Prison and Probation services (N=1168/response rate: 61%). To work in these occupation, a formal education is required and therefore most participant were educated (e.g either nurses, teachers, prison guards etc). Only 2.9% didn't have an education and thus, we didn't assess it as necessary to adjust for education.

According to Danish law, approval by the Ethics Committee written informed consent is not required in questionnaire and register-based projects.

2.2. Instruments

To measure the psycho-social work environment, we used the second version of the Copenhagen Psychosocial Questionnaire (COPSOQ) [48], which is a standardized instrument designed to monitor the psycho-social work environment. COPSOQ have acceptable intra-class correlation reliability for all scales, has shown good criteria validity and are translated into several languages. The internal consistency of the COPSOQ is comparable to other influential questionnaires such as the Job Content Scale [49] and the Effort-Reward Imbalance Questionnaire [50].

The questionnaire included most of the dimensions of seven influential psychosocial theories reviewed by Kompier in his paper on models of psychosocial factors at work [51]. The COPSOQ-II includes 50 items covering 5 broad dimensions; work demands, work organisation and job content, interpersonal relations and leadership and finally values at work. Each dimension consists of 2–5 items with a total of 18 scales. The items are measured by means of a five point Likert scale ranging from 'always' (100) to 'never' (0).

Scale scores range from 0 to 100 where high values of the scales indicate higher values of the dimension except high demands, high emotional demands, role conflicts and work-family conflict where high values of the scales indicate lower values of the dimensions. The 18 scales are labelled: quantitative work demands (e.g high number of demands at work; time pressure), emotional demands, influence over own work situation, possibilities for development, commitment to the work-place, meaning of work, predictability, rewards at work, role clarity, role conflict, work-family conflict, social community at work, social support from colleagues, social support

from nearest supervisor, quality of leadership, mutual trust between employees, trust regarding management, organizational justice and finally work-family conflicts. The wording of the items and scales are available elsewhere [48].

In the current study Cronbach's alpha (α) in nearly all scales was above 0.75, which indicates a high degree of internal consistency of the scales [52]. Mutual trust between employees was an exception with $\alpha = 0.61$. The scales were dichotomised into a group of the 25% most exposed to a poor working environment and a group of the 75% least exposed. The dichotomisation was based on the whole study population ($N = 3011$) and not in each sector separately. In this way the definition of high demands, many role conflicts, low mutual trust between employees etc. is identical across sectors, thus making the psycho-social work-environment comparable across sectors. This means that the relative proportion of participants exposed for instance to high demands, was different depending on sector.

2.3. *Outcome measures: Work-related violence and work-related threats*

Based on the definition of Wynne et al. (1997) [53], we applied a broad definition of work-related violence including threats of violence as well as physical violence. We used a checklist consisting of 11 different types of violent incidents and 7 different types of threats of violence used in previous research in Sweden [54]. Types of physically violent behaviors included being spat on, hit, hit with an object, scratched/pinched, shoved, held firmly, punched with a fist, kicked, bitten, having a hard object thrown at you, and clients using a weapon or a weapon-like object. Threatening behaviors included being threatened with beatings, written threats, threatened in a scolding manner, threatened in an insulting manner, threatened over the phone, threatened involving objects, and threatened indirectly (i.e. threats towards family), but with no physical contact. Respondents were asked to indicate how often during the past year they had experienced each of these different types of threats or violence at the workplace. For both work-related violence and threats the frequency of occurrence was measured with a five point Likert-like scale ranging from never (0) to almost daily (4). The items were computed into two sum-scales labelled 'threats of violence' and 'physical violence' respectively. The two scales were dichotomised into the

25% most exposed versus the 75% least exposed. The dichotomisation was done in each sector separately.

2.4. *Other measures-neuroticism*

Neuroticism may be both a substantive and a biasing factor in self-reporting of strain and stress [55]. As far as we know, no previous studies examining the associations between work environment and work-related violence and threats have adjusted for the potential biasing effect of neuroticism. Therefore, we adjusted for the possible confounding effect of neuroticism in the analyses.

Respondents completed the Eysenck Personality Inventory – EPS Adult [56]. The questionnaire contains 6 items. Response categories for all questions were "yes" or "no". The scale was dichotomised into the 25% scoring highest on the scale versus the 75% scoring lowest on the scale.

2.5. *Demographic questionnaire*

Background information about gender, work experience, working time and time of working hours in direct contact with patients, clients, pupils or prisoners was retrieved from the baseline survey.

