Workplace Violence

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Abstract

Workplace violence is common—especially in health, education, and hospitality jobs—and may impose broad and persistent costs. We identify incidents of workplace violence in Danish injury records and validate this classification using linked police reports. We then estimate the effect of experiencing workplace violence on victims' health and labor market outcomes. We find that workplace violence causes a 15% decline in earnings over five years and increases the likelihood of job separation. These effects are substantially larger than those from comparably severe non-violent workplace injuries, indicating that the economic costs of workplace violence extend beyond health-related incapacitation. Following violent incidents, victims sort into firms with lower violence risk, consistent with deliberate risk avoidance. Because violent incidents are concentrated in jobs with high labor market tightness, they aggravate existing labor shortages.

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JEL codes: J16; J17; J28; J81

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1 Introduction

Workplace violence is widespread: a recent ILO survey reports that one in five workers has experienced psychological violence, one in ten physical violence, and one in fifteen sexual harassment at work (International Labour Organization, 2022). The resulting effects on workers' health, productivity, and career trajectories can be large and persistent. In particular, compared to other workplace risks, violence raises concerns that extend beyond physical impairment: it may affect workers' sense of safety and dignity, forcing them to revise career-related expectations or beliefs. Moreover, because violence is often hidden, workers may underestimate its risk, leading to strong behavioral responses when it occurs.

Although a pervasive problem, we know little about the effects of violence on workers, or how violence differ from other job-related risks. A key challenge is measurement. Surveys provide information on prevalence of violence but rarely permit tracking individual outcomes around the time of an incident. Administrative data, by contrast, enable analysis of workers' trajectories but typically lack direct indicators of violence: The limited existing evidence relies on police-reported cases of physical assaults between co-workers (Adams-Prassl et al., 2024), excluding non-reported violence and violence perpetrated by clients, students, patients, or strangers—who constitute the majority of aggressors.[1]

This paper breaks new ground by identifying cases of violence using a novel data source: Danish employer-reported workplace injury records. This data allows us to cover cases of workplace violence that are not reported to the police or are perpetrated by aggressors other than colleagues. By law, employers must report all workplace injuries that may result in 1+ day of absence, including detailed information on the cause and nature of each incident. We identify cases of workplace violence as those in which the reported cause is "aggression or threats" and classify all other cases as accidental injuries.[2] We then link each case to administrative police records at the victim–month level to validate the violence classification by verifying whether victims filed a violence-related police report. Finally, we merge all cases of violence and accidents with rich administrative registers covering employment, earnings, government transfers, and doctor visits.

Between 2004 and 2017, the injury records list 443,362 workplace injuries, of which 11,709 are caused by violence. Linking cases to police reports allows us to validate our categorization. We find that 17 (25) percent of violent mental (physical) injuries are associated with a police report, compared with just 2 percent of accidental injuries. The higher police reporting rate among violent cases supports our classification. The overall levels reveal that most workplace violence goes unreported to the police. Strikingly, al-

[1] In a large member survey of public-sector frontline workers, the Danish Union of Public Employees (FOA) reports that in nine out of ten workplace violence incidents, the perpetrator is a patient, client, or resident (FOA – Fag og Arbejde, 2008).

[2] Note that workplace violence hence refers throughout this paper specifically to discrete violent incidents rather than to exposure to repeated low-level aggressions.

though women constitute 75 percent of victims, they are much less likely than men to report violence to the police: in cases of physical violence, only 20 percent of women file a police report after experiencing physical violence, compared to 38 percent of men. Moreover, comparing the two data sources confirms that the vast majority of workplace violence cases does not involve co-workers: among all workplace injuries associated with a police report, those involving a co-worker represent less than 1 percent. This highlights the importance of detecting broader types of violence in the workplace injuries data. Violent injuries are concentrated in interpersonal, service-oriented settings–notably health, education, and hospitality–whereas accidental injuries arise primarily in manual and production-oriented sectors such as manufacturing and construction.

To estimate the effects of workplace violence (and accidents) on workers, we begin by dividing injuries into four groups based on their cause and resulting harm: injuries caused by (1) violence resulting in physical harm (2) violence resulting in mental harm, (3) accidents resulting in physical harm, and (4) accidents resulting in mental harm.[3] While our primary focus is on (physical and mental) workplace violence, systematically comparing violent and non-violent injuries allows us to isolate effects that are specific to violence rather than to injuries per se. To this end, we restrict the accident sample to physical injuries that occur in sectors which overlap in violence exposure.[4] We then implement a combination of matching and event study design. For each group, we match each victim to a control worker of the same age, gender, education, tenure and average working hours, who never appear in the injury records during our study period. Using this sample, we estimate an event study model to explore the effect of violence on victims' health and economic outcomes at the monthly level over a five-year horizon.

We start by considering the effects of workplace violence on health. Victims of violence experience a sharp increase in sick leave of 15–20 percentage points in the two months following the incident. Thereafter, rates gradually decline, though 5 percent more workers continue to take sick leave five years later. Importantly, injuries caused by violence generate sick-leave patterns remarkably similar to those caused by accidents over the five-year window, regardless of whether the recorded harm is mental or physical. We also estimate persistent increases in fees from doctor visits of 11–15 percent for both violence and accidents. Hence, our evidence supports that the degree of severity of violence and accident cases are at par.

Next, we examine the impact on labor market outcomes. Violence leads to a larger and more persistent reduction in employment than accidents –6 versus 3.5 percentage points af-

[3]In the main analysis, we aggregate physical and mental injuries and report results separately for violence-related and accident-related injuries, with results for all four groups presented in the Online Appendix.

[4]Specifically, we include all accidents resulting in mental harm and restrict the sample of physical accidents to those caused by collisions with an object or another person, which is a broadly defined form of injury in the accident data.

ter five years. Violence also substantially increases separation from the establishment where the incident occurred, by 12 percentage points compared with 5 percentage points for accidents.[5] The combined effects of health deterioration, employment loss, and job separation translate into substantial earnings losses: victims of violence experience a 15.3 percent decline in cumulative earnings over five years, compared with 8.4 percent for accidents. The substantial difference in effect indicates that the consequences extend beyond health incapacitation. Our estimate is comparable to the effect of co-worker violence documented by Adams-Prassl et al. (2024) in Finland, larger than a burnout effect in Sweden (Nekoei et al., 2024), and larger than a job-loss effect in Denmark (Bertheau et al., 2023).

Decomposing the effect on job separation, we find that half of the decline following violence is driven by job switching, whereas accidents only have limited impact on job-mobility. We find that victims are 5.4 percentage points more likely to switch establishment (versus 0.5 percentage points for accidents), and 4 percentage points more likely to switch firm (versus null for accidents). Importantly, these transitions typically involve moves to different *workplace types* while remaining within the same *occupation*—for example, a nurse moving from a residential care facility to a general practice clinic—suggesting that updated preferences are employer-specific rather than occupation-specific.[6]

What explains the effect of workplace violence on mobility? To address this question, we implement a new matching procedure that compares victims who move to a new job shortly after experiencing violence to comparable job movers. We first estimate violence risk across all firms in Denmark combining a lasso model with worker responses from the *Danish Working Environment (AH) Survey*.[7] We find that victims work at higher-risk firms at the time of the violent incident: their firm is at the 67th percentile of the firm-specific violence risk distribution, while comparable movers are at the 62nd percentile. The move reduces this gap in violence risk by about 2 percentiles, suggesting that victims may move to seek safer environments. However, this pattern does not necessarily demonstrate that victims deliberately target lower-risk firms after leaving their firm. We could observe the same pattern through mean reversion: since victims start in high-risk environments, most new firms will offer lower risk regardless of search behavior.

Hence, an important question arises: beyond triggering the decision to leave, does experiencing workplace violence affect subsequent search behavior? We address this with a refined matching procedure that compares victims who change jobs after violence to similar movers *from the same firm*. We find that victims subsequently work in firms about 1 percentile lower in the violence risk distribution than these matched co-workers. This

[5]Throughout the paper, we refer to higher-level organizational units as *firms* and to the geographically defined units as *establishments*.

[6]Workplace types are defined using 2-digit NACE codes, with the full classification provided in Online Appendix Table B.6. Occupations are defined using 2-digit DISCO codes, with the corresponding classification reported in Online Appendix Table B.7.

[7]We use 56,000 female and 64,000 male survey responses stating whether the worker have been exposed to violence, mobbing, threats or sexual harassment in the past 12 months.

suggests that violence not only triggers mobility but also causes victims to systematically seek jobs with lower violence risk.

Finally, we examine whether workplace violence contributes to labor shortages. Five years after the incident, victims are disproportionately less likely to work in hospitals, youth or psychiatric residences, or in courts, prisons, or police services—workplaces widely recognized as facing recruitment challenges. To formalize this relationship, we construct a proxy for labor market tightness using average unemployment durations across occupation–workplace type cells. Because unemployment duration is inversely related to tightness, shorter durations indicate more constrained labor markets. We find that workplace violence is disproportionately concentrated in jobs with shorter unemployment durations. Consequently, the reallocation of victims away from these jobs implies that workplace violence exacerbates existing labor market imbalances by withdrawing workers from the most understaffed sectors and reallocating them toward less constrained parts of the economy.

Contribution to the literature. Our findings contribute to three strands of literature. Firstly, we expand the evidence on the recent literature on workplace violence (Batut et al., 2021; Folke and Rickne, 2022; Chikhale et al., 2025; Conway et al., 2022; Adams-Prassl et al., 2024; Folke et al., 2025). Closest to our study is the work by Adams-Prassl et al. (2024), which examines the effects of police-reported assaults by co-workers. Using data that capture a broader range of violent incidents, we extend their analysis by showing that the large and persistent negative effects of workplace violence on earnings persist when the perpetrator is not a colleague, but rather a client, student, or patient—which represent the vast majority of violence cases. Additionally, we provide new insights into the mechanisms: using workplace injuries as a benchmark reveals that the costs of violence extend beyond health incapacitation. We show that costs are driven primarily by a specific behavioral response—victims leaving their firm. Moreover, we reveal spillover costs of workplace violence beyond direct victim harm, showing it exacerbates labor shortages.

Second, our study connects to the literature analyzing the importance for workers of non-wage amenities, like workplace safety and firm-specific social ties (Smith, 1973; Thaler and Rosen, 1976; Viscusi, 1993; Viscusi and Aldy, 2003; Caldwell et al., 2025). In particular, Folke and Rickne (2022) show that workers tend to leave their company after being sexually harassed and go to jobs with a lower risk of sexual harassment. Our findings that victims of workplace violence leave their jobs and go to firms offering lower levels of violence risk are consistent. We analyze further this avoidance behavior, highlighting that it reflects both an increase in workers' propensity to leave their initial firm and in their propensity to target workplaces with lower violence risk in their subsequent search. The finding that the experience of workplace violence changes search behavior suggests that the vast majority of workers who has not (yet) been injured at work may underestimate the value of workplace safety. This is in line with the idea that workers may learn how much they value certain

social aspects of their firms, only after starting to work at the firm and experiencing them (Caldwell et al., 2025).

Finally, we contribute to a strand of research quantifying the consequences of workplace injuries for victims (Leth-Petersen and Rotger, 2009; Dworsky et al., 2022; Broten et al., 2022). Beyond conventional physical injuries, recent studies also consider mental health (Humlum et al., 2024; Nekoei et al., 2024). In this paper, we study physical and psychological injuries side by side, showing that they have very similar economic consequences. We go beyond quantifying the costs of injuries and explore how workers adapt their labor market behavior in response to the shock.

The remainder of the paper is structured as follows. Section 2 outlines the institutional context and provides an overview of workplace injury data alongside the Danish administrative registers. Section 3 provides novel descriptive statistics about workplace violence. Section 4 explains the sample construction, matching procedure, and statistical model used in the analysis. Section 5 presents the estimated effects of workplace injuries on workers' health and economic outcomes. Section 6 examines the underlying mechanisms. Section 7 explores broader impacts of violence, including effects on labor shortages. Section 8 concludes.

2 Institutional setting and data

2.1 Workplace injuries in Denmark

Workplace injuries are defined as any mental or physical harm stemming from a sudden event occurring in the office or work area. In Denmark, employers are legally required to report workplace injuries to both their company's insurance provider and the Danish Working Environment Authority within 14 days of the first day of absence, provided that the injury *could* result in an absence from work beyond the day of the incident (European Commission, 2024).[8] Medical professionals, such as doctors and dentists, are similarly mandated to report workplace injuries if they suspect or confirm that a condition is caused by work or working conditions. In rare cases where neither the employer nor medical professionals report the incident, workers have the option to register the injury themselves. All cases are reported electronically through an online portal notification system (EASY).

Individuals affected by workplace injuries in Denmark are entitled to economic assistance to cover medical expenses and income losses resulting from the incident. Denmark's universal health care system guarantees access to medical care for all citizens, with hospitalization costs fully covered by public funding. Additionally, income insurance provides financial support for workers unable to work due to injury. Initially, employees are typically

[8]Hence, employers must report incidents that, while not leading to absence, could justify a claim for benefits under the law.

entitled to full pay during their absence, the duration of which depends on their employment contract. Once employer-paid sick leave ends, or if no such provision exists in the employment contract, injured workers may apply for state-funded sickness benefits through their local municipality. These benefits last up to 22 weeks.[9] Extended support is available under specific circumstances but requires screening or medical evaluation. For individuals permanently unable to return to work, long-term disability benefits are administered by municipalities and provide annual financial support.[10]

2.2 Identifying workplace violence in injury records

We draw on administrative data on workplace injuries reported to the Danish Working Environment Authority. Each report includes detailed information on the circumstances of the incident and the nature of the resulting harm. These reports form the basis for official workplace safety statistics, which follow the standardized classification developed under the European Statistics on Accidents at Work (ESAW) framework (European Commission. Eurostat., 2013). Comparable data exist for most European countries. To identify incidents of workplace violence and distinguish them from accidents, we use two ESAW variables: the *cause of injury* (violent or accidental) and the *type of harm* (physical or psychological).

Cause of injury. We define workplace violence as injuries classified under the ESAW category "Shocks after aggression and threats" within the "cause of injury" variable. All other reported injuries are categorized as accidents. To validate this definition, we link the workplace injury data to police records and show that injuries identified as violent are substantially more likely to be reported to the police than those identified as accidental, supporting the accuracy of our classification. Descriptive statistics for this comparison are presented in Section 3.

Type of harm. Violent and accidental injuries may differ not only in their cause but also in the form of harm they produce. Psychological injuries, for instance, are more prevalent among violence cases. To account for this, we further divide both violent and accidental injuries into those resulting in *physical* and *psychological* harm, using the ESAW "Contact mode of injury" classification.

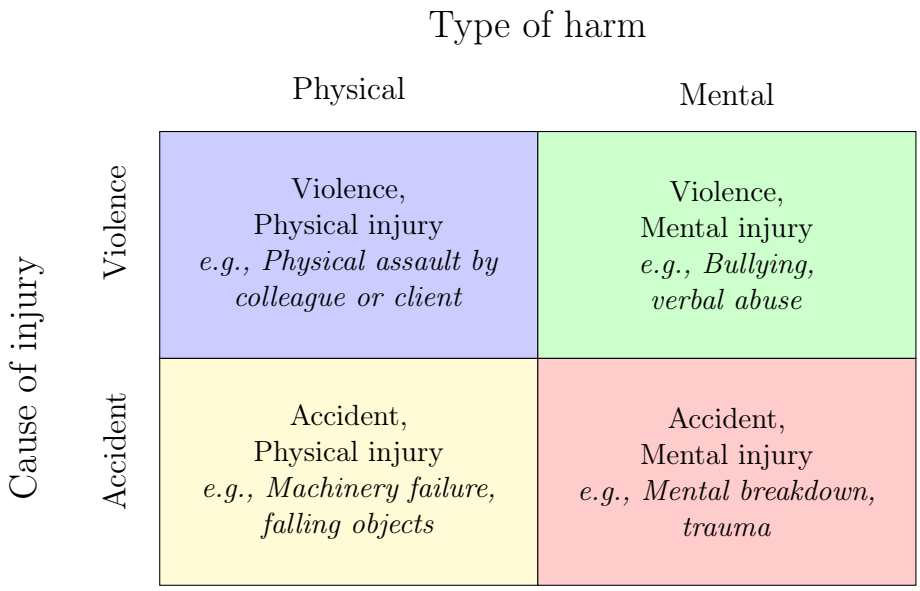
Classification. We thus distinguish between four categories of workplace injuries, illustrated in Figure 1: (1) violent physical injuries, (2) violent psychological injuries, (3) accidental physical injuries, and (4) accidental psychological injuries. Violent physical injuries include incidents such as assaults by colleagues, patients, or clients. Violent psychological

[9] As of 2019, the maximum weekly benefit was 4,355 DKK ($702).

