

Exposure to workplace bullying and violence/threats of violence and subsequent working life expectancy among older workers: A Swedish prospective cohort study

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Objectives This study aimed to quantify possible associations between exposure to workplace bullying and violence, or threats thereof, and working life expectancy (WLE) among older workers in Sweden.

Methods We conducted a prospective cohort study using data on 12 920 individuals in analyses of workplace bullying and 12 903 individuals in analyses of violence. Participants, aged ≥ 50 at baseline, were obtained from the Swedish Longitudinal Occupational Survey of Health, using data from 2008 to 2020. We applied continuous-time multistate Markov models to estimate the average number of years that individuals could be expected to work beyond the age of 50, comparing those exposed to workplace bullying or workplace violence/threats of violence to those unexposed.

Results In the unadjusted analysis, exposure to workplace bullying and workplace violence/threats of violence was associated with shorter WLE among older workers [bullying: -0.42 years, 95% confidence interval (CI) -1.23–0.01; violence: -0.42 years, 95% CI -1.06–0.01]. After controlling for sex and occupational level, WLE at age 50 was -0.56 years among those exposed to workplace violence (95% CI -1.02– -0.10) compared with the unexposed. The estimate for workplace bullying was -0.63 years (95% CI -1.39–0.14).

Conclusion Exposure to workplace violence or threats of violence was associated with fewer average expected years in work from age 50. This suggests that prevention of workplace violence could contribute to extended working lives. The association between workplace bullying and WLE was of similar magnitude but not statistically significant.

Key terms labor market participation; occupational health; psychosocial working condition; Sweden; workplace violence.

As life expectancy rises, the number and proportion of older individuals are also increasing (1, 2). To address challenges and realize the opportunities posed by this demographic shift, several policy changes have been introduced around the world, including raising the statutory retirement age to keep older workers in the labor market (3). Thus, from a labor market policy perspective, knowledge about the conditions that promote or hinder extended work participation becomes crucial. The

psychosocial work environment, defined as how jobs are designed and how work is organized, managed, and governed (4), may be an important arena for understanding labor market participation among older workers. Adverse psychosocial working conditions, including workplace offensive behaviors, can negatively influence worker's health, capacity and motivation to remain in the labor market (5–7) but may also be modifiable and amenable to preventive interventions (6, 8).

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Prior research has suggested that favorable working conditions contribute to longer working lives. For example, a recent Danish cohort study reported that favorable psychosocial working conditions, such as having influence and receiving recognition at work, were linked to working beyond the state pension age (9). Conversely, studies show that adverse working conditions may increase the risk of early labor market exits, while also reducing remaining years of healthy life. A study, using data from 1.6 million workers in Denmark, reported that higher physical workload was associated with shorter working life expectancy (WLE) among both women and men (10). A UK cohort study of workers aged ≥ 50 , reported that lack of support and low decision authority, respectively, were associated with 1.7 and 1.8 fewer years of healthy WLE (11). Similarly, a Swedish cohort study reported that older workers who experienced job strain at age 50 worked an average of 6–12 fewer months than those who did not (12). However, we are not aware of any studies to date which have examined the association between being exposed to offensive behaviors at work and WLE among older workers.

Offensive behaviors at work may include workplace bullying, defined as repeated and prolonged exposure to negative social acts involving a power imbalance between the parties concerned (13), and workplace violence or threats thereof, defined as isolated or repeated unacceptable behaviors/practices that may cause physical, psychological, sexual, or economic harm (14). While not the primary focus of this study, workplace bullying and violence may also entail expressions of discriminatory treatment (15), such as ageism. Meta-analytic evidence indicates that about 16% of employees globally experience workplace bullying and approximately 19% report exposure to physical violence at work (16). Offensive behaviors are increasingly recognized as social stressors at work and have been linked to adverse health outcomes, such depression and other common mental disorders, and the onset of cardiovascular disease (6, 17–21). In addition, exposure to offensive workplace behaviors has been linked to lower job satisfaction, increased intention to leave the job, and employee turnover or job change, suggesting a broader influence on employees' working lives (22–26). Indeed, workplace bullying and workplace violence have been associated with a higher risk of temporarily or permanently exiting the labor market, manifested through sickness absence (27–32), unemployment (24), and disability pension (33, 34), although mixed findings have been reported for the latter (35). Several mechanisms have been proposed to underlie these associations, including stress (36, 37), poor health (31), and workplace expulsion or voluntary departure (24, 25). Overall, prior research on labor market exits after exposure to offensive behaviors at work has primarily examined specific exit routes, while no

existing study has focused on quantifying these associations among older workers approaching the normative age of retirement.

Older workers may be particularly vulnerable to the labor market consequences of workplace offensive behaviors for several reasons. If these behaviors are driven by ageism, the psychological impact of violence and bullying at work may be compounded by the fact that they constitute an attack on one's identity and self-worth. Empirical evidence further suggests that older workers may be more fragile to injuries following exposure to physical violence at work, potentially influencing their future work status (38). Additionally, older workers may have fewer opportunities for alternative employment, potentially prolonging exposure to adverse work environments, which may amplify associated health outcomes. Moreover, in Sweden, older workers, have a way to exit the labor market into old-age pension, something not possible to the same extent for younger workers.