Work experience: The participants were asked how many years they had been working at the current workplace. The answer should be written in years and months and the answers were divided in two groups representing more versus less than two years of working at the present workplace.

Working time: The participants were asked at what time of the day they usually were at work. The response categories were: Fixed daytime (06–18), only in the afternoon (15–24), only night times (22–06), non-fixed working time without working at nights, non-fixed working time including working at nights and other working times. The answers were divided in two groups: daytime work or non-daytime work.

Working time/hours in direct contact with patient, client, pupil or prisoners: The participants were asked about what percentage of the working-day they considered themselves to be in direct contact with patients, clients, pupils or prisoners. The response categories were <25%, 25–49%, 50–75% and >75% and were coded in two groups: more or less than 50% of working hours in direct contact with patients, clients, pupils or prisoners.

2.6. Statistical analyzes

The data did not meet the statistical assumptions of normality and homoscedasticity required for linear regressions [52]. Therefore, we applied multilevel logistic regressions and calculated adjusted odds ratio (OR) and 95% confidence intervals (CI) for the association between psycho-social work-environment measured in 2010 and work-related violence and work-related threats measured in 2011. Statistical analyses were performed using SPSS (Version 20), except from the multilevel logistic regression, which was performed in Stata 13.

2.7. Potential confounders

We adjusted for the possible confounding effect of neuroticism in the analyses. Furthermore, we adjusted for structural/organizational factors that might affect both the risk of work-related violence and threats and the character of the psycho-social work-environment. These factors included work-experience (more or less than two years working at the actual workplace), working time (day time or non-daytime) and working hours in direct contact with patient, client, pupil or prisoners (more or less than 50% of working hours). Furthermore, we adjusted for gender and baseline threats and violence. Two exceptions must be mentioned: First, in the elder sector, 96.9% of the participants were women. Therefore, we excluded men from the analyses. Second, in the

special schools, 97.9% of the employees worked day time only. Therefore, only employees working day-time contributed in the analyses and no adjustment for working hours was carried out in this occupation.

3. Results

Descriptive data for the study sample as a whole is outlined in Tables 1 and 2. Table 1 shows that in the elder care only about 3% of the employees were men, psychiatry and special schools employed 20–30% men, and in the Prison and Probation services sample more than 60% of the employees were men. In all sectors the majority of employees had more than two years of work experience at the present workplace. More employees in the elder care and in special schools spent more than 50% of their working time together with clients or pupils than employees in the Prison and Probation service. The working times differed across sectors with most employees in the Prison and Probation services working in shift work and in special schools nearly all were working daytime.

At least once during the last year about 78% of the employees working in special schools and psychiatry and nearly 67% of the employees working at the Prison and Probation services had been exposed to at least one type of work-related threats during their work. In the elder care about 41% had been exposed to work-related threats. Furthermore, 71%

Table 1
Descriptive data of participants

	Special Schools (N = 535)	Psychiatry (N = 698)	Prison and Probation services (N = 1168)	Eldercare (N = 610)
Gender				
Women	380 (71.0)	554 (79.4)	421 (36.0)	588 (96.4)
Men	154 (28.8)	143 (20.5)	747 (64.0)	19 (3.1)
Work experience at current workplace				
0–2 years	99 (18.5)	141 (20.2)	182 (15.6)	115 (18.9)
More than 2 years	430 (80.4)	550 (78.8)	975 (83.5)	469 (76.9)
Exposure to threats during the last year				
Not exposed	104 (19.4)	133 (19.1)	369 (31.6)	333 (54.6)
Exposed at least once during last year	411 (78.3)	547 (78.3)	786 (67.3)	254 (41.6)
Exposed to violence during the last year				
Not exposed	123 (23.0)	288 (41.3)	908 (77.7)	394 (64.6)
Exposed at least once during last year	370 (71.0)	364 (52.1)	220 (18.9)	171 (28.0)
Working time				
Only daytime	520 (97.2)	216 (30.9)	309 (26.5)	347 (56.9)
All others form of working time	11 (2.1)	467 (66.9)	823 (70.5)	256 (42.0)
Time with client/patients/pupils/prisoners				
Less than 50%	99 (18.5)	326 (46.7)	471 (40.3)	124 (20.3)
More than 50%	430 (80.4)	361 (51.7)	687 (58.8)	475 (77.9)

Sum which is not equal to 100 percent is due to missing values.