[10] In 2019, approved applicants received 192,528 DKK ($31,053) if married or cohabitating and 226,500 DKK ($36,532) if single.

injuries capture experiences of bullying, verbal abuse, or threats. Accidental physical injuries correspond to conventional workplace accidents, such as machinery-related injuries or falls. Accidental psychological injuries include mental breakdowns, trauma, or stress-induced incidents unrelated to violence.

Figure 1: Classification of workplace injuries by cause and harm type.



For the main analysis, we aggregate all mental and physical injuries by cause (violence versus accident). Results disaggregated by the four injury types are presented in the Online Appendix.

2.3 Other administrative data

Employer-employee data and demographics. We link cases of workplace accidents and violence to various administrative datasets in Denmark using unique firm and individual identifiers provided through the injury data. Firstly, we link cases to the Danish employer–employee data (BFL), population registers (BEF), and income registers (IND). The BFL dataset provides spell-level data on monthly income, hours worked, and employment for all workers in Denmark from 2008 to 2022. The IND and BEF registers contain annual information on demographic characteristics for the entire population from 1995 to 2022.

Firms and establishments. The employer–employee data contain information on both the local establishment at which each worker is employed and the broader organizational unit to which the establishment belongs. Throughout the paper, we refer to these higher-level organizational units as *firms* and to the geographically defined units as *establishments*. While many of the organizations in the data are public-sector institutions—such as schools,

hospitals, and other public agencies—we use the term *firm* generically to denote the employing organization, regardless of ownership or sector.

Workplace types and occupations. Using the employer–employee data, we classify jobs along two dimensions: occupation and workplace type. Workplace types are defined using 2-digit NACE industry codes, with the full classification provided in Online Appendix Table B.6.[11] Occupations are defined using 2-digit DISCO codes, with the corresponding classification reported in Online Appendix Table B.7. While the occupational classification is worker-specific, the workplace-type classification is firm-specific due to the industry code used to construct this measure.

Government transfers. Secondly, we utilize the DREAM dataset to obtain detailed information on government transfers, including data on sick leave, unemployment insurance, participation in training programs, and disability benefits for all Danish citizens. To measure individuals' health conditions, we incorporate data from registers of doctor visit fees (SSSY and SYSI), which allow us to identify the timing and costs of medical consultations, as well as the type on consultation.

3 Descriptive statistics on workplace violence

3.1 Workplace injuries and police reports

Table 1 reports a total of 443,362 workplace injury cases recorded in Denmark from 2004 to 2017 (Column 1).[12] Among these, 11,709 cases (2.7%) are classified as violence-related. Column 3 and 4 of Table 1 present the share of injuries in each category where the victim filed an offense-related police report in the same year as the incident. 25% of violent cases involving physical harm and 17% involving mental harm are reported to the police, compared to just 2% of accidents. This suggests that we have correctly detected the cases caused by violence in the work injury data. It also reveals that a significant portion of workplace violence remains unreported to the police. This is in line with prior evidence of underreporting.[13] Strikingly, women are significantly less likely than men to report violence to the police. In cases of physical violence, only 20% of women file a police report, compared to 38% of men. In Section 5.2, we further explore the differences in outcomes

[11]Because our classification relies on industry codes, the estimated effects for "workplace types" can equivalently be interpreted as industry-level effects. We nevertheless use the term *workplace type*, as it is more meaningful in the context of workplace violence and the analysis of work environments.

[12]Cases are counted at the individual-firm-month level.

[13]The National Crime Victimization Survey conducted by the US Department of Justice show that only 44% of violent victimization were reported to the police in 2016 (Morgan and Kena (2017)). For nonvisible injuries, the reported share is much lower: three out of four people who experience some form of harassment in their workplace do not even mention this to a supervisor, manager or union representative (U.S. Equal Employment Opportunity Commission (2016)).

between police-reported and non-reported injuries, and discuss the broader implications of under-reporting.

Table 1: Workplace injuries, 2004-2017.

Injury type, harm	Total		Police reported		Police reported colleague	
	(1) Count	(2) Share	(3) Count	(4) Share	(5) Count	(6) Share
All						
Violence, physical	3,009	0.007	757	0.251	35	0.012
Violence, mental	8,700	0.020	1,503	0.173	105	0.012
Accident, physical	384,155	0.866	8,291	0.022	354	0.001
Accident, mental	47,498	0.107	1,114	0.023	62	0.001
Count all	443,362	1.000	11,665	0.026	556	0.001
Women						
Violence, physical	2,163	0.012	434	0.201	23	0.011
Violence, mental	6,498	0.035	961	0.148	70	0.011
Accident, physical	151,667	0.820	3,819	0.025	199	0.001
Accident, mental	24,778	0.134	654	0.026	44	0.002
Count women	185,106	1.000	5,868	0.032	336	0.002
Share women	0.417					
Men						
Violence, physical	846	0.003	323	0.382	12	0.014
Violence, mental	2,202	0.009	542	0.246	35	0.016
Accident, physical	232,488	0.900	4,472	0.019	155	0.001
Accident, mental	22,720	0.088	460	0.020	18	0.001
Count men	258,256	1.000	5,797	0.022	220	0.001
Share men	0.583					

Notes: This table shows all reported injuries in Denmark in the years 2004-2017. The counts and shares are shown separately for all, women, and men. Moreover, each section divides injuries into four types: violence (physical harm), violence (mental harm), accident (physical harm), and accident (mental harm). Column (1) reports the number of cases in each category reported to the Danish Working Environment Agency, while column (2) reports each category's share of total injuries. Column (3) and (4) show the number and share of cases that are police reported. Column (5) and (6) show the number and share of cases that are police reported, where a colleague is listed as a perpetrator.

In addition, among all workplace injuries associated with a police report, we focus on those where the perpetrator is identified as a co-worker in Columns 5 and 6 of Table 1. This corresponds to the specific cases analyzed in Adams-Prassl et al. (2024). We see that among reported cases of workplace violence, those inflicted by a co-workers only represent about 5% (556 cases). The vast majority of workplace violence hence appears to be inflicted by clients, patients, students or even strangers rather than co-workers. This is discussed further in Section 3.3.

Overall, Table 1 highlights that the scope of workplace violence captured in the administrative injury data is considerably broader than that reflected in police reports of co-worker assaults analyzed by Adams-Prassl et al. (2024). First, the workplace injury records include incidents that are never reported to the police, which constitute the vast majority of violent events. If police-reported cases differ systematically from unreported ones—for example, being more severe or involving workers with higher education levels and greater economic resources—the estimated effects from police data may not be representative of the broader population of victims. Moreover, the act of filing a police report may itself affect subsequent labor market outcomes, potentially confounding the estimated impact of violence. Second, unlike police records limited to co-worker assaults, the workplace injury data also capture violence perpetrated by strangers, clients, patients, or students within the work environment.

3.2 The victims of workplace violence

Table 2 presents descriptive statistics for all injured workers at the time of injury. We focus on injuries occurring between 2008 and 2017 to ensure that individuals can be tracked for up to two years before and five years after the incident. Compared to a random sample from the Danish working population (column 1), injured workers (column 2) are of similar age but have slightly lower earnings and education levels. They work longer hours, and experience more sick leave in the year prior to the incident, and and are overrepresented in the public sector.

Columns (3)–(6) distinguish between victims of physical violence, mental violence, physical accidents, and mental accidents. Strikingly, while women make up roughly half (49%) of all injured workers, they account for around three quarters (75–77%) of violence cases. This gender difference largely reflects the concentration of violent incidents in female-dominated sectors such as health care, education, and social services. Consistent with this, more than half of violence victims work in medical or teaching professions, while accidental injuries are more common among workers in manufacturing, construction, and other manual or industrial occupations. Across all categories, violence victims are more likely to be employed in public sector institutions and larger workplaces, whereas accident victims are more evenly distributed across private-sector firms and smaller establishments.

The distribution of injured workers across industries and occupations highlights clear differences in violence and accident risk across jobs. Violence is heavily concentrated in service-oriented and care-providing sectors: over half of violence victims are employed in medical institutions (56–58%), and around one-fifth in education (11–20%). By contrast, accidental injuries are most prevalent in sectors characterized by physical or manual labor, including manufacturing, construction, and industry, which together account for roughly one third of all accident cases. The occupational distribution mirrors these patterns. Vi-

Table 2: Descriptive averages, injured workers

	(1) Population	(2) Injuries, all	(3) Violence, physical	(4) Violence, mental	(5) Accident, physical	(6) Accident, mental
Age	41.74	40.75	40.22	40.22	39.91	41.90
Female (d)	0.48	0.49	0.75	0.77	0.38	0.56
Education	14.07	13.64	14.57	14.55	13.37	13.73
Earnings (1,000 dkk)	31.03	27.70	27.14	27.39	27.76	27.72
Monthly hours worked	134.88	148.56	146.64	147.71	148.34	149.12
Tenure						
Less then 1 year	0.31	0.34	0.35	0.35	0.35	0.32
2–4 years	0.41	0.45	0.49	0.46	0.45	0.45
> 4 years	0.28	0.21	0.17	0.19	0.19	0.23
Industry/ Broad workplace type (d)						
Farming, industry, raw materials	0.14	0.16	0.01	0.00	0.22	0.12
Construction	0.06	0.09	0.00	0.00	0.12	0.08
Restaurant, services, sales	0.24	0.18	0.16	0.18	0.22	0.14
Communication	0.03	0.01	0.00	0.00	0.01	0.00
Finance & real estate	0.05	0.01	0.01	0.02	0.01	0.01
Research & analytical	0.05	0.01	0.00	0.00	0.01	0.01
Teaching	0.09	0.08	0.20	0.11	0.07	0.08
Medical	0.18	0.34	0.56	0.58	0.21	0.43
Creative and recreational	0.04	0.02	0.01	0.01	0.02	0.02
Other workplace type	0.12	0.10	0.05	0.10	0.11	0.11
Occupation (d)						
Nurse, doctor	0.04	0.04	0.06	0.10	0.02	0.05
Teacher	0.09	0.13	0.36	0.26	0.11	0.13
Customer service clerk	0.06	0.02	0.02	0.04	0.02	0.02
Service worker	0.04	0.07	0.09	0.08	0.05	0.09
Care worker	0.08	0.14	0.22	0.18	0.09	0.20
Artisanry & machinery	0.05	0.12	0.00	0.00	0.17	0.09
Driver	0.02	0.05	0.04	0.02	0.06	0.05
Cleaner	0.04	0.04	0.01	0.02	0.04	0.04
Construction worker	0.04	0.08	0.01	0.01	0.11	0.06
Other	0.54	0.30	0.19	0.30	0.34	0.28
Health Outcomes (t–12)						
Sick leave months	0.32	0.54	0.56	0.55	0.52	0.55
UI months	0.32	0.49	0.51	0.39	0.54	0.47
Total doctor fees	16.56	18.55	21.31	21.46	17.10	19.55
Physical doctor fees	0.21	0.23	0.29	0.29	0.20	0.25
Psych doctor fees	0.05	0.07	0.12	0.11	0.06	0.07
Firm characteristics						
Public firm	0.33	0.52	0.80	0.79	0.38	0.62
Firm size: <20 workers	0.35	0.21	0.20	0.27	0.22	0.18
Firm size: 20–100 workers	0.31	0.41	0.52	0.42	0.41	0.40
Firm size: >100 workers	0.34	0.38	0.28	0.31	0.37	0.42
Observations	512989	62111	1681	4812	30216	25402

Notes: This table reports descriptive means in the month where workplace incidents occur. The sample covers injuries that occurred between 2008 and 2017. Column (1) presents averages for the population; Column (2) for all injury cases; Columns (3)–(6) for injury subtypes (violence vs. accident; physical vs. mental). Monetary values are in 1,000 dkk.

olence victims are predominantly employed as professionals, teachers, nurses, and care workers, whereas accident victims are overrepresented among manual laborers, artisans, and construction workers. These sectoral divides underscore that workplace violence tends

to arise in human–facing, service–oriented environments, while accidents are concentrated in more physically intensive, production-oriented settings.

3.3 The charged perpetrators

Online Appendix Table B.2 provides detailed descriptive statistics for the subset of workplace violence cases that can be linked to a police report identifying a charged perpetrator. The table highlights three main patterns concerning the characteristics of perpetrators and the nature of the crimes committed.

First, a large share of reported cases are gender-based: 90% of charged perpetrators are male, while 37% of victims are women and 63% are men. In 60% of all cases, both the perpetrator and the victim are male, and in roughly one-third the perpetrator is male and the victim female. Female-perpetrated violence is comparatively rare: only 3% of cases involve a female perpetrator and a male victim, while 7% involve both female perpetrators and victims.

Second, the majority of reported crimes involve physical forms of violence. Nearly half of the cases are classified as public crimes, typically referring to violence committed in public spaces or directed toward public-sector employees. 24% of cases involve simple assault, while 9% are categorized as serious violence offenses. Threats account for 10% of incidents, and robbery or theft-related assaults for 4%. Sexual crimes are rare, representing only about 2% of all reported cases. Overall, most police-reported incidents of workplace violence involve direct physical aggression rather than threats or sexual misconduct.

Finally, perpetrators are on average 32 years old, approximately ten years younger than the typical victim. In 40% of all cases, the perpetrator is more than ten years younger than the victim, while only 20% of incidents involve a perpetrator who is at least ten years older.[14]

4 Identification strategy

We estimate the impact of experiencing a workplace injury on health and labor market outcomes, using exact matching and event studies. The following sections present the sample construction and event-study design used for the main analysis.

4.1 Sample construction

We select the sample of workers who experienced an injury at their workplace between 2008 and 2017, which we refer to as "treated" individuals.[15] In our main analysis, we

[14]The age gap partly reflects school- or education-related incidents, where minors or young adults are identified as perpetrators of violence against teachers or educational staff.

[15]If workers appear in multiple injury reports, we use the first reported case for the main sample, ensuring that individuals are only treated once.

narrow down the sample of workers experiencing a physical accidental injury by focusing on the most common sub-category, defined as "Struck by/collision with object in motion."[16] We have seen that injured workers differ from the average Danish worker. For example, Table 2 shows that the working hours of injured victims are higher than the average hours of the working population.[17] To compare injured workers to more similar individuals, we build a control group using exact matching in the sample of workers who never experience a workplace injury during our study period. We match each injured worker to a control worker of the same age, gender, education, occupation (2-digit disco), tenure and average working hours at her firm.

Online Appendix Table B.1 describe the matched treated individuals at the time of injury, alongside the matched controls. After matching, our study sample includes 61,647 injured workers: 6,615 cases of violent injuries and 55,032 cases of accidental injuries. The control group comprises 58,935 workers.[18] The treated and control groups exhibit similar characteristics across observable variables: they work the same number of hours, have similar tenure, and have the same level of earnings. Moreover, their firms are similar in terms of size, yet treated individuals are still somewhat over-represented in public sector jobs.