This study sought to address this gap by examining whether exposure to workplace bullying and workplace violence or threats of violence were associated with shorter WLE, defined as the expected average number of working years, from a given age, that a person will spend in paid work, hereafter referred to as "work" (39, 40). As such, WLE can capture the dynamic nature of today's labor market exits, often involving multiple transitions between being in and out of work, moving into part-time work, or winding down one's long-term career before permanent exits. Specifically, our research objective was to quantify the associations between exposure to workplace bullying and workplace violence/threats of violence on the expected remaining years in working life from age 50.

Methods

Data material and study design

For this prospective cohort study, we used data from the Swedish Longitudinal Occupational Survey of Health (SLOSH), an ongoing cohort study initiated in 2006. Detailed information regarding SLOSH is available in the published cohort profile (41) and at www.slosh.se. In short, the first SLOSH wave (2006) was designed as a follow-up of the cross-sectional Swedish Work Environment Study (SWES), which was based on participants from the Swedish Labor Force Survey (stratified by work status). Since 2006, participants in SLOSH have been followed biennially (with annual follow-up starting 2022) through a questionnaire containing questions on a range of topics related to one's current work, health, family, and labor market situation. SLOSH is also linked

to the Swedish Longitudinal Integrated Database for Health Insurance and Labor Market Studies (LISA). SLOSH is an open cohort; nine refresher samples from SWES have been added to SLOSH since 2008. In 2024, the total SLOSH cohort consisted of 57 104 participants. Prior research found that both initial and repeated participation in SLOSH is more likely among women, older individuals, and individuals with higher educational attainment (41).

In this study, we used data from the SLOSH surveys conducted in 2008 through 2020. Participants were eligible for inclusion if they took part in at least two survey waves during this period (though not necessarily in consecutive survey waves). To qualify, individuals had to be aged ≥ 50 and report being in paid work at the time of their first participation within this timeframe. Participants with missing information on work status, occupational level, and exposure to workplace bullying and/or workplace violence were excluded, as were self-employed individuals at baseline (given that self-employed individuals more often lack colleagues and supervisors, which limits the assessment of workplace

bullying). Each participant's baseline year was defined as the first year they met these criteria, meaning the baseline year could differ across individuals (2008, 2010, 2012, 2014, or 2018). The length of follow-up varied between individuals (range 2–12 years). Two analytical samples were created for the analyses of bullying ($N=12\,923$) and violence/threats of violence ($N=12\,920$), respectively (figure 1). Because the samples were largely identical, demographic and transitional characteristics are presented only for the larger sample (table 1, figure 2).

Measurements

Workplace bullying and workplace violence/threats of violence. Exposure to workplace bullying and workplace violence/threats of violence were assessed via self-reports at baseline. Respondents were asked to indicate to what extent they had been exposed to “personal persecution in the form of unkind words or behaviors from superiors or fellow workers” (indicating bullying) and to “violence or threats of violence in your

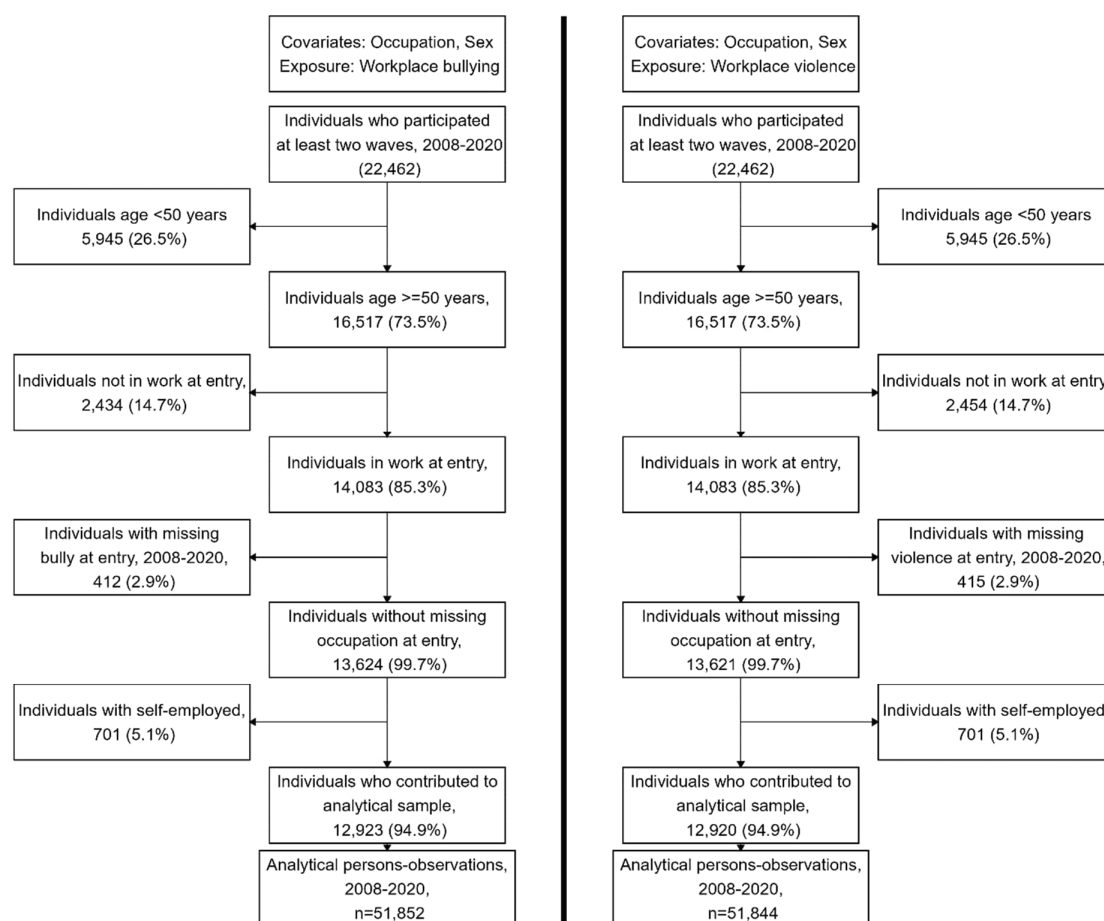


Figure 1. Flowchart of inclusion and exclusion of individuals and persons-observations included in the study.