Table 2
 Psycho-social work environment in the four sectors. Mean scores. SD in branches

Work environment	Psychiatry	Eldercare	Prison and Probation Services	Special schools
Quantitative demands at work*	39.13 (19.33)	35.03 (19.68)	32.86 (18.98)	36.63 (17.75)
Emotional demands at work*	59.63 (17.62)	63.87 (17.64)	51.29 (21.32)	57.60 (16.86)
Possibilities for development	73.17 (14.53)	72.89 (15.67)	58.86 (19.25)	74.32 (14.80)
Meaning of work	78.93 (12.75)	82.30 (12.83)	70.25 (18.20)	77.70 (12.70)
Commitment to the workplace	69.79 (71.51)	71.51 (19.68)	66.50 (18.45)	71.47 (18.42)
Influence over own work situation	49.90 (16.43)	49.13 (19.63)	43.29 (20.42)	56.36 (14.61)
Predictability in work	59.63 (17.62)	63.87 (17.64)	51.29 (21.32)	57.60 (16.86)
Rewards at work	68.64 (19.39)	72.13 (18.47)	70.21 (22.30)	69.34 (16.79)
Role clarity	70.21 (14.42)	76.44 (13.80)	68.47 (17.26)	66.96 (15.07)
Role conflicts*	40.80 (16.21)	38.70 (16.81)	47.78 (18.85)	38.99 (15.50)
Work-family conflict	50.41 (16.95)	44.17 (16.47)	48.60 (17.80)	50.41 (16.95)
Social community at work	77.23 (16.35)	80.64 (16.54)	76.29 (17.55)	77.33 (15.84)
Social support from colleagues	71.53 (16.62)	74.97 (15.95)	68.72 (17.75)	72.91 (16.08)
Quality of leadership	61.68 (19.22)	64.11 (18.37)	52.34 (21.78)	57.58 (17.35)
Social support from nearest supervisor	71.45 (22.90)	75.23 (22.37)	62.94 (25.01)	66.67 (20.93)
Mutual trust between employees	75.45 (22.90)	79.19 (14.45)	68.81 (17.43)	74.20 (14.58)
Trust regarding management	70.14 (15.54)	75.00 (14.94)	66.38 (19.79)	70.76 (14.41)
Organizational justice	57.67 (17.08)	63.50 (17.25)	58.97 (20.67)	59.81 (13.97)

Scores 0–100. All scales, the higher score, the better work environment; except :*= higher scores the poorer work environment.

of the employees working at special schools had been exposed to work-related violence at least once during the last year. In the Prison and Probation services, fewer employees (around 19%) had been exposed to work-related violence compared to the three other sectors.

Table 2 shows mean score on the different dimensions of the psycho-social work-environment. As it can be seen, the quantitative demands were higher for staff working at psychiatric wards whereas the emotional demands were highest in the elder care. The psycho-social work environment in Prison and Probation services was in general poorer compared to the three other sectors. The level of role conflicts for instance, was much higher in the Prison and Probation Services, whereas support from nearest supervisor and quality of leadership were much lower in Prison and Probation Services and the eldercare compared to the two other sectors.

3.1. All sectors: Associations between psychosocial work environment and work-related threats:

As it can be seen from Table 3, several work-environment factors were associated with work-related threats. Especially high quantitative demands, many work-family conflicts, low organization justice, low role clarity, low rewards at work, high emotional demands, many role conflicts, low predictability and low level of influence over own

work-situation were associated with work-related threats. The adjustment for potential confounders in model 1 did not change the size of the associations to any important degree. However, adjusting for baseline exposure to work-related threats (model 2) reduced the size of the associations.

3.2. All sectors: Associations between psychosocial work environment and work-related violence

As it can be seen from Table 4, several work-environment factors were associated with work-related violence. Especially many role conflicts, high emotional demands, low predictability, many work-family conflicts, low role clarity, low quality of leadership and low support from nearest supervisor were associated with work-related violence. As in the analysis of work-related threats above, adjustment for potential confounder did not change the estimates except from adjustment for baseline violence.

3.3. Sector specific findings: Associations with work-related threats in each of the four sectors

As can be seen in Table 5, in each single sector only few associations were statistically significant due to smaller strata compared to the total sample. Some differences between the four sectors were found.