4.2 Empirical model

We analyze the effect of workplace injuries (violence and accidents) on victims by implementing an event study design in our matched sample. The empirical model is specified as:

$$Y_{it} = \sum_{\substack{j=j_{min} \\ j \neq -1}}^{j_{max}} \delta_j D_{i,t}^{j} + \alpha_i + \omega_t + \varepsilon_{it} \tag{1}$$

where Y_{it} represents the outcome of individual i at calendar time t, $D_{i,t}^{j}$ is an indicator for whether for individual i, calendar time t comes j periods after a workplace injury (or before for $j < 0$) . We take as a reference the period immediately preceding the injury: $j = -1$. We include individual fixed effects (α_i) to account for time-invariant characteristics of individuals, and time-since-event fixed effects (ω_t) to control for common time trends. δ_j are the (treatment) coefficients of interest. Under the assumption that injury victims would have followed similar trajectories as their matched controls in the absence of the injury, these coefficients capture the dynamic effects of the injury in the periods following

[16]This restriction is relaxed in robustness checks, where we include various other types of physical accidents. The results remain consistent.

[17]Note that more time spent at work mechanically increase the likelihood of experiencing a workplace injury.

[18]The number of control workers is lower than the number of treated workers because control individuals can serve as matches for more than one treated worker.

the event. However, victims may have experienced smaller injuries prior to the severe injury recorded in the administrative data. In that case, we would expect to observe differential pre-event trajectories between victims and controls.

We consider various outcomes: health conditions, measured through sick leave and doctor fees, and labor market variables, assessed through employment and earnings. Our administrative data on sick leave and labor market outcomes are available at a monthly frequency, while those on doctor fee are recorded annually. To accommodate these differences, we construct one monthly and one yearly dataset. The monthly dataset traces individuals' outcomes 24 months before and 60 months after the injury, while the yearly dataset covers a longer window, spanning 10 years before and after the injury. The parameters j_{min} and j_{max} hence depend on the dataset: for the monthly dataset, $j_{min} = -24$ and $j_{max} = 60$, while for the yearly dataset, $j_{min} = -2$ and $j_{max} = 5$. Because we use exact matching for the analysis, standard errors are clustered at the matched group-level.

5 The impact of workplace violence on victims

5.1 The impact on victims' health

We start by considering the effect of workplace violence and accidents on victims' health. Figure 2 illustrate the dynamic effects on sick leave[19], while Online Appendix Table B.4 summarizes the static coefficients on sick leave and doctor visit fees. Each panel displays the results for specific injury types, as described in Figure 1.

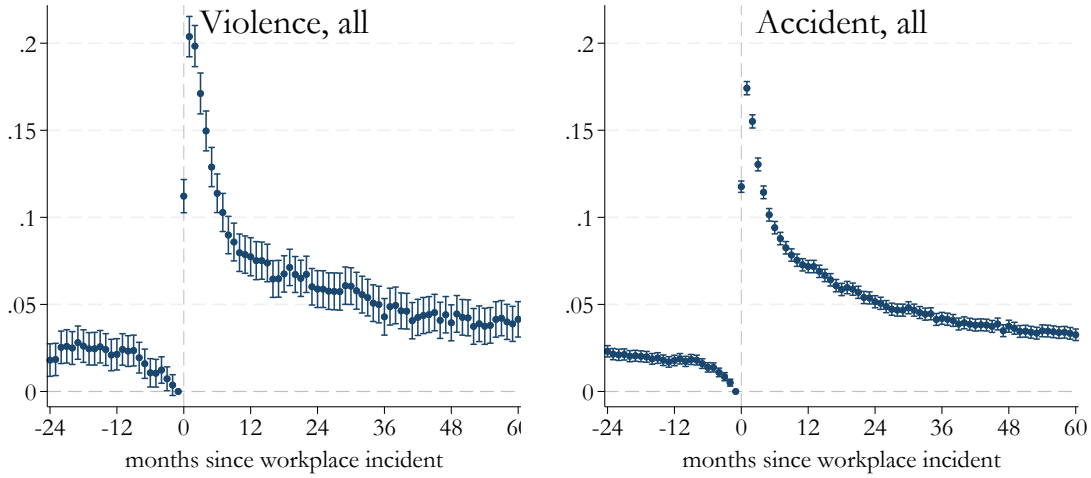
Panel a of Figure 2 shows that injured workers experience a sharp increase in sick leave, rising by 15-20 percentage points in the two months following the injury. Thereafter, sick leave registrations gradually decline, though 5% more workers continue to receive sick leave benefits even five years after the incidents. Since about 4% of treated workers go on sick leave each month on average in normal times (before violence or accidents), this implies that the amount of sick leaves persistently remains at least twice more frequent than usual. Strikingly, injuries due to accidents and violence have very similar effects on workers' sick leaves at all times.

Does the sharp rise in sick leave registrations reflect a deterioration in workers' physical and mental health? Column 3-4 of Online Appendix Table B.4 shows that workers increase their medical expenses following the incident. In the 5 years following the injury, the average effect amounts to an additional dkk 206 per year for violence and dkk 223 for accidents. This corresponds to a 11% increase for violence and 15% for accidents, relative to pre-treatment outcome means.

Finally, we investigate the type of health damage in columns (5)–(8) of Online Ap-

[19]Sick leave here denotes leave paid by the municipality, which is usually paid out for longer (+30 days) absence.

Figure 2: Effect of workplace injuries on sick leave



Notes: This figure reports event-study estimates of the effect of workplace injuries on sick leave. Treated individuals experience a workplace injury at event time 0 and are matched to control workers who never experience an injury, based on year, age, education, occupation, tenure, and working hours. Results are shown separately for injuries caused by violence (left panel) and accidents (right panel). Each point estimate is reported with its 95% confidence interval. The outcome is an indicator equal to one if the worker receives sick leave benefits from the municipality. The x-axis denotes time relative to the injury event. All specifications include individual and event-time fixed effects, with standard errors clustered at the matched-group level. Online Appendix Figure B.1 presents results separately by physical and mental harm.

pendix Table B.4: we report separately the impact on the fees spent for psychological doctor specialists and physical doctor specialists. The results indicate that injuries from violence result in limited fees from physical health treatment, while fees are higher for accidents (relative increase by 3% vs. 31%). In contrast, they generate higher fees for mental health treatment (relative increase by 88% vs. 45%). This suggests that while the overall magnitude of health effects is similar across injury types, the nature of health costs differs. Furthermore, this is a first indication that the labor market impact of violence may differ from that of accidents. Mental health issues may be less visible to employers and therefore may result in fewer workplace interventions or compensatory measures.

5.2 The impact on victims' labor market outcomes

We analyze the effect of workplace injuries caused by violence and accidents on victims' labor market trajectories. Figures 3 and 4 illustrates dynamic effects on earnings and employment, and Table 3 presents the coefficients for the average five-year treatment effects.

Earnings. We report the impact on earnings as a share of earnings in the reference period (-1) in Figure 3, and in columns (1)-(2) of Table 3. The earnings drop is visible from the same month of the incident, and increases in size over the following five years. The average decline in earnings over the five year period following the incident is 15.3% for violence,

Table 3: Effect of workplace injury on employment and earnings

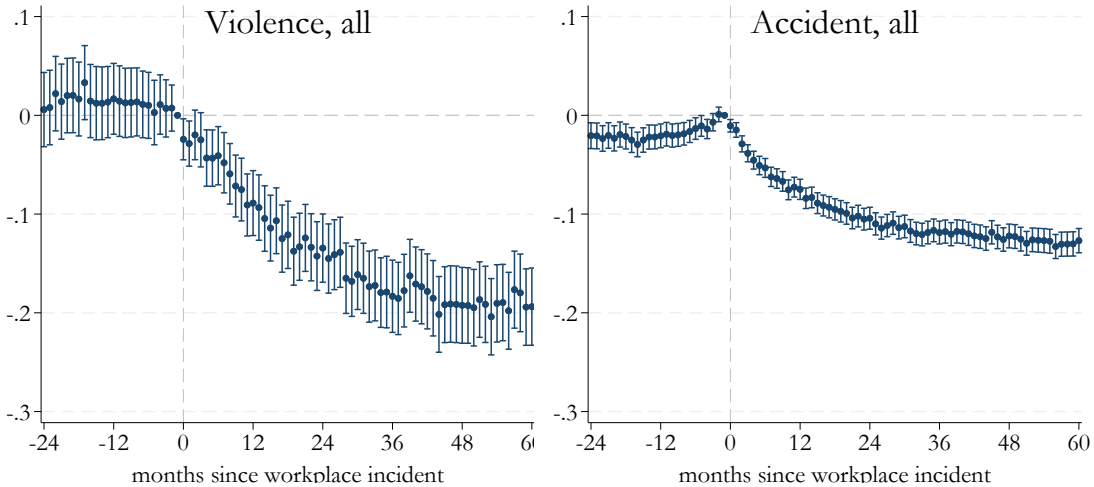
	Earnings		Employed		Employed at initial establishment	
	(1) Violence	(2) Accident	(3) Violence	(4) Accident	(5) Violence	(6) Accident
$1.treated \times 1.post$	-0.153***	-0.084***	-0.042***	-0.026***	-0.095***	-0.031***
	(0.016)	(0.005)	(0.004)	(0.002)	(0.008)	(0.003)
Outcome mean	0.995	0.995	0.927	0.928	0.647	0.690
Observations	1,073,982	8,871,694	1,073,982	8,871,694	1,073,982	8,871,694

Robust standard errors in parentheses. Outcome means show the average prior to the incident.
*** p<0.01, ** p<0.05, * p<0.1.

Notes: The table reports treatment coefficients from static difference-in-differences regressions comparing earnings and employment outcomes of injured workers to those of a matched control group. The treatment indicator, 1.treated×1.post, equals one from the month of injury onward. Results are reported separately for violence- and accident-related injuries. Control workers are matched on year, age, education, tenure, and working hours. Earnings are normalized relative to pre-injury earnings (event time −1), and outcome means correspond to pre-treatment averages. All specifications include individual and post-treatment fixed effects, with standard errors clustered at the individual level.

compared to 8.4% for accidents. After five years, the corresponding reduction in earnings is 20% for violence and 12% for accidents.

Figure 3: Effect of workplace injuries on earnings



Notes: This figure reports event-study estimates of the effect of workplace injuries on earnings. Treated individuals experience a workplace injury at event time 0 and are matched to control workers who never experience an injury, based on year, age, education, occupation, tenure, and working hours. Results are shown separately for injuries caused by violence (left panel) and accidents (right panel). Each point estimate is reported with its 95% confidence interval. The outcome is earnings normalized by earnings in the reference period. The x-axis denotes months relative to the injury event. All specifications include individual and event-time fixed effects, with standard errors clustered at the matched-group level. Online Appendix Figure B.2 presents results separately by physical and mental harm.

The observed decline in earnings may arise through several channels. Workers may lose

their job or work capacity, reduce their hours, or transition into new positions that pay less on average. To study how much of the earnings loss is attributable to health-related incapacitation, we analyze a subsample of workers who experience violence or accidents but exhibit no detectable increase in doctor fees. Online Appendix Table B.5 reports the results. Even among workers without measurable health effects, the earnings impacts remain sizable: earnings fall by 11% after violence and by 5.8% after accidents. Compared to the baseline estimates of -15.3% (violence) and -8.4% (accidents), this highlights that only a limited share of the drop in earnings can be explained by (observable) health-related incapacitation.

Employment Panel a of Figure 4 shows that injuries make victims' employment drop gradually: Violence causes a 6 percentage point drop in employment after five years while accidents cause a 3.5 percentage point drop. Consistently, we find that injuries have positive effects on the receipt of unemployment benefits, which are significantly higher for violence cases than for accidents.[20]

To study job separations, Panel b of Figure 4 shows the estimated effect of workplace injuries on employment at the *establishment where the incident occurred*. The effects of violence and accidents differ markedly: victims of workplace violence are about 12 percentage points less likely to remain employed at the same establishment within five years of the incident, compared to a decline of only 5 percentage points following accidents. This substantial gap indicates that violent incidents severely disrupt the match between workers and their employers.

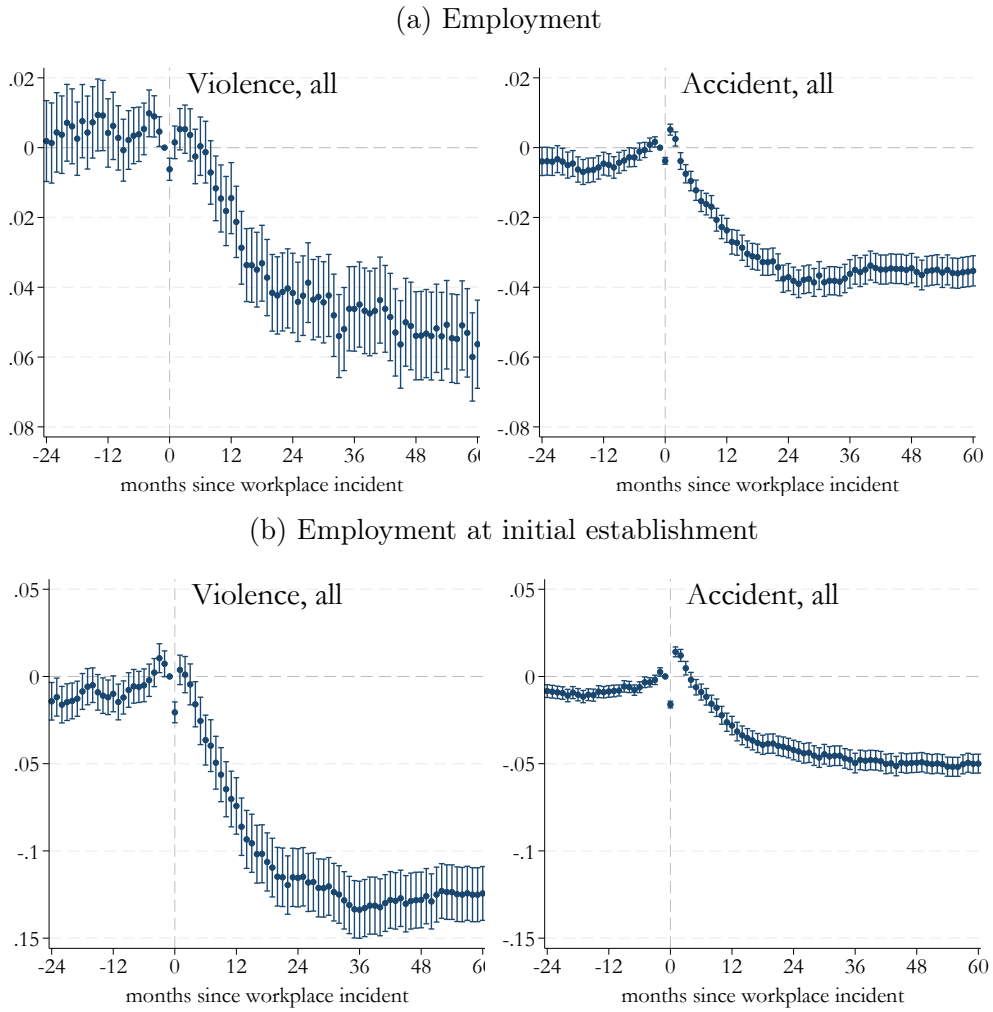
Columns (3)–(6) of Online Appendix Table B.5 report the estimated effects on employment for the subsample of workers who experience limited health impacts. Effects on are reduced by half for employment for both accidents and violence, yet only by one third for employment at the initial establishment.

5.3 Comparison with prior literature

How do our estimates of the earnings effects of different types of work injuries compare with existing evidence? Nekoei et al. (2024) report an annual income loss of 12% seven years after the onset of stress-related illness due to burnout, which is similar to our estimate for mental (accidental) injuries. Bertheau et al. (2023) estimate a job-loss earnings effect in Denmark to be -18% the first year, rebounding to -12% five years later. For workplace violence, Adams et al. (2024) document a 20% average decline in earnings over the five years after a worker reports a co-worker for assault to the police. This effect is closely comparable to the 20% decline we estimate for workplace violence after 5 years. This speaks to the external validity of prior findings in Adams et al. (2024). This is somewhat surprising, as

[20]See impact on uptake of unemployment insurance benefits in Online Appendix Figure B.4.

