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ORIGINAL ARTICLE

Workplace bullying and the risk of cardiovascular disease and depression

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Aims: To examine exposure to workplace bullying as a risk factor for cardiovascular disease and depression in employees.

Methods: Logistic regression models were related to prospective data from two surveys in a cohort of 5432 hospital employees (601 men and 4831 women), aged 18–63 years. Outcomes were new reports of doctor diagnosed cardiovascular disease and depression during the two year follow up among those who were free from these diseases at baseline.

Results: The prevalence of bullying was 5% in the first survey and 6% in the second survey. Two per cent reported bullying experiences in both surveys, an indication of prolonged bullying. After adjustment for sex, age, and income, the odds ratio of incident cardiovascular disease for victims of prolonged bullying compared to non-bullied employees was 2.3 (95% CI 1.2 to 4.6). A further adjustment for overweight at baseline attenuated the odds ratio to 1.6 (95% CI 0.8 to 3.5). The association between prolonged bullying and incident depression was significant, even after these adjustments (odds ratio 4.2, 95% CI 2.0 to 8.6).

Conclusions: A strong association between workplace bullying and subsequent depression suggests that bullying is an aetiological factor for mental health problems. The victims of bullying also seem to be at greater risk of cardiovascular disease, but this risk may partly be attributable to overweight.

No generally accepted definition of workplace bullying exists, but most definitions refer to aspects such as the persistence of bullying and the negative or detrimental effects perceived by the victim.¹ Examples of bullying include situations in which someone is subjected to social isolation or exclusion, the subject's work and work efforts are devalued, and the subject is threatened or otherwise worn down or frustrated. Thus, victimisation to workplace bullying may represent a social stressor related to a serious deficiency in perceived organisational justice and fairness.^{1–3}

Epidemiological research on the association between workplace bullying and health has only now begun to emerge. A longitudinal study on school age children found that a history of victimisation was associated with a twofold incidence of self reported emotional problems such as depression and anxiety.⁴ Among adults, workplace bullying was related to a 25–90% increase in the risk of recorded sickness absence.^{5–6} In cross sectional studies, staff who had been bullied reported more depressive symptoms, higher levels of stress and anxiety, and lower levels of job satisfaction.^{2–7–9} However, the question whether workplace bullying predicts the onset of illness, such as cardiovascular disease and depression, has awaited longitudinal testing.

Stress can contribute to the development of disease. Chronic overactivity or underactivity in cardiovascular and metabolic systems in relation to prolonged stress has been found to be an aetiological factor for cardiovascular disease and hypertension.^{10–12} Prolonged stress at work may also contribute to psychiatric disorders, including depression.¹³ When representing a major chronic stressor, workplace bullying can be hypothesised to increase the victims' vulnerability to these stress related diseases. Testing this hypothesis requires repeated measurements of victimisation for the establishment of continuous bullying, a measurement strategy that has not been applied in prior occupational studies.

We carried out a prospective study to examine whether exposure to workplace bullying is associated with new

reports of cardiovascular disease and depression among hospital personnel. The study data on prolonged exposure to bullying were based on two surveys over two years.

METHODS

Study population

A postal questionnaire was sent to all 10 969 employees (1712 men and 9257 women) aged 18–63 years, working in Finnish hospitals in 1998. Ten per cent of the employees were doctors, 47% nurses, 12% laboratory and x ray department staff, 12% administrative staff, and 19% maintenance, cleaners, and other workers. Respondents who were still working in the hospitals two years later, were sent a follow up questionnaire in 2000. The surveys gathered information on bullying, stress related diseases, and behavioural risks on both occasions. The approval of the Ethics Committee of the Finnish Institute of Occupational Health was obtained for the study.