Table 3
Associations between psychosocial work environment and work-related threats; All sectors

Psycho-social work environment	Work-related threats		
	Unadjusted Odds ratio (CI)	Model 1 Odds ratio (CI)	Model 2 Odds ratio (CI)
High quantitative demands at work	1.9 (1.5–2.4)***	2.3 (1.8–3.1)***	2.0 (1.4–2.8)***
High emotional demands at work	2.0 (1.6–2.6)***	2.0 (1.5–2.7)***	1.4 (1.1–2.0)*
Low possibilities for development	1.6 (1.2–2.1)**	1.4 (1.1–1.9)*	1.3 (0.9–1.9)
Low meaning of work	1.5 (1.2–1.9)***	1.3 (0.9–1.6)	1.1 (0.8–1.5)
Low commitment to the work place	1.3 (1.1–1.6)*	1.2 (0.9–1.5)	1.1 (0.8–1.4)
Low influence over own work situation	1.8 (1.4–2.3)***	1.6 (1.3–2.1)***	1.4 (1.1–1.9)*
Low predictability	1.9 (1.5–2.5)***	1.8 (1.5–2.5)***	1.4 (1.1–1.9)*
Low rewards at work	1.9 (1.6–2.3)***	1.7 (1.4–2.1)***	1.5 (1.1–2.0)*
Low role clarity	2.0 (1.6–2.7)***	2.0 (1.5–2.6)***	1.5 (1.1–2.2)*
Many role conflicts	2.1 (1.7–2.8)***	2.1 (1.6–2.9)***	1.4 (1.1–2.0)*
Many work-family conflicts	2.4 (1.9–3.0)***	2.4 (1.8–3.1)***	1.6 (1.2–2.2)*
Low social community at work	1.3 (1.1–1.7)*	1.3 (1.1–1.6)*	1.3 (0.9–1.7)
Low social support from colleagues	1.5 (1.1–1.9)**	1.5 (1.1–1.9)*	1.3 (0.9–1.8)
Low quality of leadership	1.8 (1.4–2.3)***	1.7 (1.3–2.1)***	1.3 (0.9–1.8)
Low social support from nearest supervisor	1.6 (1.3–2.1)***	1.5 (1.2–1.9)**	1.3 (0.9–1.7)
Low mutual trust between employees	1.5 (1.2–1.9)**	1.6 (1.2–2.0)**	1.3 (0.9–1.8)
Low trust regarding management	1.8 (1.4–2.4)***	1.7 (1.3–2.2)***	1.2 (0.9–1.7)
Low organizational justice	2.0 (1.6–2.6)***	1.9 (1.5–2.5)***	1.6 (1.1–2.1)*

Model 1: Adjusted for gender, work experience, working time, time together with clients and neuroticism. Model 2: Adjusted for gender, work experience, working time, time together with clients and neuroticism and baseline violence/threats. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$. CI = Confidence intervals.

Table 4
Associations between psychosocial work environment and work-related violence; All sectors

Psycho-social work environment	Work-related violence		
	Unadjusted Odds ratio (CI)	Model 1 Odds ratio (CI)	Model 2 Odds ratio (CI)
High quantitative demands at work	1.4 (1.1–1.8)*	1.6 (1.2–2.2)**	1.4 (0.9–1.9)
High emotional demands at work	1.9 (1.4–2.4)***	1.8 (1.4–2.5)***	1.6 (1.2–2.3)**
Low possibilities for development	1.5 (1.1–1.9)*	1.3 (0.9–1.7)	1.2 (0.8–1.6)
Low meaning of work	1.4 (1.1–1.7)*	1.2 (0.9–1.5)	1.2 (0.8–1.6)
Low commitment to the workplace	1.3 (1.0–1.5)*	1.2 (0.9–1.5)	1.1 (0.8–1.5)
Low influence over own work situation	1.5 (1.1–1.9)**	1.3 (1.1–1.7)*	1.4 (0.9–1.8)
Low predictability	1.7 (1.3–2.2)***	1.6 (1.2–2.2)***	1.6 (1.2–2.2)**
Low rewards at work	1.6 (1.2–2.0)***	1.4 (1.1–1.7)*	1.3 (0.9–1.7)
Low role clarity	1.6 (1.2–2.1)***	1.6 (1.1–2.1)**	1.6 (1.2–2.2)*
Many role conflicts	2.1 (1.6–2.7)***	2.0 (1.5–2.7)***	1.7 (1.3–2.4)**
Many work-family conflicts	1.9 (1.5–2.5)***	2.0 (1.5–2.6)***	1.6 (1.2–2.2)**
Low social community at work	1.1 (0.9–1.4)	1.1 (0.8–1.5)	1.1 (0.8–1.4)
Low social support from colleagues	1.3 (1.0–1.7)*	1.2 (0.9–1.7)	1.1 (0.8–1.5)
Low quality of leadership	1.6 (1.3–2.1)***	1.6 (1.3–2.2)***	1.5 (1.2–2.0)**
Low social support from nearest supervisor	1.5 (1.2–1.8)**	1.3 (1.1–1.7)*	1.3 (1.1–1.7)*
Low mutual trust between employees	1.3 (0.9–1.6)	1.3 (1.0–1.7)*	1.2 (0.9–1.6)
Low trust regarding management	1.5 (1.1–1.9)*	1.3 (1.0–1.8)*	1.2 (0.8–1.6)
Low organizational justice	1.6 (1.2–2.0)**	1.4 (1.1–1.8)*	1.3 (0.9–1.8)