Figure 4: Effect of workplace injuries on employment



Notes: This figure reports event-study estimates of the effect of workplace injuries on employment outcomes. Panel (a) shows estimates for overall employment, while Panel (b) reports estimates for employment at the initial establishment. Treated individuals experience a workplace injury at event time 0 and are matched to control workers who never experience an injury, based on year, age, education, occupation, tenure, and working hours. Results are shown separately for injuries caused by violence (left panels) and accidents (right panels). Each point estimate is reported with its 95% confidence interval. The x-axis denotes time relative to the injury event. All specifications include individual and event-time fixed effects, with standard errors clustered at the matched-group level. Online Appendix Figure B.3 presents results separately by physical and mental harm.

one may expect that police reported cases of violence may be more severe and carry greater losses than non-reported ones.

To refine the comparison with police-reported cases, we examine whether workplace violence cases that are reported to the police have different effects on victims' labor market outcomes than non-reported ones, within our data. Specifically, we separately estimate the impacts of violence-induced injuries on employment and earnings for workers who filed a police report in the month of the incident and for those who did not. We further distinguish between police-reported cases that result in a charged perpetrator and those without any

listed charge. Finally, conditional on a listed perpetrator, we assess whether outcomes differ depending on whether the perpetrator is a colleague of the victim.

Table 4 presents the results. Victims of violence reported to the police experience somewhat smaller earnings losses (12%) than those whose cases are not reported (16%), suggesting that officially reported incidents may differ in nature or context from unreported ones. Conditional on a police report, violence is associated with an estimated earnings loss of around 11% when a charge against the perpetrator is filed and 15% when it is not. Interestingly, the largest effect arises for the relatively small subset of victims assaulted by a co-worker: earnings decline by nearly 39%, compared to a 9% decline in cases involving non-colleague perpetrators, although the difference is not statistically different. Overall, the Table shows that the negative effects of workplace violence are broadly similar whether it is police reported or not and whether the perpetrator is a colleague or not, although they may be even more severe with colleague perpetrators.

Table 4: Earnings effects by police report and perpetrator characteristics

	Police reported case		Charged perpetrator		Colleague perpetrator	
	(1)	(2)	(3)	(4)	(5)	(6)
	Yes	No	Yes	No	Yes	No
$Treated \times Post$	-0.118***	-0.159***	-0.107**	-0.147**	-0.394**	-0.092*
	(0.039)	(0.018)	(0.047)	(0.068)	(0.160)	(0.049)
Observations	161,160	912,510	116,530	44,630	5,678	110,852

Robust standard errors in parentheses. Outcome mean shows the pre-incident average.
*** p<0.01, ** p<0.05, * p<0.1.

Notes: This table reports estimated treatment effects on earnings for subgroups of workplace violence victims, distinguishing cases that were (i) reported to the police, (ii) involved a charged perpetrator, and (iii) involved a colleague perpetrator. The coefficients correspond to the interaction term $1.treated \times 1.post$ from a difference-in-differences model. All regressions include individual and post-treatment fixed effects, and standard errors are clustered at the matched-group level.

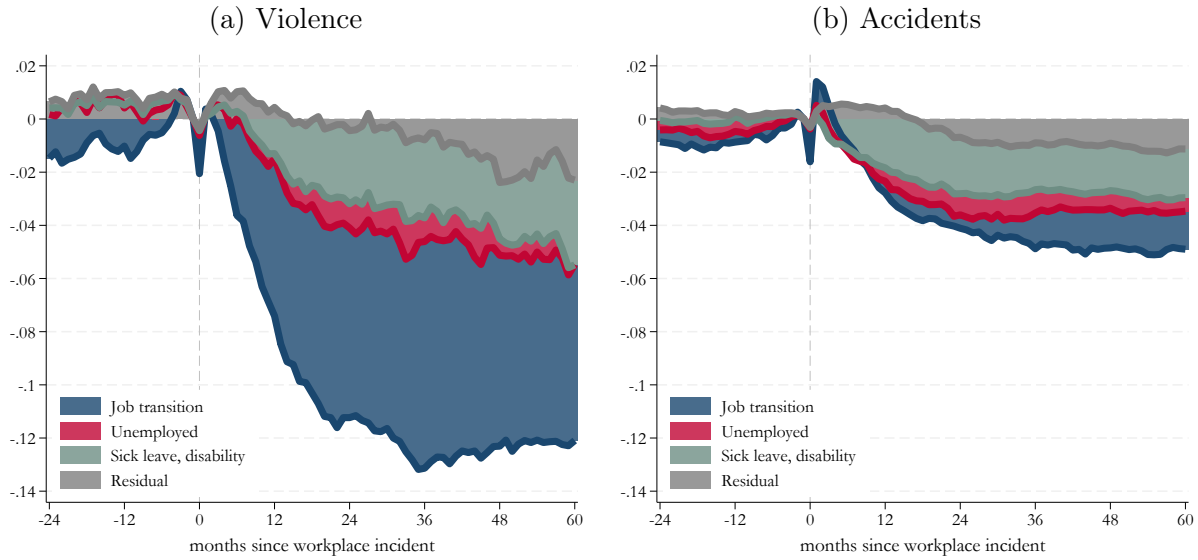
6 Mechanisms behind the effect of workplace violence

We have shown that the labor market costs of workplace violence are higher than for other forms of injuries, driven primarily by stronger effects on employment loss and job separations. What are the mechanisms underlying the specific effect of violence?

6.1 Job mobility

We decompose the decline in employment at the initial establishment to examine what victims do after leaving their workplace. Figure 5 illustrates how much of the post-incident employment loss can be attributed to sick leave, unemployment, or job transitions. The

Figure 5: Decomposed drop in employment at initial establishment



Notes: This figure reports event-study estimates of the effect of workplace injuries on employment at the initial establishment. Treated individuals experience a workplace injury at event time 0 and are matched to control workers who never experience an injury, based on year, age, education, occupation, tenure, and working hours. The effects are decomposed into four mutually exclusive post-separation states: (1) job transitions, (2) unemployment, (3) sick leave, and (4) other non-employment states. Results are shown separately for injuries caused by violence (left panel) and accidents (right panel). The x-axis denotes time relative to the injury event. All specifications include individual and event-time fixed effects, with standard errors clustered at the matched-group level.

share of workers who leave their establishment to go on sick leave or become unemployed, are similar across violence (panel a) and accident cases (panel b). In contrast, victims of workplace violence are substantially more likely to move into new employment elsewhere. This pattern indicates that violent incidents trigger job mobility and potential sorting in the labor market, whereas accidental injuries have only a limited effect on workers' employment transitions.

In line with this, Online Appendix Figure B.5 plots the effect of workplace injuries on the probability of being employed in a *new job* relative to the job held at $t = 0$. Victims of workplace violence experience a sharp increase in job-switching: they are 8 percentage points more likely to be employed in a new job five years following the incident. In contrast, workers exposed to accidental injuries only see a minimal increase in job switching.

To shed light on the nature of job transitions following workplace injuries, Table 5 reports the estimated effects on employment in a new (1) establishment, (2) firm, (3) workplace type, (4) granular occupation (5 digit disco), (5) broader occupation (2 digit disco) and (5) sector (public or private).[21] Figure 6 complements this by illustrating the dynamic effects on transitions to a new workplace type (panel a) and a new occupation (panel b). Three key patterns emerge.

[21]See Online Appendix Table B.6 for a full list of workplace types and Online Appendix Table B.7 for a full list of occupational categories considered.

Table 5: Effect of workplace injury on job transitions

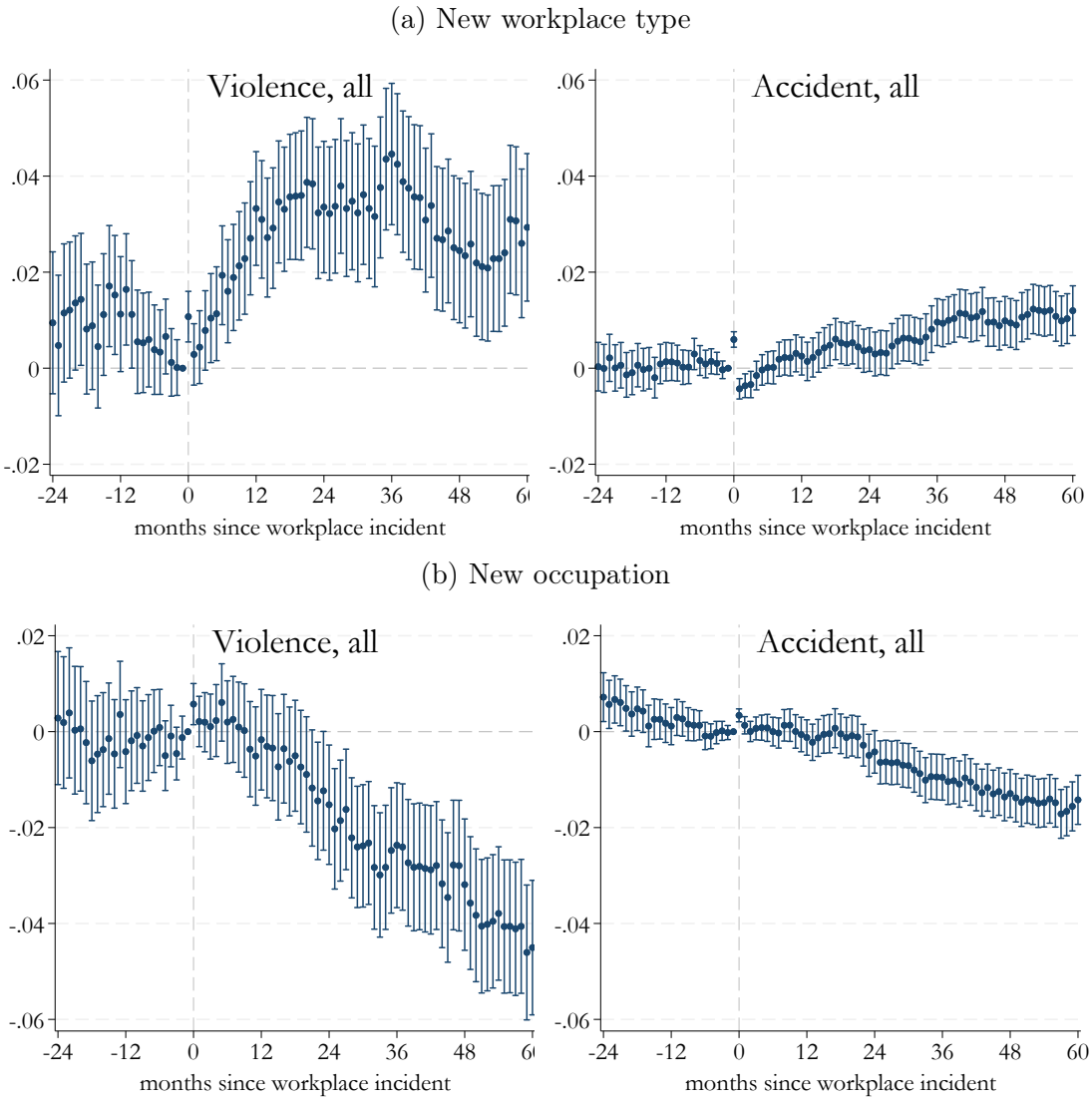
Panel A: Violence						
	Is employed in new					
	(1) Establishment	(2) Firm	(3) Workplace type	(4) Occupation (5-digit)	(5) Occupation (2-digit)	(6) Sector (Public/Private)
1.*treated*×1.*post*	0.054***	0.036***	0.020***	-0.000	-0.012*	0.047***
	(0.007)	(0.006)	(0.006)	(0.008)	(0.007)	(0.005)
Outcome mean	0.365	0.221	0.188	0.325	0.256	0.155
Observations	1,073,982	1,073,982	1,094,690	1,073,982	1,094,690	1,094,690
Panel B: Accidents						
	(1) Establishment	(2) Firm	(3) Workplace type	(4) Occupation (5-digit)	(5) Occupation (2-digit)	(6) Sector (Public/Private)
1.*treated*×1.*post*	0.005*	0.000	0.006***	-0.009***	-0.008***	0.018***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.001)
Outcome mean	0.346	0.237	0.187	0.333	0.268	0.115
Observations	8,871,694	8,871,694	9,019,306	8,871,694	9,019,306	9,019,306

Notes: This table reports estimated effects of workplace injuries on employment transitions into new establishments, firms, workplace types, occupations, and sectors. Workplace types are defined using 2-digit NACE industry codes; the full classification is provided in Online Appendix Table B.6. Occupations are classified using 2-digit DISCO codes; the corresponding list is reported in Online Appendix Table B.7. Sector indicates whether employment is in the public or private sector. Each coefficient is obtained from a static difference-in-differences regression comparing injured workers to a matched control group, with results reported separately for violence-related injuries (Panel A) and accident-related injuries (Panel B). Treated individuals are those who experience a workplace injury, while control workers never experience an injury and are matched on year, age, education, tenure, and working hours. The treatment indicator equals one from the month of injury onward. All specifications include individual and post-treatment fixed effects. Robust standard errors, clustered at the matched-group level, are reported in parentheses. Statistical significance is denoted by *** p<0.01, ** p<0.05, and * p<0.1.

First, in multi-establishment organizations, workplace violence induces substantial internal mobility: victims are on average 5.4 percentage points more likely to change establishment, but only 3.6 percentage points more likely to change firm. This implies that a portion of transitions occur across establishments within the same employer, suggesting that job mobility may be motivated by the desire to change the physical location of the job. Second, Figure 6 shows that the probability of changing *workplace type* rises by 4 percentage points five years after a violent incident, compared with just 1 percentage point following accidents, while the likelihood of changing occupation does not increase. In fact, occupational mobility declines: violence victims are more likely to remain in the same occupation as before the incident relative to controls. This suggests that workplace violence primarily prompts movements across workplaces or institutional environments rather than across occupations, pointing to sorting that is employer– or context-specific rather than task-specific.[22] The negative effect on occupational mobility further captures the effect of

[22]Online Appendix Figure B.8 further strengthens this view by showing no impact on the probability to work in an occupation with high interpersonal contact.

Figure 6: Effect of workplace injuries on employment at new workplace or occupation



Notes: This figure presents event-study estimates of the impact of workplace injuries on workers' subsequent employment transitions. Panel (a) shows the effect on the probability of being employed in a *new workplace type*, while Panel (b) shows the effect on employment in a *new occupation*. Workplace types are defined using 2-digit NACE industry codes, with a full list presented in Online Appendix Table B.6. Occupations are classified according to 2-digit DISCO codes, with a full list presented in Online Appendix Table B.7. Each series plots the estimated coefficients from separate event-study regressions with 95% confidence intervals. The outcome variables are defined at the individual level, indicating whether the worker is employed in a different workplace type or occupation than prior to the incident. All models include individual fixed effects and time-since-event fixed effects, and Standard errors are clustered at the matched group level. Online Appendix Figure B.6 shows results across the 4-group breakdown (physical/mental harm).

violence on career disruptions.

Finally, workplace violence is also associated with a higher rate of sector switching: 4.7 percentage points for violence compared with 1.8 percentage points for accidents. These transitions are driven largely by a reallocation of workers from the public to the private sector. Online Appendix Figure B.9 shows that five years after the incident, victims of workplace violence are 9 percentage points more likely to work in the private sector, compared

with a 4 percentage point increase following accidents.