Measures

Bullying was measured by the following question: "Workplace bullying refers to a situation where someone is subjected to social isolation or exclusion, his or her work and efforts are devalued, he or she is threatened, derogatory comments are made about him or her in his or her absence, or other negative behaviour that is aimed to torment, wear down, or frustrate the victim occur. Have you been subjected to such bullying?"^{7,5}

Cardiovascular disease and depression were measured using a self administered checklist of common chronic diseases.¹⁴ For each disease, the respondent was requested to indicate whether or not a medical doctor had diagnosed him or her as having the disease. Cardiovascular disease was identified if the respondent reported myocardial infarction, angina pectoris, cerebrovascular disease, or hypertension. Depression was identified if the respondent reported that a medical doctor had diagnosed him or her as having depression. Incident cases of cardiovascular disease and

Main messages

- There is a strong association between workplace bullying and subsequent depression. Exposure to bullying predicts the onset of depression in a dose-response gradient.
- There is also an association between bullying and incidence of cardiovascular disease. However, this association may partly be attributable to obesity.

Policy implications

- Evidence of depression implies that the problem of workplace bullying should be effectively treated in workplaces.
- Early identification and prevention of workplace bullying may be a key factor in attempts to minimise its adverse effects on mental health.

depression were respondents reporting disease in 2000, but not in 1998.

Other variables were: smoking (smoker versus non-smoker, and the number of cigarettes smoked per day); alcohol consumption in grams of absolute alcohol per average week (cut offs for high consumption 280 and 190 g for men and women, respectively); weight and height for the calculation of body mass index (overweight indicated by BMI >29 kg/m²); and demographics (sex, age, occupation, income, and job contract (permanent versus temporary) obtained from the employers' records).

Statistical analysis

We used logistic regression analysis to test predictive relations of bullying to cardiovascular disease and depression. The first step tested reversed causality. Baseline diseases and other baseline characteristics were set as predictors for incident caseness of bullying (bullied in the second survey) among employees who did not report being bullied at baseline.

The second step examined whether prolonged bullying predicted incidence of cardiovascular disease and depression. Three exposure groups were formed: employees not reporting bullying in the first survey and in the second survey (the control group); employees who reported victimisation either in the first survey or the second survey (but not both); and victims of prolonged bullying (reporting victimisation in both surveys). Those with baseline diseases were excluded. Odds ratios and 95% confidence intervals (CI) for new cardiovascular disease and depression in the second survey were adjusted for sex, five year age categories, and income tertiles (calculated separately for men and women).

The third step reported logistic models where the associations of bullying with cardiovascular disease and depression were additionally adjusted for those behavioural risk factors that showed significant differences between the levels of bullying. Finally, interactions between these behavioural risks and bullying on cardiovascular disease and depression were studied.

All analyses were conducted using the SPSS 9.0 software package.

RESULTS

Response rates and sample attrition

A total of 8104 employees (74%) responded to the first survey. The mean age of the respondents was 43.3 years, 88% were women, 77% had a permanent job contract, and the mean income was 1849 per month. The corresponding figures for the eligible population were 42.9 years, 84%, 75%, and 1884 per month, respectively. Thus, any differences between the respondents and all eligible employees were small.

Of respondents to the first survey, 6674 were working in the target hospitals two years later at the time of the second survey. Table 1 shows that the drop outs were mainly temporary workers who also were younger than those who remained. When the analysis was restricted to permanent

employees, disease at baseline was associated with an increased risk of dropping out. The odds ratios (OR) of dropping out were 1.32 (95% CI 1.06 to 1.67) and 1.48 (95% CI 1.15 to 1.90) in the presence of cardiovascular disease and depression, respectively. Dropping out was not increased in the presence of bullying.

Of the 6674 eligible respondents of the first survey, 5432 (81%) responded to the second survey. Female, high income, non-depressive, and permanent employees were slightly overrepresented (table 1).

Reversed causality

The prevalence of reported bullying was 5.2% in the first survey and 5.9% in the second survey. Table 2 presents the results of testing reversed causality—that is, odds ratios for associations between baseline characteristics and being bullied in the follow up among those not bullied at baseline. Only depression at baseline predicted subsequent bullying.