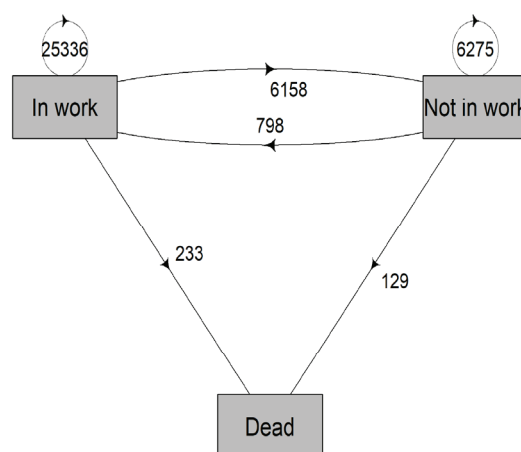
Table 1. Distributions of demographic characteristics, work status, and workplace offensive behaviors for individuals at entry (SLOSH, 2008–2018). [SD=standard deviation.]

Covariates	Men (N=5650)		Women (N=7273)	
	N (%)	Mean (SD)	N (%)	Mean (SD)
Age		56.6 (5.1)		56.0 (4.9)
Work status				
Full-time	5271 (93.3)		6378 (87.7)	
Part-time	379 (6.7)		895 (12.3)	
Occupational level				
Professional	2170 (38.4)		2087 (28.7)	
Intermediate	2074 (36.7)		3818 (52.5)	
Routine	1407 (24.9)		1375 (18.9)	
Workplace bullying				
Unexposed	5232 (92.6)		6488 (89.2)	
Exposed	418 (7.4)		785 (10.8)	
Workplace violence				
Unexposed	5232 (92.6)		6488 (89.2)	
Exposed	418 (7.4)		785 (10.8)	

work”, respectively. Response options and time frame for exposure varied between survey years (supplementary material, www.sjweh.fi/article/4320 table S1). For both bullying and violence, the items were analyzed dichotomously with respondents reporting affirmative answers considered as exposed, and respondents reporting “no” or “not at all” considered unexposed. Cohen’s kappa estimates (supplementary table S2) suggest low agreement between the measures of workplace bullying and violence/threats of violence across survey waves ($\kappa=0.08\text{--}0.11$).

Working life expectancy. WLE was measured using accumulated data on an individual’s work and death statuses over time. Two recurrent states (in work, not in work) and one absorbing state (death) were included in the model. The recurrent states were based on self-reported data in SLOSH. We defined “in work” as working ≥ 10 hours per week and “not in work” as working < 10 hours per week. The threshold of 10 hours per week reflects an arbitrary but pragmatic cut-off for a substantial contribution to working life, in line with our previous conceptualization of WLE (12). Information on age at death was retrieved from the Cause of Death Register kept by the Swedish Board of Health and Welfare.

Covariates. Information on age (in years) and sex (female/male) was retrieved from the LISA-register. Occupational level was measured using self-reported job title and coded according to the Swedish socioeconomic classification. Following previous research (12), we collapsed occupational level into three groups: routine (eg, manual workers), intermediate (eg, assistant, and intermediate non-manual employees), and professional

**Figure 2.** The observed number of transitions between and within the non-absorbing states (“in work” and “not in work”), as well as from the non-absorbing states to death, according to the three-state model to estimate working life expectancy.

(eg, executives, professionals, and other high level non-manual employees).

Analytical approach

We applied multi-state survival models to estimate transition probabilities between different statuses (in work, not in work) and death (the absorbing state). These models incorporated stochastic processes to account for dynamic labor market trends and mortality patterns influencing older workers’ trajectories. Unlike prevalence-based methods (eg, the Sullivan method) (31), multi-state models permit bidirectional transitions (eg, re-entry into work after not being in work), enabling robust estimates of marginal working life expectancies that reflect individuals’ cumulative exposure to labor market risks over time.

Hazard rates for state transitions were modeled using the *msm* package (32) in *R* (33), with age as a continuous covariate under a Gompertz function. This approach assumes log-linear, piecewise-constant transition probabilities within defined age intervals (34). To compute working life expectancies, we employed the *elect* package (34), which extends the *msm* framework by integrating Gompertz-based hazard extrapolation. The analyses were first conducted in the total study sample and subsequently in stratified subsamples defined by sex, occupational level, and the combined categories of sex and occupational level. Both absolute WLE estimates and differences in WLE between exposed and unexposed participants were calculated, together with 95% confidence intervals (CI). The CI were derived from 500 parametric bootstrap simulations, leveraging asymptotic properties of maximum likelihood estimators

(34, 35). To obtain an overall estimate that corresponds to a model adjusted for sex and occupational level, we pooled the sex- and occupation-specific estimates using fixed-effect meta-regression with inverse-variance weighting and calculated the adjusted difference in WLE between exposed and unexposed participants.