Model 1: Adjusted for gender, work experience, working time, time together with clients and neuroticism. Model 2: Adjusted for gender, work experience, working time, time together with clients and neuroticism and baseline violence/threats. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$. CI = Confidence intervals.

First, in the Prison and Probation Services the associations between the psycho-social work environment and work-related threats were in general stronger compared to the three others sectors. Second, in the special schools and at the psychiatric wards several

risk estimates were below 1 and thus the direction of the association was in some cases opposite compared to the two others sectors. For instance, low support from nearest supervisor was a protective factor for work-related threats at psychiatric wards, but a risk

Table 5
Associations between psychosocial work environment and work-related threats in each sector

Psycho-social work environment	Special schools [#] Odds ratio (CI)	Psychiatry Odds ratio (CI)	Prisons and Probation service Odds ratio (CI)	Eldercare ^{##} Odds ratio (CI)
High quantitative demands at work	1.4 (0.7–3.0)	1.6 (0.8–3.3)	2.5 (1.5–4.3)**	2.5 (1.2–5.4)*
High emotional demands at work	0.9 (0.5–1.9)	1.2 (0.6–2.3)	2.0 (1.1–3.6)*	1.3 (0.5–3.0)
Low possibilities for development	1.6 (0.5–5.4)	0.5 (0.2–1.5)	1.3 (0.8–2.1)	1.3 (0.5–3.2)
Low meaning of work	0.9 (0.5–1.9)	0.5 (0.2–1.1)	1.6 (0.9–2.5)	0.6 (0.2–1.6)
Low commitment to the workplace	0.9 (0.5–1.7)	0.9 (0.5–1.7)	1.1 (0.7–1.7)	1.1 (0.5–2.3)
Low influence over own work situation	0.9 (0.4–2.7)	1.1 (0.5–2.4)	1.5 (0.9–2.4)	1.5 (0.7–3.1)
Low predictability	0.9 (0.4–2.0)	0.8 (0.4–1.9)	1.6 (0.9–2.5)	1.6 (0.6–4.0)
Low rewards at work	1.2 (0.6–2.3)	1.2 (0.7–2.3)	1.7 (1.1–2.8)*	1.2 (0.6–2.5)
Low role clarity	1.3 (0.7–2.6)	0.8 (0.3–1.8)	1.6 (0.9–2.7)	2.4 (0.8–7.6)
Many role conflicts	1.4 (0.5–3.6)	0.9 (0.4–2.0)	1.6 (0.9–2.5)	1.2 (0.5–3.0)
Many work-family conflicts	1.3 (0.6–2.5)	1.9 (1.1–3.6)*	1.7 (1.1–2.8)*	1.1 (0.5–2.6)
Low social community at work	0.9 (0.4–2.0)	1.1 (0.5–2.0)	1.8 (1.1–2.9)*	1.3 (0.9–1.7)
Low social support from colleagues	1.2 (0.5–2.8)	0.9 (0.4–2.0)	1.5 (0.9–2.5)	1.2 (0.4–3.1)
Low quality of leadership	1.4 (0.7–2.8)	0.7 (0.3–1.4)	1.3 (0.8–2.0)	2.1 (0.9–4.5)
Low social support from nearest supervisor	2.3 (1.3–4.3)*	0.5 (0.2–0.9)*	1.6 (1.1–2.5)*	0.9 (0.5–1.9)
Low mutual trust between employees	1.1 (0.5–2.4)	0.9 (0.4–1.9)	1.7 (1.1–2.7)*	0.9 (0.4–2.2)
Low trust regarding management	0.6 (0.3–1.4)	1.1 (0.6–2.3)	1.2 (0.8–2.0)	2.0 (0.7–5.5)
Low organizational justice	1.5 (0.7–3.5)	1.1 (0.6–2.1)	1.6 (1.1–2.6)*	1.9 (0.9–4.0)

Model adjusted for gender, work experience, working time, time together with clients, neuroticism and baseline threats. [#]Not adjusted for working time. ^{##}Not adjusted for gender. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$. CI=Confidence intervals.

factor in two other sectors. Only high quantitative demands, low rewards at work, many work-family conflicts and low organizational justice were associated with work-related threats in all four sectors.