Bullying as a predictor of new disease

Of the respondents, 1.7% reported bullying experiences in both surveys. As table 3 shows, prolonged bullying was associated with the onset of cardiovascular disease and depression. After adjustment for sex, age, and income, the odds ratio of incident cardiovascular disease for prolonged bullying, compared with no bullying, was 2.3. The corresponding odds ratio of new physician diagnosed depression was 4.8. For those who reported bullying only in one of the two surveys, the odds ratio of depression was 2.3.

The role of behavioural risk factors

Of the behavioural risk factors, overweight predicted the onset of new cardiovascular disease (OR 2.95, 95% CI 2.20 to 3.95). Smoking and high alcohol consumption at baseline were associated with an increased risk of depression (ORs 1.54 (95% CI 1.08 to 2.21) and 1.53 (95% CI 1.00 to 2.34), respectively).

Examination of whether bullying contributes to behavioural risk factors shows that prolonged bullying, compared with no bullying, did not predict subsequent smoking (baseline adjusted OR 0.64, 95% CI 0.19 to 2.19), heavy alcohol consumption (OR 1.06, 95% CI 0.46 to 2.46), or overweight (OR 0.64, 95% CI 0.25 to 1.64). However, individuals who were bullied at both times were more often overweight at baseline than non-victims (OR 2.04, 95% CI 1.20 to 3.46).

Adjustment for overweight in addition to demographic factors attenuated the association between bullying and new cardiovascular disease (OR 1.62, 95% CI 0.75 to 3.50 for bullying at both times versus at neither time), but did not affect the association between bullying and depression (OR 4.16, 95% CI 2.01 to 8.63). Interactions between bullying and overweight were not significant for cardiovascular disease ($p = 0.902$) and depression ($p = 0.174$).

Table 1 Characteristics of respondents to the first survey by status in the second survey

Respondents to the 1st survey	Status in the 2nd survey				p value for difference	
	Total no. (%)	Drop out no. (%)	Respondent no. (%)	Non-respondent no. (%)	Drop outs v respondents and non-respondents	Respondents v non-respondents
Sex					0.311	0.000
Male	973 (12)	183 (13)	601 (11)	189 (15)		
Female	7131 (88)	1247 (87)	4831 (89)	1053 (85)		
Age group					0.000	0.020
<35	1653 (20)	616 (43)	812 (15)	225 (18)		
35–50	4260 (53)	468 (33)	3104 (57)	688 (55)		
>50	2191 (27)	346 (24)	1516 (28)	329 (27)		
Income (tertiles)*					0.421	0.000
1 (low)	2709 (34)	468 (33)	1715 (32)	526 (43)		
2	1903 (24)	319 (23)	1314 (24)	270 (22)		
3 (high)	3404 (42)	617 (44)	2357 (44)	430 (35)		
Job contract					0.000	0.005
Permanent	6126 (77)	715 (51)	4438 (83)	973 (79)		
Non-permanent	1869 (23)	698 (49)	919 (17)	252 (21)		
Victimised					0.088	0.695
Not bullied	7592 (95)	1325 (94)	5116 (95)	1151 (95)		
Bullied	420 (5)	87 (6)	269 (5)	64 (5)		
Cardiovascular disease†					0.259	0.739
No	6980 (90)	1242 (91)	4686 (90)	1052 (89)		
Yes	797 (10)	129 (9)	542 (10)	126 (11)		
Depression					0.103	0.039
No	7109 (92)	1234 (91)	4815 (92)	1060 (91)		
Yes	632 (8)	126 (9)	396 (8)	110 (9)		
Smoking					0.308	0.149
No	6572 (85)	1171 (86)	4438 (85)	963 (83)		
Yes	1158 (15)	192 (14)	775 (15)	191 (17)		
Alcohol consumption‡					0.113	0.231
No/moderate	7276 (91)	1298 (92)	4894 (91)	1084 (90)		
High	693 (9)	107 (8)	468 (9)	118 (10)		
BMI (kg/m ²)					0.180	0.512
≤29	6990 (88)	1254 (89)	4673 (88)	1063 (89)		
>29	917 (12)	148 (11)	634 (12)	135 (11)		

*Cut off points for tertiles were €1693 and €2740 per month in men and €1507 and €1826 per month in women.