The exact timing of transitions between non-absorbing states (eg, in work to not in work) between two survey waves are not known; thus, the non-absorbing states were treated as interval-censored. The *msm* package's censoring facility accommodated this uncertainty, ensuring unbiased parameter estimates despite unobserved exact transition times.

Results

Table 1 shows the distribution of demographic characteristics, work status, and exposure to workplace offensive behaviors for the study sample at their given baseline year (SLOSH 2008–2018), stratified by sex. A larger proportion of women were in part-time work at baseline. A larger proportion of men than women had routine or professional level occupations, whereas women clustered in intermediate occupations. Among women, 10.8% reported exposure to workplace bullying and 10.8% reported exposure to workplace violence/threats of violence. Among men, that proportion was 7.4% for bullying and 7.4% for violence/threats of violence.

Figure 2 shows the observed number of transitions between the three states (in work, not in work, dead) derived from the three-state Markov models. During the study period, there were 6158 transitions from “in

work” to “not in work”, and 798 transitions from “not in work” to “in work”. Transitions were further observed from both “in work” and “not in work” to death (233 and 129 transitions, respectively). A large majority (25 336) remained in the “in-work” state during the entire study period. Based on these models, we proceeded to estimate total WLE from age 50.

Table 2 shows the estimated WLE, including 95% CI, for individuals exposed and unexposed to workplace bullying. In the total sample, the estimated WLE from age 50 was shorter (-0.42 years, 95% CI -1.23–0.01) for individuals having experienced exposure to workplace bullying, compared to unexposed individuals. Analyses stratified by sex, by occupational level, and their combination (supplementary table S3) showed consistent patterns, with lower WLE among bullied compared to not bullied participants across all strata, with statistically significant differences observed among individuals in intermediate occupations. After adjusting for sex and occupational level, exposure to workplace bullying was associated with a -0.63-year difference in WLE (95% CI -1.39–0.14) compared to those unexposed. However, this difference was not statistically significant (table 2, supplementary table S4).

Table 3 shows WLE, including 95% CI for individuals exposed and unexposed to workplace violence/threats of violence. In the total sample, the estimated WLE from age 50 was shorter (-0.42 years, 95% CI -1.06–0.01) for individuals having experienced exposure to workplace violence/threats of violence, compared to unexposed individuals. Again, a similar pattern was observed across all strata of sex and of occupational level, as well as their combination (supplementary table S5), although these differences in WLE were not statis-

Table 2. Estimated total working-life expectancies (WLE) at age 50 for individuals exposed and not exposed to workplace bullying, and the corresponding crude and adjusted differences in WLE. [SE=standard error; CI=confidence interval.]

	WLE			Difference in WLE (95% CI)	Adjusted difference in WLE (95% CI) ^a
	Estimate	SE	95% CI		
All					
Unexposed	12.91	0.07	12.77–13.03		
Exposed	12.49	0.36	11.64–12.84	-0.42 (-1.23–0.01)	-0.63 (-1.39–0.14)
Men					
Unexposed	13.17	0.10	12.95–13.35		
Exposed	12.80	0.62	11.46–13.20	-0.37 (-1.67–0.07)	
Women					
Unexposed	12.69	0.09	12.49–12.84		
Exposed	12.32	0.34	11.63–12.65	-0.36 (-1.00–0.00)	
Professional					
Unexposed	13.55	0.14	13.28–13.81		
Exposed	13.11	0.55	11.91–13.53	-0.44 (-1.63–0.05)	
Intermediate					
Unexposed	12.79	0.10	12.58–12.96		
Exposed	12.35	0.54	11.41–12.73	-0.44 (-1.37– -0.01)	
Routine					
Unexposed	12.66	0.12	12.37–12.87		
Exposed	12.27	0.53	11.15–12.66	-0.39 (-1.42–0.07)	

^a Adjusted for sex and occupational level. Estimate derived from fixed-effect meta-regression with inverse-variance weighting.

Table 3. Estimated total working-life expectancies (WLE) at age 50 for individuals exposed and not exposed to workplace violence, and the corresponding crude and adjusted differences in WLE. [SE=standard error; CI=confidence interval].

	WLE			Difference in WLE (95% CI)	Adjusted difference in WLE (95% CI) ^a
	Estimate	SE	95% CI		
All					
Unexposed	12.91	0.06	12.77–13.02		
Exposed	12.49	0.26	11.85–12.87	-0.42 (-1.06–0.01)	-0.56 (-1.02– -0.10)
Men					
Unexposed	13.17	0.10	12.97–13.35		
Exposed	12.81	0.58	11.52–13.21	-0.36 (-1.66–0.09)	
Women					
Unexposed	12.69	0.09	12.49–12.84		
Exposed	12.33	0.62	11.51–12.68	-0.36 (-1.16–0.07)	
Professional					
Unexposed	13.55	0.13	13.28–13.77		
Exposed	13.12	0.63	12.31–13.54	-0.43 (-1.22–0.05)	
Intermediate					
Unexposed	12.79	0.10	12.55–12.93		
Exposed	12.36	0.32	11.77–12.78	-0.43 (-1.06–0.05)	
Routine					
Unexposed	12.66	0.12	12.38–12.88		
Exposed	12.28	0.71	10.51–12.68	-0.38 (-2.28–0.10)	

^a Adjusted for sex and occupational level. Estimate derived from fixed-effect meta-regression with inverse-variance weighting.

tically significant. In the analysis adjusted for sex and occupational level, we found a statistically significant difference in WLE between exposed and unexposed individuals. Specifically, exposure to violence/threats of violence was associated with a -0.56-year difference in WLE (95% CI -1.02– -0.10) compared to those unexposed (ie, approximately 6.7 months) (table 2, supplementary table S6).