One potential reason for the effect of workplace violence on job mobility that we observe is that victims may want to work in jobs with lower violence risk. We know relatively little about how workplace violence alters the labor market behavior of victims after they were exposed to violence. Folke and Rickne (2022) find that women who report harassment in surveys are more likely to move to jobs with a higher share of female employees and lower wages. This pattern suggests that victims of violence may actively avoid high-risk firms. We explore whether we find evidence of such avoidance behavior in the next paragraphs.

6.2 Variation in violence risk

Victims may change job in order to work in a safer environment, to the extent that there is variation in violence risk in the jobs accessible to them. We start by examining the variation in violence risk across occupations, workplace types and firms. Victims of workplace violence experience a marked increase in workplace switches, yet show limited sorting across occupations. To understand this pattern, we examine how the incidence of violence varies across different job types by computing violence rates within occupation–industry cells. We use data on all workplace injuries reported between 2008 and 2017. Next, we classify jobs into workplace types and occupations using 2-digit NACE and DISCO codes. Complete categorizations are reported in Online Appendix Table B.6 for workplace types and Online Appendix Table B.7 for occupations. We then compute violence rates for each occupation–workplace combination where we can observe a minimum of 100 workers per month:

$$R_{ow} = \frac{\sum I_{ow}}{N_{ow}} \tag{2}$$

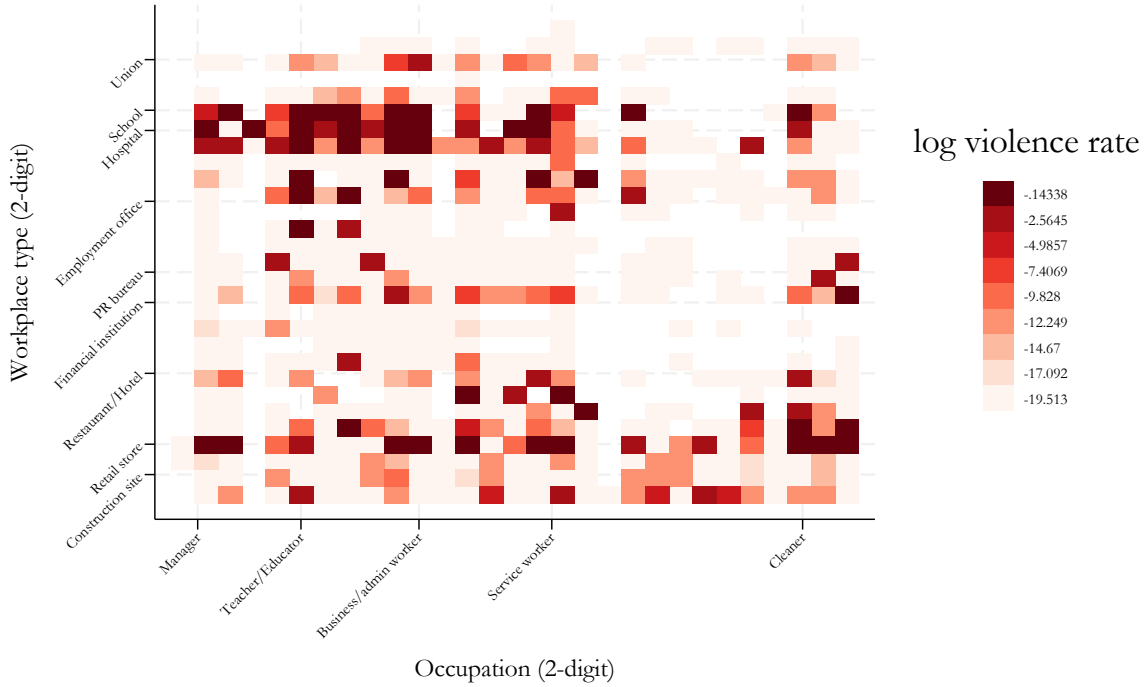
where the violence rate is defined as the total number of violent incidents I_{ow} in occupation o and workplace w divided by the total number of workers N_{ow}.

Figure 7 presents a heatmap of the log violence rate across ($\approx 50 \times 50$) occupation–workplace combinations.[23] The key takeaway is that violence risk varies more across workplace types than across occupations. For instance, the risk faced by an administrative worker and a manager employed in a retail store is relatively similar, whereas the risk differs sharply between admin workers employed at a retail store and those working in a hotel, or in a financial institution. This suggests that the work environment or institutional context, rather than the task-specific content of the job, is the primary determinant of exposure to violence.

To numerically assess how much of the variation in workplace violence risk can be at-

[23]The lightest shaded cells correspond to occupation–industry combinations with more than 100 observed workers per month. White cells indicate combinations with fewer than 100 workers and are therefore excluded from the analysis.

Figure 7: Workplace violence rate across occupation-workplace types



Notes: This figure displays a heatmap of the (log) violence rates across occupation–workplace type cells. Violence rates are calculated as the number of reported incidents relative to total employment in the corresponding cell. Darker colors indicate higher relative incidence of violence. Occupation-workplace type combinations with less than 100 workers are excluded, and those with 0 cases of violence are assumed to have rates of $1e^{-}6$, such that all cells with 0 recorded violence cases have the brightest shading in the heatmap. Workplace type is shown on the y-axis, and occupation on the x-axis, with specific examples listed in text. Workplace types are defined using 2-digit NACE industry codes, with a full list presented in Online Appendix Table B.6. Occupations are classified according to 2-digit DISCO codes, with a full list presented in Online Appendix Table B.7. A corresponding heatmap for accidental injury exposure is shown in Online Appendix Figure B.10.

tributed to each dimension, we conduct a variance decomposition based on an analysis of variance (ANOVA) of the cross-sectional distribution of violence rates across occupation–workplace cells. We decompose the total variance in violence rates into components explained by systematic differences across workplace types and occupations, following the NACE and disco 2-digit classifications. The results indicate that 31% of the total variation in violence rate is explained by differences across workplace types, while only 9% is explained by differences across occupations. The remaining 60% reflects interaction effects, capturing specific occupation–workplace combinations that are unusually exposed relative to what would be predicted by their average occupation and workplace risk levels. In contrast, for accidental injuries, occupations account for a substantially larger share of the total variation: 49%, compared with 25% explained by workplace types.

Taken together, our evidence implies that heterogeneity in exposure to workplace violence is largely driven by the work environment rather than occupational specialization, in contrast to other workplace hazards that are more closely tied to occupation. This pattern is consistent with victims of workplace violence primarily transitioning to new workplace

types or institutional settings, rather than changing their occupation or line of work.

6.3 Do violence victims seek lower-risk firms?

Predicting violence risk at the firm-level using the Working Environment Survey. Because many firms are too small to reliably compute violence rates using administrative incident data, we adopt an alternative firm-level approach based on survey information. Specifically, we use data from the Danish Working Environment and Health Survey (*Arbejdsmiljø og Helbred i Danmark*, AH), a large-scale, nationally representative survey of employees administered by the National Research Centre for the Working Environment. The survey is conducted in repeated cross-sectional waves and is designed to monitor working conditions, psychosocial exposures, and health outcomes in the Danish workforce. Importantly, AH includes information on the physical and psychosocial work environment, as well as detailed self-reported measures of workplace violence. Respondents are asked whether they have experienced physical violence, threats, mobbing, or sexual harassment at work within the past 12 months.

Table B.3 reports sample means of self-reported workplace harassment and violence over the past 12 months, separately for men and women. Across the four survey waves conducted in 2012, 2014, 2016, and 2018, the data comprise 231,455 individual responses, of which 119,611 include information on violence exposure. Among male respondents, 11% report having experienced mobbing, 3% violence, 6% threats, and 1% sexual harassment. The corresponding shares among women are higher: 12% for mobbing, 9% for violence, 11% for threats, and 4% for sexual harassment.[24]

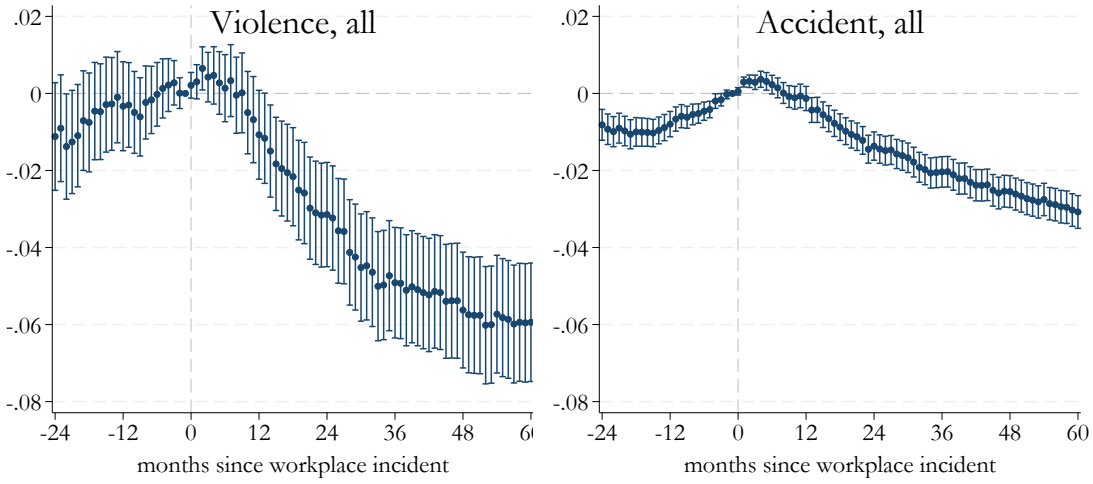
Based on the survey responses, we construct a binary indicator equal to one if a respondent reports having experienced violence, sexual harassment, or mobbing during the recall period, and compute annual firm-level violence risk as the share of surveyed employees within a firm reporting such experiences. To get a measure of violence-risk across all firms, we use the survey-based firm-level measure to estimate a linear Lasso model relating violence risk to a rich set of firm characteristics, including firm size, firm age, female employment share, historical sick-leave rates, employee turnover, average hours worked, average wages, and sector type (public/private). Using the estimated model, we generate predicted violence risk for all firms in Denmark, including firms not directly observed in the survey. Finally, we transform these predictions into percentile ranks, yielding a continuous measure of expected firm-level violence risk across the full population of firms. We use this measure to examine whether victims of violence sort into firms with lower expected

[24]The survey further asks respondents to identify the perpetrator in cases of sexual harassment. Conditional on having experienced sexual harassment, 65% of men report a colleague as the source, followed by a manager (23%), another worker (16%), and a client or customer (44%). Among women, clients or customers are the predominant source (74%), followed by colleagues (40%), managers (21%), and other workers (3%). These patterns underscore the importance of capturing workplace violence beyond incidents perpetrated by co-workers.

violence risk, following the procedure described in the next section.

Firm switching and risk avoidance behavior. We examine whether victims of workplace violence subsequently sort into jobs with lower predicted risk, using the survey-based measure. Figure 8 shows the effect on the probability of working in a firm within the top 25th percentile of predicted violence risk. Following an incident, this probability declines by 6 percentage points for violence and by 3 percentage points for accidents after five years.

Figure 8: Effect of workplace injuries on probability to work in a high-risk firm



Notes: This figure reports event-study estimates of the effect of workplace injuries on the probability of working in a high–violence-risk job. Treated individuals experience a workplace injury at event time 0 and are matched to control workers who never experience an injury, based on year, age, education, tenure, and working hours. Results are shown separately for injuries caused by violence (left panel) and accidents (right panel). Each point estimate is reported with its 95% confidence interval. The outcome is an indicator equal to one if the worker is employed in a firm within the top 25th percentile of predicted violence risk. Predicted violence risk is estimated using a Lasso model applied to all jobs in Denmark, based on job-specific characteristics and observed violence exposure from the Danish Working Environment Survey (*Arbejde og Helbred*, AH). The x-axis denotes months relative to the injury event. All specifications include individual and event-time fixed effects, with standard errors clustered at the matched-group level. Online Appendix Figure B.7 presents results separately by physical and mental harm.

However, the observed decline in employment at high-risk firms may reflect victims leaving their initial establishment or exiting employment altogether, mechanically lowering the probability of working at *any* firm. To address this concern, we next restrict attention to victims who transition to a different firm within two years of the workplace violence event. We implement a new matching procedure that pairs these workers with individuals who are similar just prior to the incident in terms of education, gender, age, occupation, and hours worked, and who likewise change firms and obtain new employment within two years.

Table 6 present the results from this analysis. In Panel a, column (1) compares the firm-specific violence risk faced by victims in their baseline job (i.e. before workplace violence) to that faced by movers from the control group; column (2) compares the violence risk

faced by victims in the first new job they take afterwards (i.e. after workplace violence) to that faced by movers from the control group; and column (3) compares the change in violence risk between victims and other movers. Victims were in firms that were 5.081 percentiles higher in the risk distribution (column (1)). In column (2), we see that victims were still in riskier firms after their job transition, but less so: they moved to firms that were 2.812 percentiles higher in the risk distribution. The transitions following workplace violence hence decreased the gap in firm risk levels between victims and their matched controls by 2.270 percentiles (column (3)). This confirms that the job transitions following workplace violence were associated with a decrease in violence risk for victims that is larger than typical transitions among similar workers.

This is consistent with the findings by Folke and Rickne (2022) that sexual violence victims move to firms with characteristics associated with a lower risk of sexual violence for them. This suggests that one reason why workplace violence increases mobility is that victims want to avoid the high exposure to violence risk in their firm. However, this does not mean that victims deliberately target lower-risk firms afterwards. Indeed, we could see exactly the same pattern if workplace violence caused victims to move without affecting their subsequent search criteria because of mean reversion: Since victims are in especially risky environment to start with, most new firms will offer a lower risk. A distinct question is therefore: beyond affecting the decision to leave the firm, does the experience of workplace violence affect the subsequent search behavior?

Table 6: Effect of victim status on firm-level violence risk

	a) Baseline matching			b) Baseline matching + co-worker		
	(1) Initial firm	(2) Next firm	(3) All	(4) Initial firm	(5) Next firm	(6) All
Victim	5.081***	2.812***		-0.115	-1.258	
	(0.632)	(0.669)		(0.782)	(0.861)	
Victim × NextFirm			-2.270***			-1.142*
			(0.582)			(0.679)
Individual FE	No	No	Yes	No	No	Yes
Outcome mean	61.653	60.286	66.734	70.138	65.738	70.022
Observations	566,486	566,486	1,132,972	49,532	49,532	99,064
No. of victims	1,213	1,213	1,213	883	883	883

Notes: This table reports regression estimates of firm-level predicted workplace violence risk for workers who change jobs following a violent incident. Predicted risk is constructed from a model that relates firm characteristics to observed violence rates using data from the Danish Working Environment and Health (AH) Survey. Columns (1)–(3) compare victims with matched controls using baseline matching on age, gender, working hours, and occupation. Columns (4)–(6) repeat the analysis matching victims to co-workers who also leave the same firm. "Initial job" refers to the position held at the time of the incident, while "Next job" denotes the subsequent employment for job movers. Columns (3) and (6) capture the differential change in violence risk between the new and old jobs for treated and control workers. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

To shed light on this question, we implement a refined matching procedure that addresses the systematic difference between victims and control movers' baseline firms. Specifically, we focus on victims who change jobs after violence and match each to a co-worker *from the same pre-incident firm* who also moves to a new job. We also impose similar matching criteria as before, warranting similarity in terms of education, age, occupation, and hours worked. We present the results in Panel b. Compared to similar co-workers, victims of workplace violence subsequently work in firms with that are 1.142 percentiles lower in the firms' violence risk distribution. This suggests that the experience of violence not only triggers moves, it also makes victims systematically target new jobs with lower violence risk.