†Chronic hypertension in 658 persons, cerebrovascular disease in 118 persons, angina pectoris in 91 persons, and myocardial infarction in 28 persons (total exceeds 797 because one subject could have more than one disease).

‡High consumption >280 g and >190 g absolute alcohol per week by men and women, respectively.

DISCUSSION

Workplace bullying and employee health

This longitudinal study examined associations between workplace bullying and morbidity in employees. The present data show a clear cumulative relation between bullying and the incidence of depression: the longer the exposure to bullying, the greater the risk of depression. The status of workplace bullying as an aetiological factor of mental health problems was therefore supported. This is in agreement with previous studies on bullying predicting depressive symptoms among teenage school children,⁴ and findings on the association between interpersonal conflicts and psychiatric morbidity.¹⁵

Interestingly, we also found that depression predicted new cases of bullying. In stressful hospital work, employees having psychiatric disorders that limit their full working capacity may be likely targets of bullying. Disease may also make the employee more likely to perceive other people's behaviour as hostile.⁷ The process of bullying may actually include characteristics of a vicious circle in which mental health problems are a result of bullying and increase susceptibility to bullying.

Not only psychological stress, but also obesity may play a role in the association between workplace bullying and cardiovascular disease. Experience of being bullied for a longer period (2 years) was significantly associated with an increased risk of new cardiovascular disease before, but not after, adjustment for overweight. The victims of prolonged bullying had an average of one unit higher body mass index than other employees, a difference that has been reported to increase the risk of coronary heart disease mortality.¹⁶ We did

not find evidence that higher body mass in victims of prolonged bullying is a consequence of victimisation. In contrast, earlier research suggests that weight related discrimination occurs in workplaces, and that widely held, negative stereotype beliefs are associated with overweight in Western cultures.¹⁷ The association between bullying and onset of cardiovascular disease may therefore be partially attributable to body mass—that is, overweight may increase both the risk of cardiovascular disease and the likelihood of being bullied.

Prevalence of bullying

The prevalence of bullying varied between 5% and 6% in the two surveys of the study. These figures are in agreement with previous findings. In a random sample of Finnish citizens aged 25–64, 4% of social welfare and healthcare workers reported being victims of bullying.¹⁸ In Norwegian studies, the corresponding figure for assistant nurses from hospitals and nursing homes was 3%, and 8% for employees in a sample of 2105 health care workers.¹⁹ Almost 40% of employees reported experienced bullying when a broader definition was used in a study on a British National Health Services Community Trust.⁷

We found that 64% of those who were bullied at baseline did not report bullying two years later. This suggests that, in many cases, bullying can be sporadic rather than prolonged. Effective personal coping strategies, effective prevention in the target organisations, and/or other reasons may explain the relatively low continuity of bullying. Variability in the status of bullying does not support the tough minded view that reported bullying only reflects the characteristics of the

Table 2 Associations of baseline characteristics with incidence of bullying (test of reverse causality)

Baseline characteristic	n	Odds ratio of new victimisation* (95% CI)
Sex		
Female	4475	1.00
Male	566	0.86 (0.56 to 1.32)
Age group		
<35	768	1.00
35–50	2875	1.34 (0.89 to 1.99)
>50	1398	1.20 (0.77 to 1.87)
Income (tertiles)†		
3 (high)	2191	1.00
2	1232	0.82 (0.58 to 1.15)
1 (low)	1577	1.07 (0.80 to 1.44)
Employment contract		
Permanent	4114	1.00
Non-permanent	861	1.03 (0.74 to 1.45)
Cardiovascular disease		
No	4366	1.00
Yes	499	1.31 (0.88 to 1.94)
Depression		
No	4502	1.00
Yes	348	2.46 (1.69 to 3.57)
Smoking		
No	4124	1.00
Yes	727	0.86 (0.58 to 1.26)
Alcohol consumption‡		
No/moderate	4551	1.00
High	434	1.01 (0.64 to 1.59)
BMI (kg/m ²)		
≤29	4361	1.00
>29	581	0.90 (0.60 to 1.37)

*Subjects bullied at baseline excluded; 243 new victims in follow up.