Discussion

In this population-based prospective Swedish cohort study, exposure to workplace violence/threats of violence was associated with a shorter WLE among workers from age 50. This association was statistically significant after adjusting for sex and occupational level, with the adjusted difference estimated at 0.56 years, equivalent to approximately 6.7 months per exposed individual. Exposure to workplace bullying was also associated with a shorter WLE, although this difference was not statistically significant when adjusting for sex and occupational level. Together, these findings suggest that offensive behaviors at work may influence the duration of working lives among older workers.

To the best of our knowledge, this is the first study examining associations between offensive behaviors at work and WLE. Our results are in line with previous studies that have reported associations between both exposure to workplace bullying and exposure to violence/threats of violence and subsequent temporary and permanent labor market exits, including sickness absence (27–32), unemployment (24), and disability

pension (33, 34), though direct comparisons are complicated by differences in outcome operationalizations. The results from our study are also in line with previous research from Scandinavian samples showing that poor psychosocial working conditions are associated with shorter WLE among workers at age 50 (10, 42, 43). The magnitude of the difference observed in our study is comparable to that reported for high versus low effort-reward imbalance in a Finnish sample of public sector employees (approximately 5 months) (43), and somewhat smaller than estimates reported for high versus low job strain (6–12 months) (12) and low job control (approximately one year) (42) in samples based on the general Swedish workforce.

The -0.56-year difference in WLE at age 50 between individuals exposed to workplace violence and those unexposed can be translated into individual-level costs, such as lower pension accrual and higher reliance on sickness absence or disability benefits. According to the Swedish Pension Agency, working one year less before retirement would result in approximately 1900– 2300 SEK less in pension per month (44). Previous studies have reported a prevalence of 11–17% of workplace violence or threats of violence in the general working population in Sweden with a mean age of around 50 years (45). Therefore, this -0.56-year difference is likely to translate into a substantially larger impact at the population level, especially concerning lost tax revenue, added benefit costs, and reduced pension capital.

Implications

The present study found that exposure to offensive behaviors at work is associated with shorter remaining

WLE at age 50. At the individual level, the findings highlight that outcomes of exposure to offensive behaviors at work may extend beyond immediate changes in health to influence long-term labor market participation, potentially influencing financial security in retirement. For employers, the findings underscore the need for primary prevention of offensive behaviors at work. This may be particularly relevant in certain sectors, such as healthcare, where exposure to violence is highly prevalent (46) and workforce retention is already a considerable challenge, although more research is needed to examine sector-specific differences in WLE. Finally, our findings are relevant in the context of ongoing efforts to extend working lives in aging populations (3). If offensive behaviors at work contribute to shorter WLE, addressing these behaviors may be one avenue for supporting longer labor market participation among older workers. Given that WLE-estimates express associations in years, it may be a useful measure that is easy to interpret when communicating the potential labor market relevance of poor working conditions to policy-makers.

Strengths and limitations

This is the first study to estimate WLE in relation to exposure to offensive behaviors at work. One of the key advantages of this study is the use of a large and longitudinal dataset. By employing multi-state modeling techniques instead of relying on more traditional metrics such as the average retirement age, this study better captures the dynamic nature of current labor-market exits. These models also allowed us to account for deaths, a competing transition, which is likely to reduce bias in estimates of length of working life.

The results of the study should be considered in light of several limitations. First, our measure of WLE relied on self-reported information on the number of working hours, where individuals who worked <10 but >0 hours were also treated as “not in work”. Our data did not allow us to distinguish between different reasons for not being in work (eg, long-term sickness absence, permanent disability pension, unemployment). Moreover, limited sample size prevented us from distinguishing between working full-time and working part-time in our multi-state model, thus introducing a risk of misclassification. For instance, individuals who transitioned from full-time work to part-time work (eg, due to part-time sickness absence or partial disability pension or old-age retirement), were still classified as remaining in the in-work state provided that their total working time exceeded 10 hours per week. If such transitions occurred more frequently among exposed individuals, our estimates may underestimate the impact of exposure to offensive behaviors on WLE. Limited sample size also meant that relatively few of the individuals

included in our analyses were categorized as exposed, which may have reduced statistical power needed to detect associations.

Second, due to the statistical complexity of multi-state modeling, we could not adjust our analysis for any other covariates potentially related to both WLE and offensive behaviors, beyond sex and occupational level. In our case, factors such as birth country or baseline mental health may have influenced both the likelihood of (reporting) exposure to workplace offensive behaviors as well as the risk of early labor market exit. Furthermore, as workplace violence exposure may be occupation-specific, likely concentrated in roles facing external parties such as clients, patients, or pupils, the broad occupational level categorization used here may not fully account for within-group variation in violence risk, and residual confounding by occupation cannot be excluded. This may have contributed to an overestimation of the association between workplace violence and reduced WLE.