7 Broader impacts of workplace violence

7.1 Labor shortages

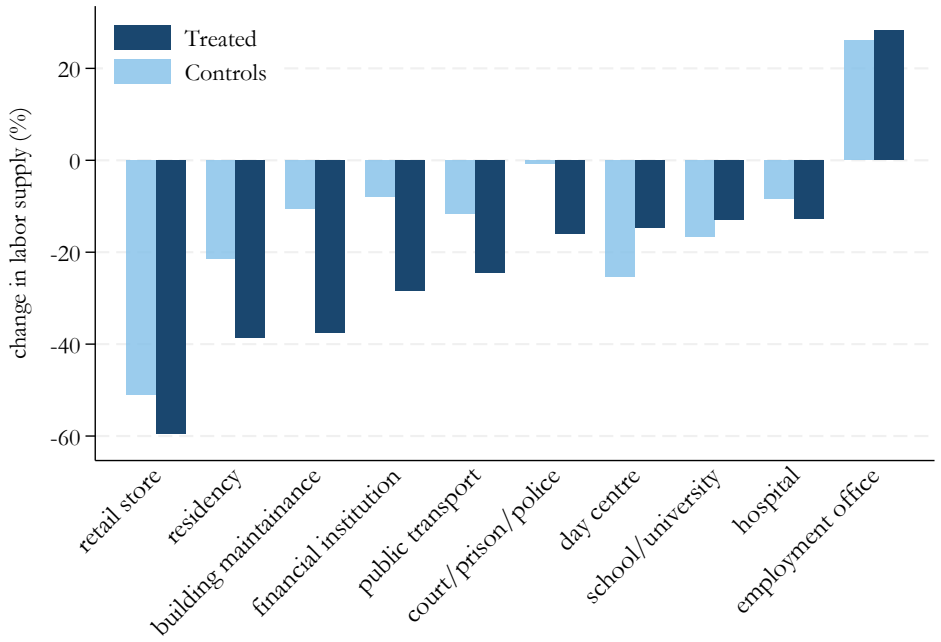
Does workplace violence contribute to labor shortages? Our results suggest that victims of workplace violence are more likely to leave their jobs in search of less risky work environments. When the incidence of violence is concentrated in workplaces that already face high labor shortages, such patterns may exacerbate existing hiring difficulties. The following sections explores the evidence on this.

Net changes in sorting. We begin by examining how violence victims reallocate across workplace types. Figure 9 presents the five-year change in the distribution of workers across the ten most common workplace types in the violence sample, comparing treated victims of violence to the matched controls.[25] The most common workplace types are, in order of prevalence: (1) residencies, (2) day centers, (3) schools and universities, (4) hospitals, (5) retail stores, (6) public transport, (7) police, courts, and prisons, (8) employment offices, (9) building maintenance, and (10) financial institutions.

All workplace types–except employment offices–experience a decline in worker shares over the five-year horizon for both treated and control groups. Moreover, labor supply changes differ systematically between the two groups, indicating potential sorting patterns. Victims of workplace violence are 38% less likely to remain employed in residencies after five years, compared to only 20% lower probability among controls. Moreover, victims are also less likely to work at building maintenance firms (-40% vs. -10% for controls), financial institutions (-28% vs. -7%), hospitals (-12% vs. -7%), the police/court/prison system (-15% vs. 0%), or in retail stores (-60% vs. -50%). By contrast, violence victims are slightly more likely to be employed in educational institutions (schools or universities), day centers, or

[25]Note that this exercise accounts for the distribution of occupations, as victims are matched to controls from the same (2-digit disco) occupation.

Figure 9: Change in 5-year labor supply across workplace types



Notes: This figure displays the relative 5-year change in the labor supply across the 10 most common workplace types in the violence sample. The relative change is calculated as the (%) difference in the frequency of workers in a given workplace type between event month $j = 0$ and $j = 60$. Results are shown separately for treated victims of violence (dark blue), and their matched controls based on year, age, education, gender, occupation, tenure and working hours (light blue).

employment offices.

Labor market tightness. The composition of the most common workplace types already suggests that workplace violence is concentrated in jobs that face persistent labor shortages. These jobs—including health care and social care work— are often carried out under challenging working conditions, factors that the OECD links to persistent difficulties in attracting and retaining workers (OECD, 2023).

To formalize this observation, we construct a measure of labor market tightness based on the duration of unemployment spells (EUE transitions). Shorter average unemployment durations indicate that vacancies are filled quickly, reflecting tighter labor markets, while longer durations suggest excess labor supply. We therefore use the duration of EUE spells as an inverse proxy for labor market tightness:[26]

$$\text{UI duration}_{ow} \approx \frac{1}{m_0\, \theta_{ow}^{\alpha}}, \tag{3}$$

where θ_{ow} denotes labor market tightness in occupation-workplace type ow, m_0 is the baseline matching efficiency, and $\alpha > 0$ captures the elasticity of matches with respect to

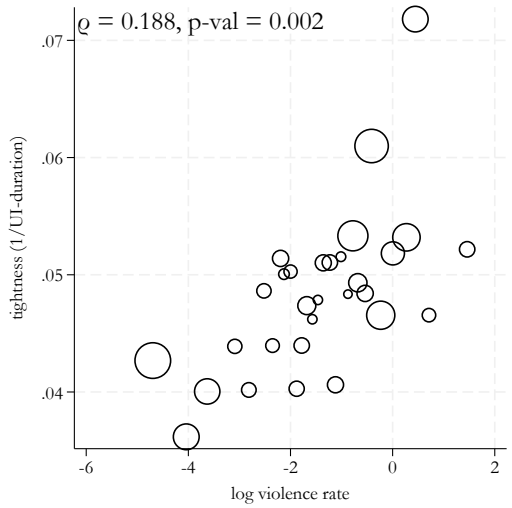
[26]See Online Appendix Section A for a formal derivation showing why unemployment duration can be used to proxy for market tightness.

tightness.

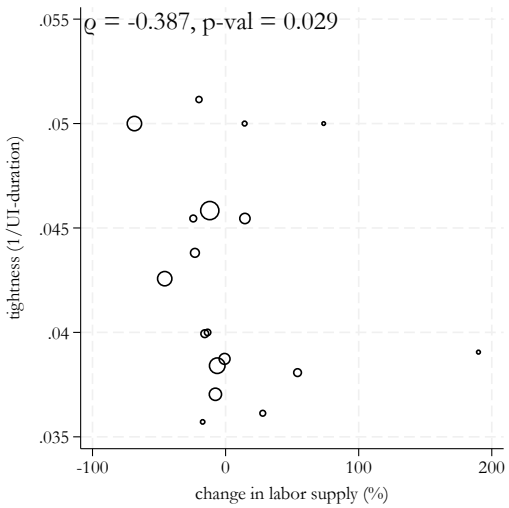
For each job type–defined as an occupation–workplace combination–we compute both the incidence of workplace violence and the average duration of EUE transitions. As expected, our tightness measure is positively correlated with sick-leave rates and negatively correlated with average wages, consistent with tighter markets being associated with more demanding work environments and higher worker turnover.

Figure 10: Workplace violence and labor shortages

(a) Violence rate



(b) Change in 5-year labor supply (%)



Notes: This figure presents binned scatterplots illustrating the relationship between labor market tightness, workplace violence, and labor supply responses across job types, defined as occupation–workplace type cells. Labor market tightness, shown on the y-axis, is proxied by the inverse of the average unemployment duration (the employment–unemployment–employment transition rate) within each job type. Panel (a) plots labor market tightness against log workplace violence rates for job types with at least one observed violent incident between 2008 and 2017. Panel (b) relates labor market tightness to the relative change in labor supply among violence victims in the main sample between event year 0 and 5. The size of each bin reflects the average monthly number of workers in the bin. The Pearson correlation coefficient, weighted by the number of workers in each cell, is reported in the upper-left corner of each panel alongside the p-value. The corresponding results for workers exposed to accidents is shown in Online Appendix Figure B.11.

Panel (a) of Figure 10 plots log violence rates against our measure of labor market tightness across 222 occupation–workplace type cells with at least one observed violent incident. Panel (b) relates labor market tightness to the relative five-year change labor supply for the same cells, constructed similarly as the measure in Figure 9.

We find a positive association between workplace violence and labor market tightness. The Pearson correlation coefficient equals 0.19 (p-value = 0.002). Consistent with this pattern, labor market tightness is negatively associated with subsequent labor supply in the treated sample, with a correlation coefficient of -0.39 (p-value = 0.029).[27] This suggests that workplace violence is predictive of more understaffed job types, consistent with violence-induced labor supply reductions.

[27]Online Appendix Figure B.11 presents analogous results for accident exposure, showing qualitatively similar but weaker relationships.

8 Conclusion

This paper combines administrative injury records with labor market data to study the consequences of workplace violence. We identify incidents of workplace violence from Danish injury records and examine their effects on workers' health and employment outcomes. Violence-related injuries have substantially more severe and persistent consequences than comparable accidents: violent incidents are more likely to result in job separation, prolonged non-employment, and sustained earnings losses, with average earnings declining by 15 percent compared to 8 percent after accidents.

Following a violent incident, victims are substantially more likely to leave their current establishment and move to a lower-risk firm. These transitions predominantly involve changes in the work environment—such as moving between institutions or workplace types—rather than switching occupations. The pattern is consistent with our analysis of violence risk across the Danish labor market, which shows that risk varies more by workplace type than by occupation.

Finally, we document that violence risk is highest in jobs facing the greatest hiring difficulties. This highlights the broad potential benefits from violence prevention interventions, which may both protect exposed workers and attenuate labor shortages.

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Online Appendix: Workplace Violence

A Modeling labor shortages

To connect the observed length of unemployment insurance (UI) spells to the concept of labor shortages, we rely on a standard job-search framework in which unemployed workers find jobs according to a Poisson process. In this setting, the probability of finding a job within a small time interval dt is given by $\lambda\, dt$, where λ denotes the job-finding rate. The probability that a worker remains unemployed beyond time t is therefore

$$P(T > t) = e^{-\lambda t}.$$

The unemployment duration T thus follows an exponential distribution with parameter λ, implying that the expected duration of unemployment is

$$E[T] = \frac{1}{\lambda}.$$

Hence, the average observed duration of UI spells provides a direct inverse measure of the underlying job-finding rate:

$$\text{UI duration} \;\approx\; \frac{1}{\lambda}.$$

In standard search-and-matching models, the job-finding rate is determined by the aggregate tightness of the labor market. Let θ_s denote labor market tightness in sector s, defined as the ratio of vacancies to unemployed workers, $\theta_s = V_s/U_s$. The matching function can be written as

$$\lambda_s = m_0\, \theta_s^{\alpha},$$

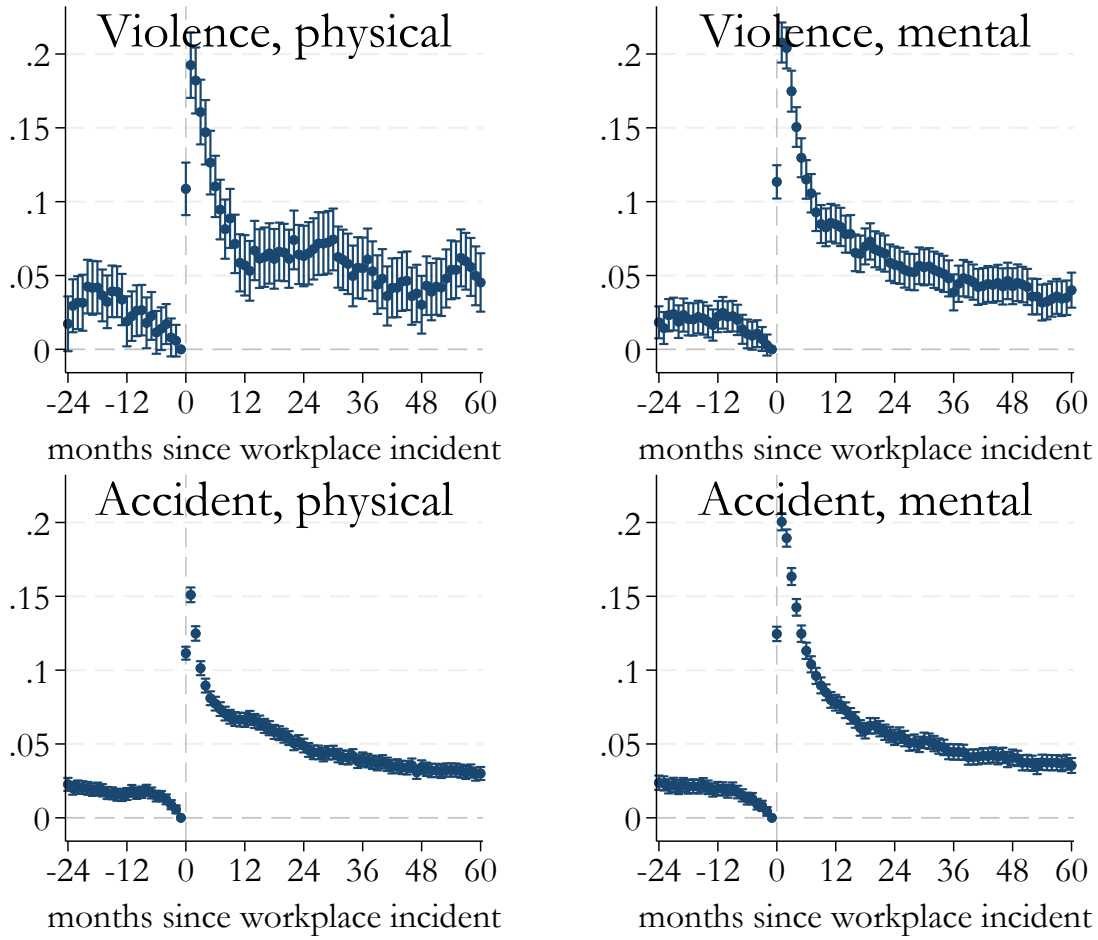
where m_0 is the matching efficiency parameter and $\alpha \in [0.4, 0.7]$ is the elasticity of job finding with respect to tightness. Combining the two expressions yields

$$\text{UI duration}_s \;\approx\; \frac{1}{m_0\, \theta_s^{\alpha}} \quad \Rightarrow \quad \theta_s \propto (\text{UI duration}_s)^{-1/\alpha}.$$

This relationship implies that average UI durations can be used as an empirical proxy for sector-level labor market tightness and, by extension, labor shortages: sectors where unemployed workers spend longer periods before reemployment correspond to lower θ_s and thus more severe shortages.