3.4. Sector specific findings: Associations with work-related violence in each of the four sectors

As in the sector specific analysis with threats, the sector specific analysis with violence lacked power in each stratum. As can be seen in Table 6, some differences between the four sectors were found. First, in the Prison and Probation Services the associations between the psycho-social work environment and work related violence were in general stronger compared to the three others sectors. Second, in the special schools and at the psychiatric wards several risk estimates were below 1 and thus the direction of the association was in some cases opposite compared to the elder sector and the Prison and Probation Service. For instance, low mutual trust between employees was not a risk factor for work-related threats at special schools and at psychiatric wards, but was a risk factor in the two other sectors. Only low role clarity, many role conflicts, many work-family conflicts and low trust regarding management were positively associated with work-related violence across sectors.

4. Discussion

The main purpose of this study was to identify associations between psycho-social work environment and work-related threats and violence in four high risk sectors and to identify whether the associations were different or similar across sectors. Based on data from 3011 employees working in four sectors, special schools, eldercare, psychiatric wards and in Prison and Probation Service, we found that high quantitative demands, high emotional demands, low level of influence over own work-situation, low predictability, low rewards at work, low role clarity, many role conflicts, many work-family conflicts and low organization justice were associated with work-related threats. Furthermore, high emotional demands, low predictability, low role clarity, many role conflicts, many work-family conflicts, low supervisor quality and low support from nearest supervisor were associated with work-related violence. All the associations were statistically significant. Finally, we found some sector similarities as well as differences in these associations.

In accordance with the model of Viitasara & Menckel (2002), our results underline that work-related threats and violence are influenced by the psycho-social work environment [17]. The results point out that the entire organisation must be involved in preventive work. Identification of risk factors at the psycho-social work environment level implies that

Table 6
Associations between psychosocial work environment and work-related violence in each sector

Psycho-social work environment	Special schools [#] Odds ratio (CI)	Psychiatry Odds ratio (CI)	Prisons and Probation service Odds ratio (CI)	Eldercare ^{##} Odds ratio (CI)
High quantitative demands at work	1.9 (0.9–4.1)	1.1 (0.5–2.1)	1.2 (0.7–2.1)	0.9 (0.4–2.2)
High emotional demands at work	2.1 (1.1–4.3)*	1.1 (0.5–2.0)	2.4 (1.4–4.0)**	0.9 (0.4–2.3)
Low possibilities for development	1.1 (0.2–4.8)	0.4 (0.1–1.3)	1.5 (0.9–2.2)	0.8 (0.3–2.2)
Low meaning of work	0.7 (0.3–1.5)	0.7 (0.3–1.3)	1.1 (0.8–1.7)	1.9 (0.8–4.4)
Low commitment to the work place	0.6 (0.3–1.3)	1.4 (0.7–2.6)	0.9 (0.6–1.4)	2.2 (1.2–4.3)*
Low influence over own work situation	0.9 (0.3–2.8)	1.3 (0.6–2.5)	1.6 (1.1–2.4)*	1.2 (0.6–2.4)
Low predictability	0.6 (0.3–1.5)	1.8 (0.8–3.8)	1.8 (1.2–1.7)*	1.1 (0.4–2.9)
Low rewards at work	0.8 (0.4–1.6)	1.5 (0.8–2.7)	1.1 (0.7–1.7)	1.7 (0.8–3.4)
Low role clarity	1.2 (0.6–2.6)	1.7 (0.8–3.9)	1.5 (0.9–2.4)	1.9 (0.7–6.1)
Many role conflicts	1.7 (0.7–4.3)	1.6 (0.7–3.7)	1.6 (1.1–2.5)*	1.5 (0.6–3.7)
Many work-family conflicts	1.7 (0.8–3.6)	2.7 (1.4–5.5)**	1.2 (0.8–1.9)	1.3 (0.6–2.8)
Low social community at work	0.6 (0.3–1.3)	1.1 (0.6–2.2)	1.3 (0.8–2.0)	0.9 (0.4–1.8)
Low social support from colleagues	0.6 (0.2–1.4)	1.1 (0.5–2.2)	1.1 (0.6–1.7)	2.0 (0.8–5.0)
Low quality of leadership	1.1 (0.5–2.3)	0.9 (0.5–1.9)	1.8 (1.2–2.6)*	2.1 (0.9–4.8)
Low social support from nearest supervisor	1.1 (0.6–2.2)	0.9 (0.5–1.8)	1.5 (0.9–2.2)	1.3 (0.6–2.6)
Low mutual trust between employees	0.9 (0.5–2.1)	0.8 (0.4–1.7)	1.3 (0.9–2.0)	1.3 (0.6–3.1)
Low trust regarding management	1.8 (0.9–3.6)	1.8 (0.9–3.6)	1.2 (0.7–1.9)	1.5 (0.5–4.6)
Low organizational justice	0.7 (0.3–1.7)	1.2 (0.6–2.2)	1.3 (0.8–2.1)	1.4 (0.7–3.0)