Third, we only measured exposure at one point in time. Some misclassification might thus have occurred as individuals classified as exposed at baseline may have experienced exposure to bullying or violence at a later time point. Moreover, whether baseline exposure reflected accumulated or isolated episodes of bullying/violence is unknown. Because exposure could only be measured while participants were working, some misclassification may have occurred near employment exit, potentially leading to underestimation of the association with WLE. The perpetrator of the offensive acts was also not fully identified: bullying was limited to colleagues or supervisors, whereas violence could involve individuals both inside and outside the organization, eg, patients or clients. The lack of differentiation between perpetrators of violence may also have introduced some overlap with the bullying measure. However, kappa values assessing agreement between the two measures were low, lending confidence to the interpretation of their associations with WLE as reflecting partly distinct phenomena. Moreover, the measures of bullying and violence were based on self-reports, using single items without definitions of the concepts. Misclassification due to underreporting or failure to capture exposure to certain behaviors associated with bullying or violence might have contributed to bias towards the null.

Fourth, selection might have influenced the results. Highly educated individuals and individuals born in Sweden, generally less affected by workplace bullying and violence, are for example overrepresented in the SLOSH sample. Prior research has also indicated that individuals who participate in multiple SLOSH-waves are healthier than those who only take part once (41), potentially leading to an underestimation of the true impact on WLE.

Lastly, this study aimed at estimating WLE for older workers after exposure to workplace offensive behaviors, and thus, we cannot determine how workplace offensive behaviors might alter the working lives of younger workers, under the age of 50. The potential reduction in WLE could be considerably greater if exposure leads to premature labor market exit at a younger age, including permanent exits. We, therefore, recommend that future studies examine these associations also in younger populations.

Concluding remarks

Our analysis shows that older employees who have been exposed to violence or threats of violence in the workplace, on average, can be expected to have a shorter working life from the age of 50. This corresponds to approximately six months less of WLE than among those who have not experienced such violence. Given the number of older workers potentially affected by these types of offensive behaviors at work, this reduction could have costly societal and economic implications, not the least in the context of ongoing demographic changes. The findings from this study, thus, underscore the potential importance of preventive interventions targeting workplace violence, although further research is needed to confirm these associations and to evaluate effective intervention strategies.

Acknowledgements

Protection of research participants

Thus study was conducted in accordance with the Helsinki Declaration as revised in 2008. Ethical approval for SLOSH has been obtained from the Regional Ethical Review Board in Stockholm (#2012/373-31/5, #2006/158-31, #2008/240-32, #2008/1808-32, #2010/0145-32, #2012/373-31/5, #2013/2173-32, #20152187, #2015/2298-32, #2017/25-35-32). Participants in SLOSH are informed about the purpose of the survey, that their participation is voluntary, and that they have the right to withdraw from participation at any time.

Conflict of interest

The authors declare no conflicts of interest.

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References

1. Oeppen J, Vaupel JW. Demography. Broken limits to life expectancy. *Science* 2002 May;296(5570):1029–31. <https://doi.org/10.1126/science.1069675>.
2. Kontis V, Bennett JE, Mathers CD, Li G, Foreman K, Ezzati M. Future life expectancy in 35 industrialised countries: projections with a Bayesian model ensemble. *Lancet* 2017 Apr;389(10076):1323–35. [https://doi.org/10.1016/S0140-6736\(16\)32381-9](https://doi.org/10.1016/S0140-6736(16)32381-9).
3. OECD. Pensions at a Glance 2015: OECD and G20 indicators. Paris; 2015.
4. ILO. The psychosocial working environment: Global developments and pathways for action. Geneva; 2026.
5. Rugulies R. What is a psychosocial work environment? *Scand J Work Environ Health* 2019 Jan;45(1):1–6. <https://doi.org/10.5271/sjweh.3792>.
6. Rugulies R, Aust B, Greiner BA, Arensman E, Kawakami N, LaMontagne AD et al. Work-related causes of mental health conditions and interventions for their improvement in workplaces. *Lancet* 2023 Oct;402(10410):1368–81. [https://doi.org/10.1016/S0140-6736\(23\)00869-3](https://doi.org/10.1016/S0140-6736(23)00869-3).
7. Madsen IE, Rugulies R. Understanding the impact of psychosocial working conditions on workers' health: we have come a long way, but are we there yet? *Scand J Work Environ Health* 2021 Oct;47(7):483–7. <https://doi.org/10.5271/sjweh.3984>.
8. Laaksonen M. Increasing labor force participation in older age requires investments in work ability. *Scand J Work Environ Health* 2021 Jan;47(1):1–3. <https://doi.org/10.5271/sjweh.3941>.
9. Andersen LL, Thorsen SV, Larsen M, Sundstrup E, Boot CR, Rugulies R. Work factors facilitating working beyond state pension age: prospective cohort study with register follow-up. *Scand J Work Environ Health* 2021 Jan;47(1):15–21. <https://doi.org/10.5271/sjweh.3904>.
10. Pedersen J, Schultz BB, Madsen IE, Solovieva S, Andersen LL. High physical work demands and working life expectancy in Denmark. *Occup Environ Med* 2020 Aug;77(8):576–82. <https://doi.org/10.1136/oemed-2019-106359>.
11. Lynch M, Bucknall M, Jagger C, Kingston A, Wilkie R. Demographic, health, physical activity, and workplace factors are associated with lower healthy working life expectancy and life expectancy at age 50. *Sci Rep* 2024 Mar;14(1):5936. <https://doi.org/10.1038/s41598-024-53095-z>.