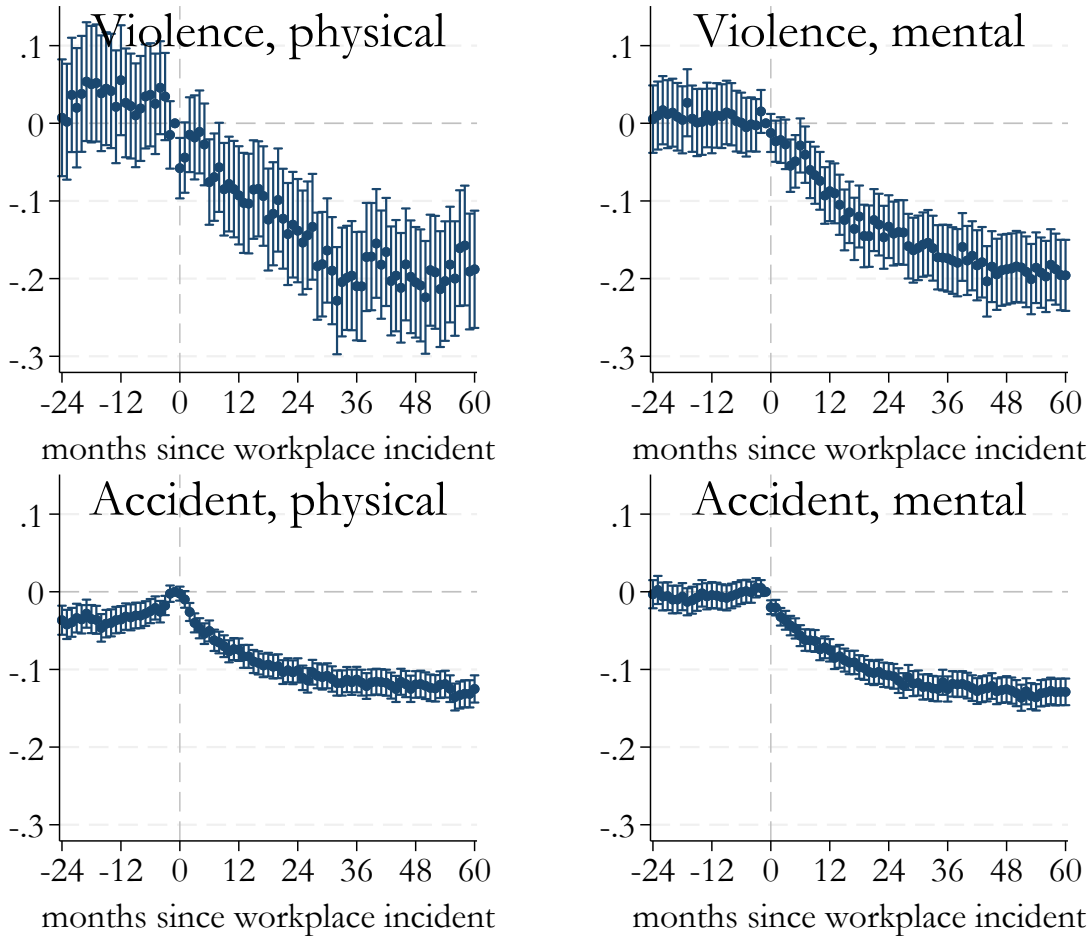
B Additional Tables and Figures

Figure B.1: Effect of workplace injuries on sick leave



Notes: This figure reports event-study estimates of the effect of workplace injuries on sick leave. Treated individuals experience a workplace injury at event time 0 and are matched to control workers who never experience an injury, based on year, age, education, occupation, tenure, and working hours. Results are shown separately for injuries caused by (1) Violence (physical harm), (2) Violence (mental harm), (3) Accident (physical harm), and (4) Accident (mental harm). Each point estimate is reported with its 95% confidence interval. The outcome is an indicator equal to one if the worker receives sick leave benefits from the municipality. The x-axis denotes time relative to the injury event. All specifications include individual and event-time fixed effects, with standard errors clustered at the matched-group level.

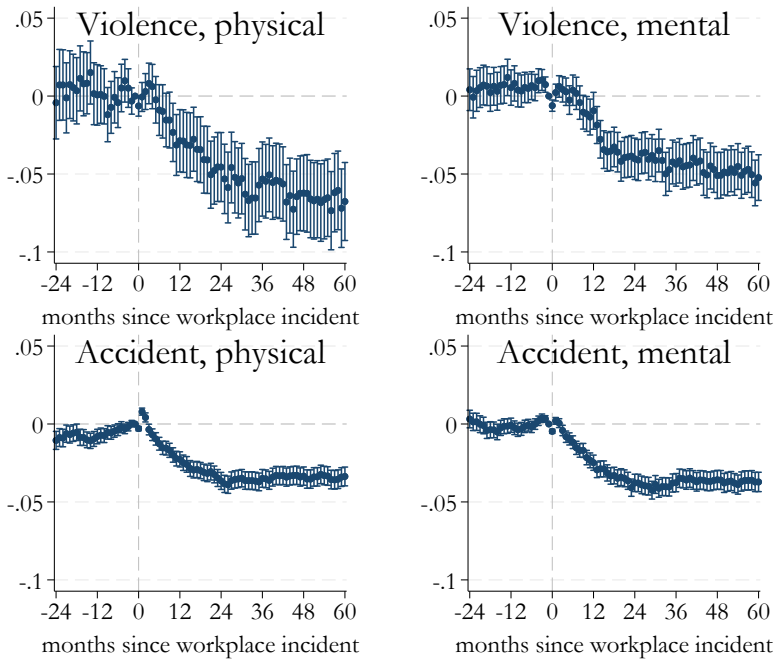
Figure B.2: Effect of workplace injuries on earnings



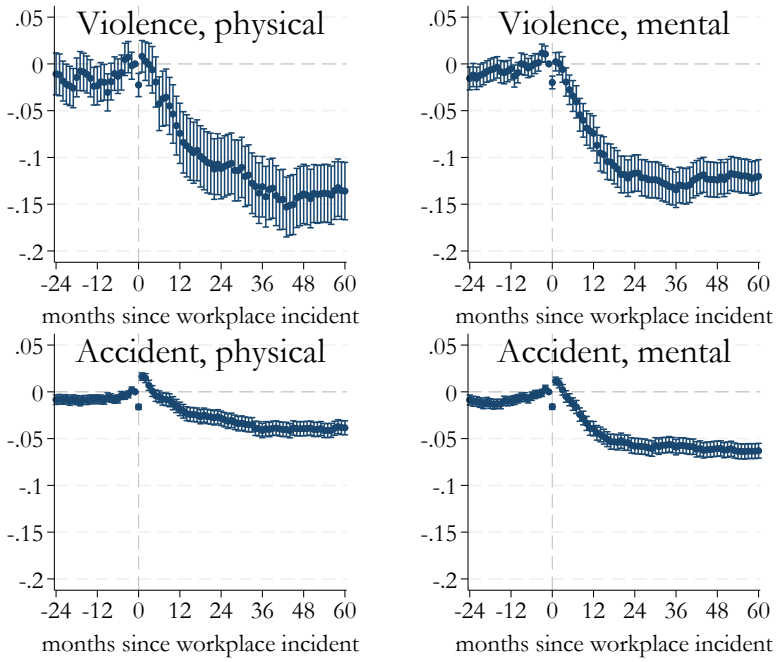
Notes: This figure reports event-study estimates of the effect of workplace injuries on earnings (working income). Treated individuals experience a workplace injury at event time 0 and are matched to control workers who never experience an injury, based on year, age, education, occupation, tenure, and working hours. Results are shown separately for injuries caused by (1) Violence (physical harm), (2) Violence (mental harm), (3) Accident (physical harm), and (4) Accident (mental harm). Each coefficient is plotted with its 95% confidence interval. The Y-axis denotes the ratio of contemporary earnings over earnings in the reference period. The x-axis represents months relative to the injury. The model includes person fixed effects, time-since-event fixed effects. Standard errors are clustered at the matched group level.

Figure B.3: Effect of workplace injuries on employment

(a) Employment

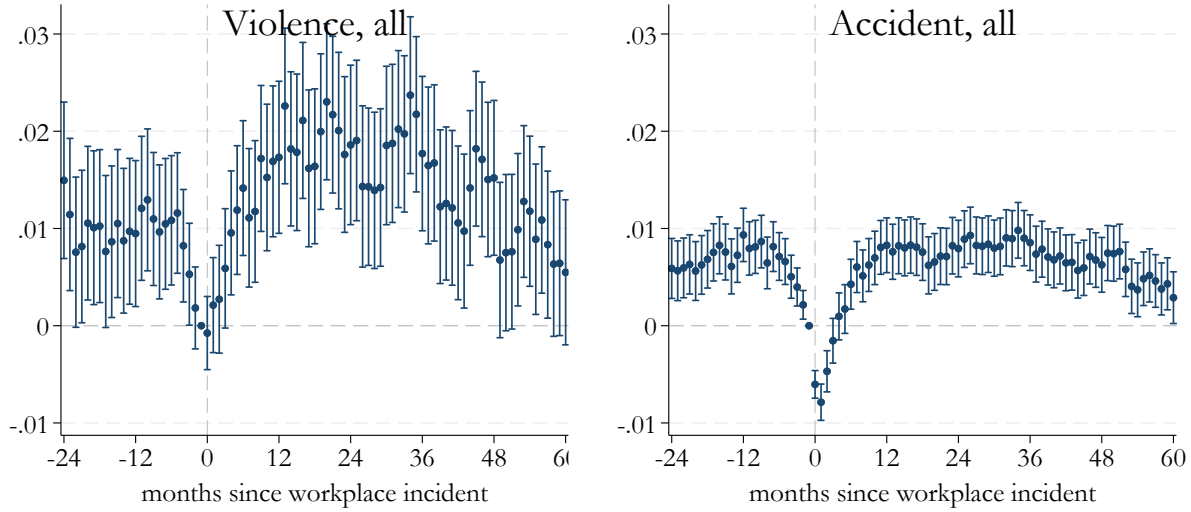


(b) Employment at initial establishment



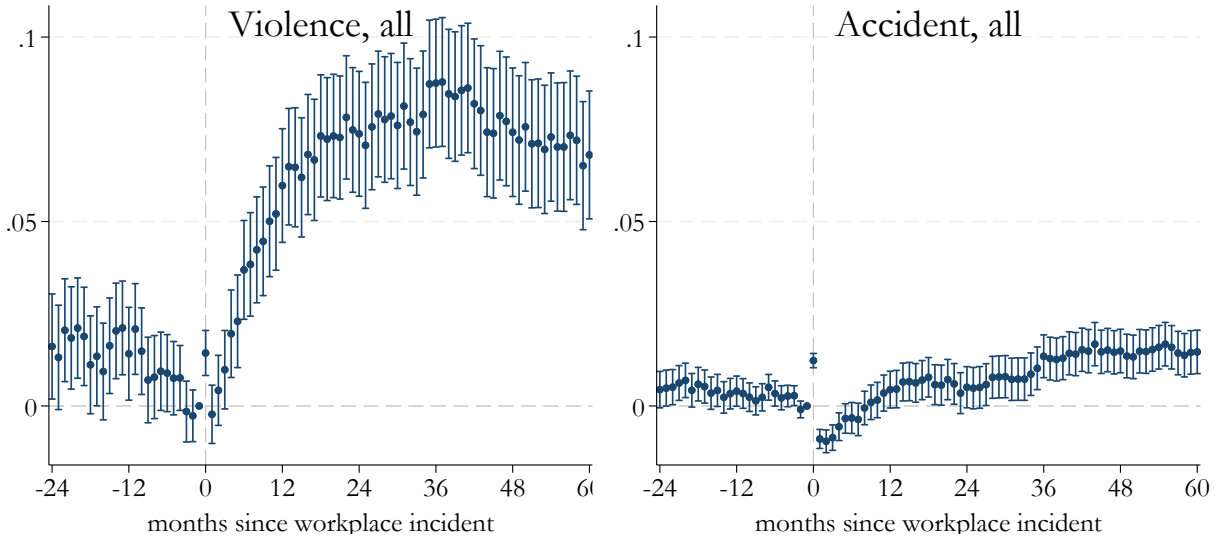
Notes: This figure presents event study estimates of the effect of workplace injuries on workers employment. Panel a show coefficients for overall employment and panel b for employment at the incident firm. Results are shown separately for injuries caused by (1) Violence (physical harm), (2) Violence (mental harm), (3) Accident (physical harm), and (4) Accident (mental harm). Each coefficient is plotted with its 95% confidence interval. The y-axis shows medical expenses in dkk. The x-axis represents time relative to the injury. The model includes person and time-since-event fixed effects. Standard errors are clustered at the matched group level.

Figure B.4: Effect of workplace injuries on unemployment insurance



Notes: This figure presents event study estimates of the impact of workplace injuries on unemployment benefits. Results are shown separately for injuries caused by violence (left) and accidents (right). Each coefficient is plotted with its 95% confidence interval. The Y-axis is a dummy variable which equals one if the worker received unemployment insurance benefits in the given month. The x-axis represents months relative to the injury. The model includes person fixed effects, time-since-event fixed effects. Standard errors are clustered at the matched group level.

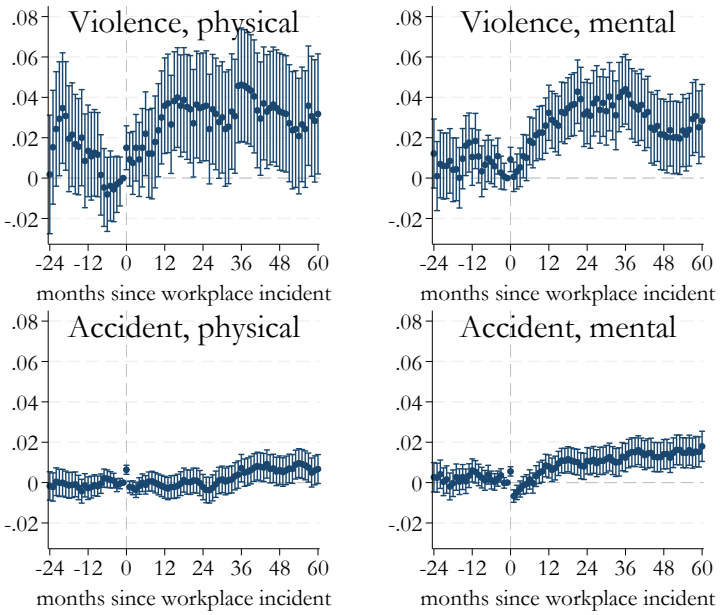
Figure B.5: Effect of workplace injuries on employment in new establishment



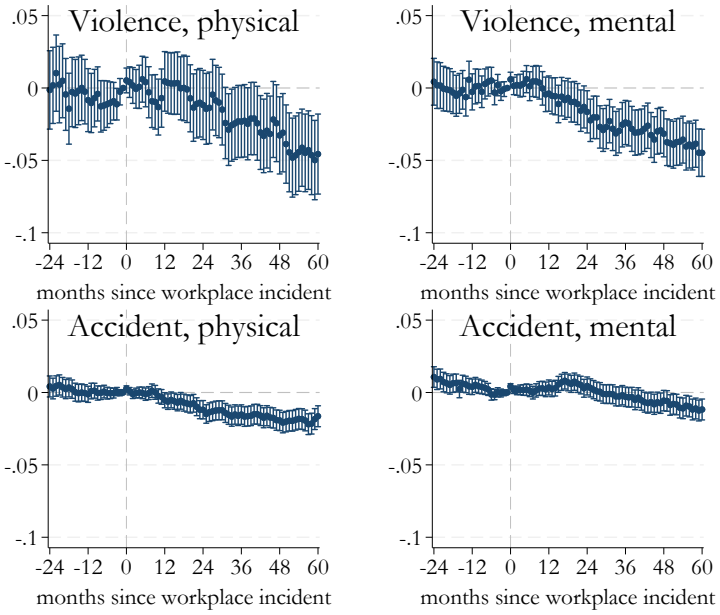
Notes: This figure presents event study estimates of the effect of workplace injuries on the probability to be employed at a new establishment, defined as a different establishment than the initial establishment at $t = 0$. Results are shown separately for injuries caused by violence (left) and accident (right). Each coefficient is plotted with its 95% confidence interval. The x-axis represents time relative to the injury. The model includes person and time-since-event fixed effects. Standard errors are clustered at the matched group level.