†Cut off points for tertiles were €1693 and €2740 per month in men and €1507 and €1826 per month in women.

‡High consumption >280 g and >190 g absolute alcohol per week by men and women, respectively.

victim (for example, his or her tendency to always blame others for personal misfortunes or unhappiness). Less than 2% of the cohort reported prolonged bullying in our data.

Methodology

The strengths of this study were prospective design, the use of two time points to define exposure to bullying, the test of reversed causality, and large sample size. The surveys achieved 74–81% response rates, which are satisfactory for studies of this kind.²⁰ Women, permanent employees, and higher income groups were slightly over-represented, but these characteristics were not associated with bullying.

Bullying, cardiovascular disease, and depression were measured by self reports. It is well known that common method variance may artificially inflate associations in cross sectional data, through factors such as social desirability and negative or positive response sets. Because we measured

incidence (that is, change in health between the two surveys), an artificial inflation of associations would have occurred only if common method variance had affected the second survey but not the first survey. We believe that this is a very unlikely alternative, and, therefore, common method variance was no probable source of confounding in the present findings.

Although a new report of a doctor diagnosis may be influenced by recall of diagnosis and access to medical care, evidence supports the reliability and validity of our measure. For example, Bosma and others showed a high correspondence between self reported and documented coronary heart disease.²¹ In addition, currently observed associations of age, sex, socioeconomic status, smoking, and body mass with cardiovascular disease and depression correspond with register based findings on these diseases.^{14 16 22 23}

At least two issues may affect findings on the effects of bullying. Under-reporting of bullying across all sectors of work is probable.^{1 24} If a large proportion of those not reporting bullying were in fact victims of such behaviour, the observed associations between bullying, cardiovascular disease, and depression may be underestimates. Healthy worker effect, arising from the fact that those permanent employees who dropped out of the cohort were typically less healthy than others, further increases the likelihood of under-evaluation of associations. Further studies with follow ups of all study participants, irrespective of their drop out status, will attenuate these problems.

CONCLUSION

In summary, this study has shown that exposure to bullying predicts the onset of depression in a dose-response gradient. Prolonged bullying was also associated with an increased risk of subsequent cardiovascular disease, but this risk was partly attributable to increased prevalence of overweight among the victims. Future research with other indicators of morbidity is needed to confirm the strength of these associations. The present findings have a clear implication for organisations and individuals. Early identification and prevention of bullying may be a key factor in attempts to minimise adverse effects of workplace bullying on mental health.

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Table 3 Associations of bullying with incidence of cardiovascular disease and depression

Subjected to bullying*	n	Crude odds ratio (95% CI)	Adjusted† odds ratio (95% CI)
Incident cardiovascular disease (286 cases)			
At neither time	3884	1.00	1.00
At one time	323	0.73 (0.43 to 1.22)	0.72 (0.43 to 1.21)
At both times	65	2.53 (1.28 to 5.03)	2.31 (1.15 to 4.63)
Incident depression (214 cases)			
At neither time	4109	1.00	1.00
At one time	325	2.26 (1.50 to 3.40)	2.27 (1.50 to 3.42)
At both times	64	4.78 (2.45 to 9.31)	4.81 (2.46 to 9.40)

*Subjects with cardiovascular disease/depression at baseline were excluded. In addition, 103 respondents of the two surveys were excluded because they did not respond to the question on bullying at both times.

†Adjusted for sex, five year age categories, and income.

Contributors: M Kivimäki, the principal investigator, designed the hypothesis, coordinated the project, supervised the analyses, and was the principal author of the paper. M Virtanen helped in data collection and conducted all analyses. M Virtanen, M Vartiainen, M Elovainio, J Vahtera, and L Keltikangas-Järvinen contributed to the planning of the study design, interpretation of results, and writing of the paper.

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