12. Chungkham HS, Högnäs R, Alexanderson K, Zaninotto P, Farrants K, Hyde M et al. Association between job strain and working life expectancy: a longitudinal study of older people in Sweden. *Eur J Public Health* 2025 Feb;35(1):85–90. <https://doi.org/10.1093/eurpub/ckae186>.
13. Einarsen S, Hoel H, Zapf D, Cooper C. *Bullying and Harassment in the Workplace: Developments in Theory, Research, and Practice*. Boca Raton: CRC Press; 2011. Available from: <https://ezp.sub.su.se/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edsebk&AN=337594&site=eds-live&scope=site>.
14. International Labour Organization. *Eliminating Violence and Harassment in the World of Work*. Switzerland; 2019.
15. Lewis DG, Hoel H. *The role of discrimination in workplace bullying. Bullying and harassment in the workplace*: CRC Press; 2020.
16. Dhanani LY, Lapalme ML, Joseph DL. How prevalent is workplace mistreatment? A meta-analytic investigation. *J Organ Behav* 2021;42(8):1082–98. <https://doi.org/10.1002/job.2534>.
17. Xu T, Magnusson Hanson LL, Lange T, Starkopf L, Westerlund H, Madsen IE et al. Workplace bullying and workplace violence as risk factors for cardiovascular disease: a multi-cohort study. *Eur Heart J* 2019 Apr;40(14):1124–34. <https://doi.org/10.1093/eurheartj/ehy683>.
18. Hogh A, Viitasara E. A systematic review of longitudinal studies of nonfatal workplace violence. *Eur J Work Organ Psychol* 2005;14(3):291–313. <https://doi.org/10.1080/13594320500162059>.
19. Rudkjoebing LA, Hansen ÅM, Rugulies R, Kolstad H, Bonde JP. Exposure to workplace violence and threats and risk of depression: a prospective study. *Scand J Work Environ Health* 2021 Nov;47(8):582–90. <https://doi.org/10.5271/sjweh.3976>.
20. Holmgren R, Sørensen JK, Rugulies R, Xu T, Dalsager L, Madsen IE et al. Onset of exposure to workplace bullying and incident treatment with psychotropic medication - an emulated target trial with 25 309 Swedish and Danish employees. *Epidemiol Psychiatr Sci* 2026 Jan;35:e3. <https://doi.org/10.1017/S2045796025100413>.
21. Gash V, Blom N. Workplace violence and fear of violence: an assessment of prevalence across industrial sectors and its mental health effects. *Scand J Work Environ Health* 2025 Sep;51(5):370–9. <https://doi.org/10.5271/sjweh.4230>.
22. Boudrias V, Trépanier SG, Salin D. A systematic review of research on the longitudinal consequences of workplace bullying and the mechanisms involved. *Aggress Violent Beh.* 2021;56.
23. Glambek M, Matthiesen SB, Hetland J, Einarsen S. Workplace bullying as an antecedent to job insecurity and intention to leave: a 6-month prospective study. *Hum Resour Manage J* 2014;24(3):255–68. <https://doi.org/10.1111/1748-8583.12035>.
24. Glambek M, Skogstad A, Einarsen S. Take it or leave: a five-year prospective study of workplace bullying and indicators of expulsion in working life. *Ind Health* 2015;53(2):160–70. <https://doi.org/10.2486/indhealth.2014-0195>.
25. Rosander M, Salin D, Blomberg S. The last resort: workplace bullying and the consequences of changing jobs. *Scand J Psychol* 2022 Apr;63(2):124–35. <https://doi.org/10.1111/sjop.12794>.
26. Heponiemi T, Kouvonen A, Virtanen M, Vänskä J, Elovainio M. The prospective effects of workplace violence on physicians' job satisfaction and turnover intentions: the buffering effect of job control. *BMC Health Serv Res* 2014 Jan;14(1):19. <https://doi.org/10.1186/1472-6963-14-19>.
27. Sterud T, Degerud E, Skare Ø, Hanvold TN, Christensen JO. Adverse social behaviour at the workplace and subsequent physician certified sick leave: a three-wave prospective study of the general working population in Norway. *Occup Environ Med* 2021 Jan;oemed-2020-106973. <https://doi.org/10.1136/oemed-2020-106973>.
28. Hoffmann SH, Bjørner JB, Xu T, Mortensen J, Török E, Westerlund H et al. Workplace violence and long-term sickness absence: assessment of the potential buffering effect of social support in two occupational cohort studies. *J Occup Environ Med* 2020 Oct;62(10):830–8. <https://doi.org/10.1097/JOM.0000000000001975>.
29. Wijkander M, Farrants K, Magnusson Hanson LL. Exposure to work-related violence and/or threats of violence as a predictor of certified sickness absence due to mental disorders: a prospective cohort study of 16,339 Swedish men and women in paid work. *Int Arch Occup Environ Health* 2023 Mar;96(2):225–36. <https://doi.org/10.1007/s00420-022-01917-w>.
30. Nielsen MB, Indregard AM, Øverland S. Workplace bullying and sickness absence: a systematic review and meta-analysis of the research literature. *Scand J Work Environ Health* 2016 Sep;42(5):359–70. <https://doi.org/10.5271/sjweh.3579>.
31. Liao X, Wang Y, Zeng Q, Wang J, Yang X, Yan W et al. Is there a bidirectional relationship between workplace bullying and the risk of sickness absence? Systematic review and meta-analysis of prospective studies. *Occup Environ Med* 2023 Sep;80(9):529–37. <https://doi.org/10.1136/oemed-2023-108823>.
32. Holmgren R, Grotta A, Farrants K, Magnusson Hanson LL. Bidirectional associations between workplace bullying and sickness absence due to common mental disorders - a propensity-score matched cohort study. *BMC Public Health* 2024 Mar;24(1):744. <https://doi.org/10.1186/s12889-024-18214-5>.
33. Clausen T, Conway PM, Burr H, Kristensen TS, Hansen ÅM, Garde AH et al. Does leadership support buffer the effect of workplace bullying on the risk of disability pensioning? An analysis of register-based outcomes using pooled survey data from 24,538 employees. *Int Arch Occup Environ Health* 2019 Oct;92(7):941–8. <https://doi.org/10.1007/s00420-019-01428-1>.
34. Nielsen MB, Emberland JS, Knardahl S. Workplace Bullying as a Predictor of Disability Retirement: A