Model adjusted for gender, work experience, working time, time together with clients, neuroticism and baseline violence. [#]Not adjusted for working time. ^{##}Not adjusted for gender. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$. CI = Confidence intervals.

preventive interventions can be made from a broader perspective and not solely with focus on perpetrator and victim.

Our results were in line with previous research that had identified similar associations between psychosocial work environment and work-related violence [29, 32–34]. Thus our results add to existing empirical data that supports the integration of the psycho-social work environment into research on work-related threats and violence. Also, our study overcame some of the limitations of the previous research. By the use of a follow-up design and participation of several sectors, we overcame the problem of causality and the problems with generalizability found in previous cross-sectional and mono-sector studies. Furthermore, by adjusting for a personality trait neuroticism, we minimized the confounding effect of this personality trait.

In the present study, we found that low organizational justice was associated with work-related threats. Organizational justice may be a precondition for cooperation and communication in relation to task performance and may contribute to increase performance and quality of service delivered [57, 58], and thus decrease the risk of work-related threats. We also found that poor supervisor support and poor quality of leadership were associated with increased risk of work-related violence. This is in line with previous research [29, 59]. For instance, among 8134 health-care workers in the elder care, one study found,

that poor leadership quality increased the risk of work-related violence and another study found that work-related violence was more prevalent among respondents with lack of social support from their manager [60, 61]. One explanation may be that good supervisors support employees through direct task assistance, feedback and advice to employees [62] so staff may provide a better service to the clients, which may establish a more ‘peaceful’ environment and reduce the risk of violence and threats. Thus supervisors support may be important to take into account when considering prevention of work-related violence and threats.

The third purpose of the study was to identify similarities and differences among the four sectors with regard to associations between psycho-social work environment and violence and threats. We found some similar associations across sectors between psycho-social work environment and work-related threats and violence. Even though the risk estimates varied (and not all associations were statistically significant), high quantitative demands were positively associated with work-related threats in all four sectors. We also found some sector specific associations. First of all, the size of the associations and the number of statistically significant associations between psycho-social work environment and work-related threats and violence were higher in the Prison and Probation services compared to three other sectors. However, this was likely mainly due to a larger

sample in this sector. Furthermore, we found that support from nearest supervisor and supervisor quality was associated with work-related violence in the Prison and Probation Services and in the elder sector, but not at psychiatric wards or in special schools. Previous single sector studies have also found different associations between psycho-social work environment and work-related violence depending on the sector in which the studies were carried out [29, 32–34]. Thus, the different associations may reflect different work conditions across sectors [40].

4.1. *Strengths*

The present study has important strengths. First, the response rates are high and above the mean usually seen in organizational surveys [63]. Second, previous research has primarily been based on a single sector or cross-sectional designs. By examining participants from four sectors at the same time, using the same measurements and a follow-up design, this study contributes to the existing literature with more reliable results. Furthermore, the study also identifies certain factors in the psycho-social work environment (high quantitative demands, high emotional demands and many role conflicts) that prospectively and across four sectors are associated with work-related threats and violence. Third, instead of a single item to measure work-related threats and violence, we used a 19-items check-list questionnaire. A single items approach (e.g. ‘have you been physically assaulted at work during the past year?’) in some extent leaves it up to the respondents to define what constitutes work-related violence. Thus the reported frequencies of work-related threats and violence may be affected by personal experience, interpretation and the culture of the workplace [64]. Fourth, we controlled statistically for several structural and one personal risk factor which may strengthen the results. Finally, the analyses were carried out using multilevel analysis and thus to some degree took the social context at each workplace into account.