- Prospective Registry Study of Norwegian Employees. *J Occup Environ Med* 2017 Jul;59(7):609–14. <https://doi.org/10.1097/JOM.0000000000001026>.
35. Sterud T. Work-related psychosocial and mechanical risk factors for work disability: a 3-year follow-up study of the general working population in Norway. *Scand J Work Environ Health* 2013 Sep;39(5):468–76. <https://doi.org/10.5271/sjweh.3359>.
 36. Grynderup MB, Nabe-Nielsen K, Lange T, Conway PM, Bonde JP, Garde AH et al. The associations between workplace bullying, salivary cortisol, and long-term sickness absence: a longitudinal study. *BMC Public Health* 2017 Sep;17(1):710. <https://doi.org/10.1186/s12889-017-4716-7>.
 37. Grynderup MB, Nabe-Nielsen K, Lange T, Conway PM, Bonde JP, Francioli L et al. Does Perceived Stress Mediate the Association Between Workplace Bullying and Long-Term Sickness Absence? *J Occup Environ Med* 2016 Jun;58(6):e226–30. <https://doi.org/10.1097/JOM.0000000000000750>.
 38. Friis K, Larsen FB, Lasgaard M. Physical violence at work predicts health-related absence from the labor market: A 10-year population-based follow-up study. *Psychol Violence* 2018;8(4):484–94. <https://doi.org/10.1037/vio0000137>.
 39. Chungkham HS, Högnäs RS, Head J, Zaninotto P, Westerlund H. Estimating Working Life Expectancy: A Comparison of Multistate Models. *SAGE Open* 2023;13(2):215824402311772. <https://doi.org/10.1177/21582440231177270>.
 40. Pedersen J, Bjorner JB. Worklife expectancy in a cohort of Danish employees aged 55–65 years - comparing a multi-state Cox proportional hazard approach with conventional multi-state life tables. *BMC Public Health* 2017;17:879. <https://doi.org/10.1186/s12889-017-4890-7>.
 41. Magnusson Hanson LL, Leineweber C, Persson V, Hyde M, Theorell T, Westerlund H. Cohort Profile: The Swedish Longitudinal Occupational Survey of Health (SLOSH). *Int J Epidemiol* 2018 Jun;47(3):691–692i. <https://doi.org/10.1093/ije/dyx260>.
 42. Almroth M, Nevriana A, Falkstedt D, Burdorf A, Kjellberg K, Hemmingsson T et al. Job control and working life expectancy in Sweden. *Scand J Work Environ Health* 2025 Nov;51(6):516–25. <https://doi.org/10.5271/sjweh.4250>.
 43. Haukka E, Heikkilä K, Pentti J, Vahtera J, Chungkham HS, Zaninotto P et al. Work-related psychosocial factors and working life expectancy among Finnish public sector employees aged 50 years or older. *Scand J Work Environ Health* 2026 May;52(3):272–81. <https://doi.org/10.5271/sjweh.4298>.
 44. Swedish Pensions Agency. Jobba längre ger högre pension [Working more years gives higher pension benefits] 2026. Available from: <https://www.pensionsmyndigheten.se/ga-i-pension/planera-din-pension/pensionaldernsbetydelse#:~:text=Allt%20r%C3%A4knas.-,Allt%20r%C3%A4knas,mitt%20emellan%20jobb%20r%C3%A4knas%20ocks%C3%A5.&text=25%20042%20kronor%20under%20hela,med%20till%20din%20allm%C3%A4nna%20pension>.
 45. Xu T, Magnusson Hanson LL, Lange T, Starkopf L, Westerlund H, Madsen IE et al. Workplace bullying and violence as risk factors for type 2 diabetes: a multicohort study and meta-analysis. *Diabetologia* 2018 Jan;61(1):75–83. <https://doi.org/10.1007/s00125-017-4480-3>.
 46. Liu J, Gan Y, Jiang H, Li L, Dwyer R, Lu K et al. Prevalence of workplace violence against healthcare workers: a systematic review and meta-analysis. *Occup Environ Med* 2019 Dec;76(12):927–37. <https://doi.org/10.1136/oemed-2019-105849>.

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