4.2. *Limitations*

However, the results of the present study should be considered in the light of some potential limitations. First, the participants from special schools, psychiatry and elder care are not necessarily representative as data from these three sectors were based on a convenience sample primarily located in two regions in Denmark. Even though the

general sample size is large, the participating workplaces from psychiatry, eldercare and special schools were recruited in a non-random sampling method. Furthermore, some workplaces refused to participate and we cannot rule out the risk of selection bias. If workplaces with poor working environment and/or high levels of exposure to threats and violence in general refused to participate, we may have underestimated the associations, thus reducing the external validity of the findings [65]. In addition, the method of data collection was different across the four sectors. Employees at the psychiatric wards, elder sectors and the special schools filled out paper-and-pencil questionnaires during a meeting, whereas participants in the Prison and Probation Services were given a web-based questionnaire to fill out, when there was time for it during the workday and a computer was available. This may have affected the response rate (which was lower in Prison and Probation Service compared to the three other sectors) and may again introduce selection bias. If only employees with interest in the topic responded (i.e. those who were most exposed to work-related threats and violence), this may have inflated the associations. However, an additional analysis showed no difference in gender, work experience and education between responders and non-responders at baseline in the Prison and Probation Service (data not shown). Furthermore, only healthy employees participated in the current study. Those on sick leave, including sick-leave due to work-related violence and threats, did not participate. This may have led to underestimation of the associations between psycho-social work environment and work-related threats and violence. Furthermore, analysing each sector separately affected the sample size for each analysis, and this decreased precision of the estimates. Another limitation relates to the data coming entirely from self-report and hence the possibility that mono method bias or unmeasured third variables are present [66]. A further limitation is the use of dichotomized measures, i.e. threats and violence, which creates a loss of information and perhaps a simplification of the relationships in question. However, dichotomizing also has some advantages as measures such as the odds ratio, often provide more realistic and meaningful assessments of the strength of relationships [67]. The final limitation concerns recall bias. Even though the time span for being exposed to work-related violence and threats was one year as recommended by researchers [47], the answers concerning the frequency of exposure in a questionnaire may be influenced by recall errors [46]. However, it is

unlikely that the employees have forgotten important episodes compared to more frequent and everyday like episodes.

We adjusted for baseline violence and threats. However, it can be discussed whether the reported baseline is a reliable baseline, or just an arbitrary point in time [68]. The frequencies of work-related violence and threats at baseline may for example be affected by number and type of clients, pupils, patient and prisoners in the different workplaces and sectors. Therefore, adjusting for baseline violence and threats may inadvertently weaken, rather than strengthen the results by reducing the power of the explanatory variables.

4.3. Future research

More research is needed on how psycho-social work environment is related to work-related violence/threats. First of all, and most important, larger studies with many participants are needed to increase the statistical power. Next, more multi sector studies are needed to confirm or reject that the associations between psycho-social work environment and work-related violence have sector specific characteristics. Additionally, future research may supplement exposure data with the use of diaries as a repeated measure of work-related violence and threats to minimize recall errors. Finally, our results should be replicated in follow-up studies using other and several time lags to identify the dynamics between psycho-social work environment and work-related violence and threats. Longitudinal studies with several measurement points over an extended period of time might add to our knowledge of dynamics between psycho-social work environment and work-related threats and violence

5. Conclusion

Based on data from 3011 participants in four high-risk human service sector occupations, we investigated the associations between psycho-social work-environment factors and work-related violence and threats. We identified that high quantitative demands, many work-family conflicts, low organizational justice, low role clarity, high emotional demands, many role conflicts, low predictability and low level of influence over own work-situation, were associated with work-related threats. We identified that many role conflicts, high emotional demands,

low predictability, many work-family conflicts, low role clarity, quality of leadership and low support from nearest supervisor, were associated with work-related violence. Finally, we found some sectors specific associations between psycho-social work-environment and work-related threats and violence.

The practical implication of the results is that management must take the psycho-social work environment and social relations into account, when working with prevention strategies in relation to work-related violence and threats. The results underline that work-related violence and threats must be understood within the framework of the general social context in which they occur and the entire organisation must be involved in preventive work. The results may motivate managers to create a healthy psycho-social work environment that supports staff and thus decreases the risk of work-related threats and violence.

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Conflict of interest

No competing interests or financial competing interests are declared.

Authors' contributions

LPA drafted the manuscript. LPA, GAG and AH participated in the design of the study. KB and LPA performed the statistical analysis. AH, KB and GAG co-wrote the manuscript. All authors read and approved the final manuscript.

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