Figure B.6: Effect of workplace injuries on employment at new workplace or occupation

(a) New workplace type

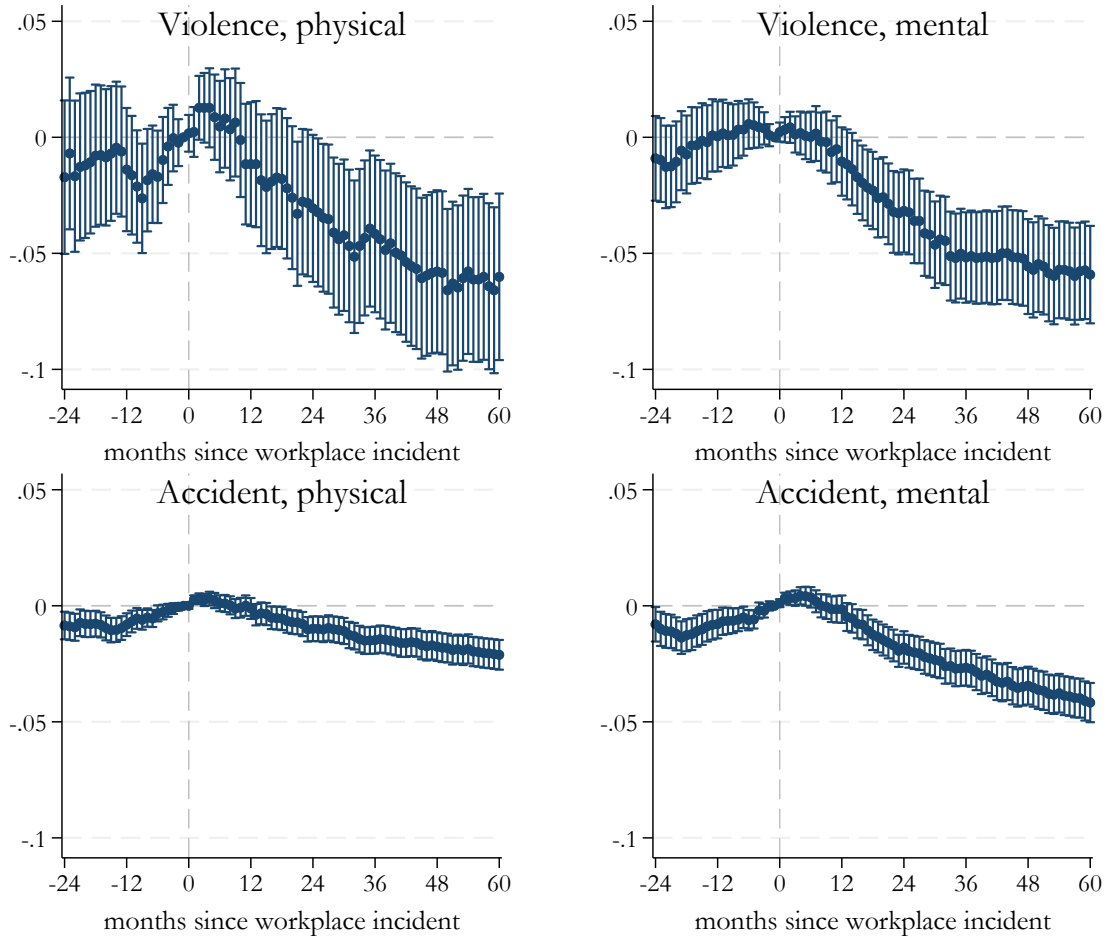


(b) New occupation



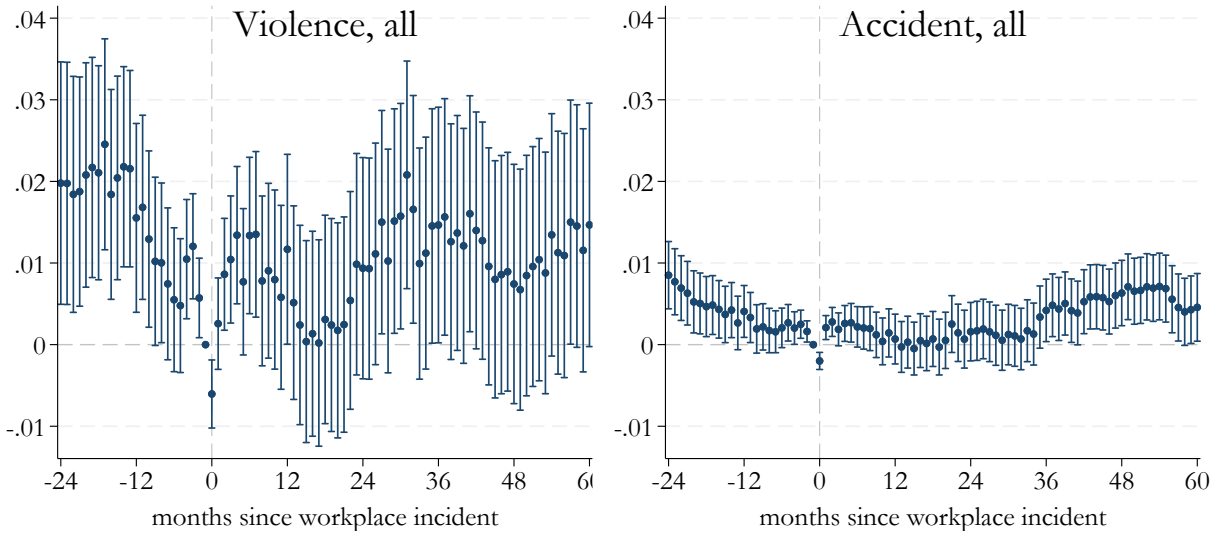
This figure presents event-study estimates of the impact of workplace injuries on workers' subsequent employment transitions. Panel (a) shows the effect on the probability of being employed in a *new workplace type*, while Panel (b) shows the effect on employment in a *new occupation*. Workplace types are defined using 2-digit NACE industry codes, with a full list presented in Online Appendix Table B.6. Occupations are classified according to 2-digit DISCO codes, with a full list presented in Online Appendix Table B.7. Each series plots the estimated coefficients from separate event-study regressions with 95% confidence intervals. The outcome variables are defined at the individual level, indicating whether the worker is employed in a different workplace type or occupation than prior to the incident. All models include individual fixed effects and time-since-event fixed effects, and standard errors are clustered at the matched-group level.

Figure B.7: Effect of workplace injuries on probability to work in a high-risk firm



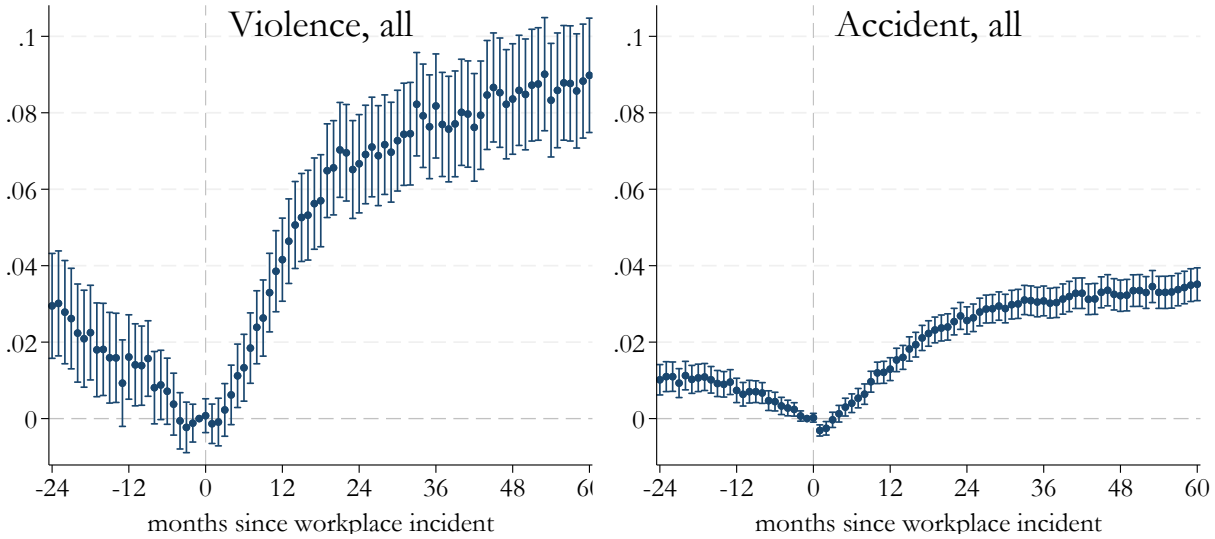
Notes: This figure presents event study estimates of the impact of workplace injuries on the probability of working in a job within the top 25th percentile of predicted violence risk. Results are shown separately for injuries caused by (1) Violence (physical harm), (2) Violence (mental harm), (3) Accident (physical harm), and (4) Accident (mental harm). Each coefficient is plotted with its 95% confidence interval. The dependent variable equals one if the worker is employed in a job within the top 25th percentile of predicted violence risk. Predicted violence risk is estimated using a Lasso model for all jobs in Denmark, based on job-specific characteristics and observed violence exposure based on the Danish Working Environment (AH) Survey. The x-axis measures months relative to the injury. All specifications include individual fixed effects and event-time fixed effects. Standard errors are clustered at the matched group level.

Figure B.8: Effect of workplace injuries on probability to work in a high-interpersonal contact occupation



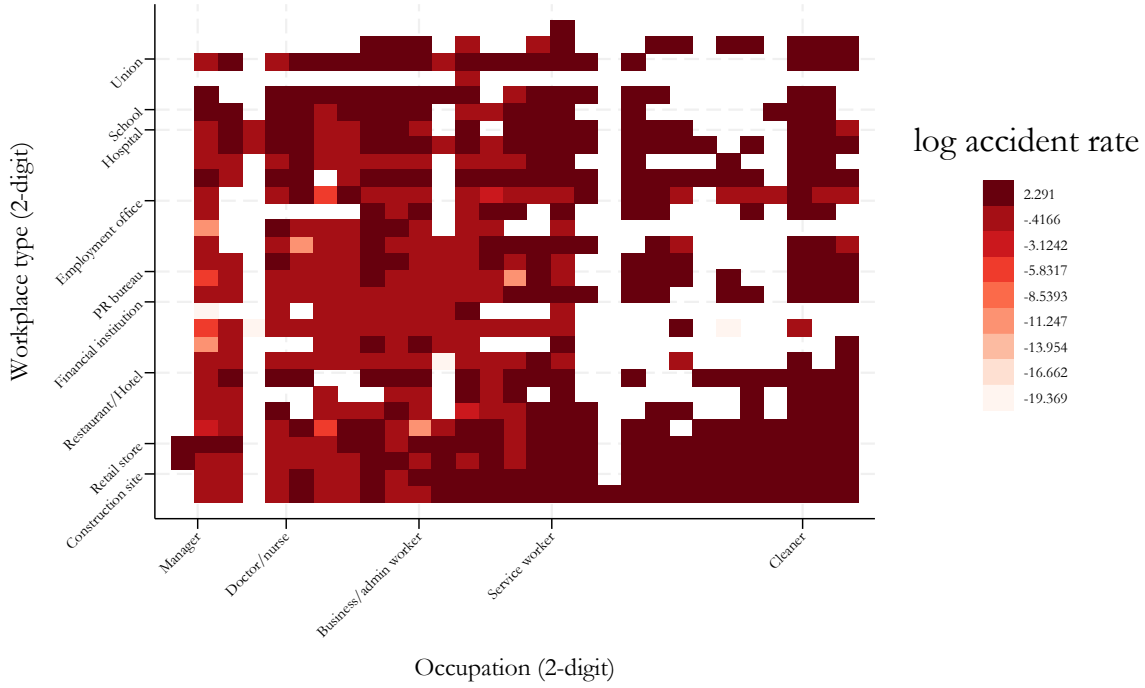
Notes: This figure presents event study estimates of the impact of workplace injuries on the probability of working in an occupation with high interpersonal contact. Results are shown separately for injuries caused by violence (left) and accident (right). Each coefficient is plotted with its 95% confidence interval. The dependent variable equals one if the worker is employed in an occupation with high levels of interpersonal contact, defined as occupations with frequent exposure to patients, customers, clients or students. The x-axis measures months relative to the injury. All specifications include individual fixed effects and event-time fixed effects. Standard errors are clustered at the matched group level.

Figure B.9: Effect of workplace injuries on private sector employment



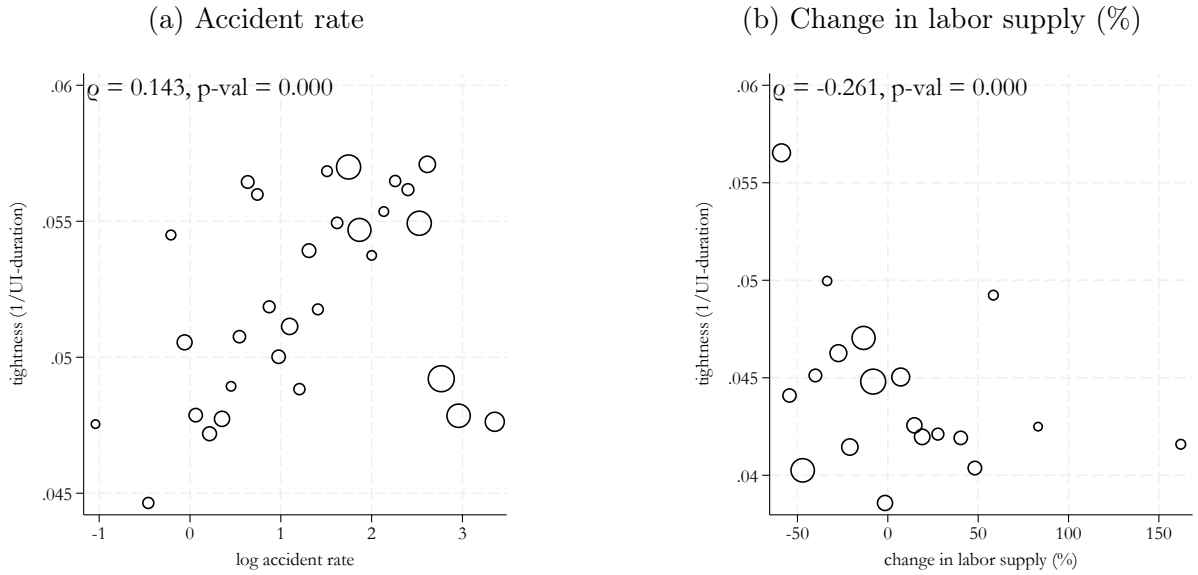
Notes: This figure presents event study estimates of the effect of workplace injuries on the probability to be employed in the private sector. The dependent variable is a dummy variable equal to 1 if the worker was employed in a private sector job. Results are shown separately for injuries caused by violence (left) and accident (right). Each coefficient is plotted with its 95% confidence interval. The x-axis represents time relative to the injury. The model includes person and time-since-event fixed effects. Standard errors are clustered at the matched group level.

Figure B.10: Workplace accident rate across occupation-workplace types



Notes: This figure displays a heatmap of the (log) accident rates across occupation–workplace type cells. Each cell represents an occupation–workplace combination. Cells with less than 100 workers are excluded, and those with 0 cases of accidents are assumed to have rates of $1e^{-}6$. Workplace type is shown on the y-axis, and occupation on the x-axis, with specific examples listed in text. Workplace types are defined using 2-digit NACE industry codes, with a full list presented in Online Appendix Table B.6. Occupations are classified according to 2-digit DISCO codes, with a full list presented in Online Appendix Table B.7. Accident rates are calculated as the number of accidental injuries recorded 2008-2017 relative to total employment in the corresponding cell. Darker colors indicate higher relative incidence of accidents.

Figure B.11: Workplace accidents and labor shortages



Notes: This figure presents binned scatterplots illustrating the relationship between labor market tightness, workplace accident rates, and labor supply responses across job types, defined as occupation–workplace type cells. Labor market tightness, shown on the y-axis, is proxied by the inverse of the average unemployment duration (the employment–unemployment–employment transition rate) within each job type. Panel (a) plots labor market tightness against log workplace accident rates for job types with at least one observed accident incident between 2008 and 2017, corresponding to 933 cells. Panel (b) relates labor market tightness to the relative change in labor supply among workers experiencing an accident in the main sample between event year 0 and 5. The size of each bin reflects the average monthly number of workers in the bin. The Pearson correlation coefficient, weighted by the number of workers in each cell, is reported in the upper-left corner of each panel alongside the p-value.

Table B.1: Descriptive averages, matched sample and controls

		Violence		Accidents	
	Population	Treated	Controls	Treated	Controls
	(1)	(2)	(3)	(4)	(5)
Age	41.74	40.11	40.11	40.69	40.69
Female (d)	0.48	0.77	0.77	0.46	0.46
Education	14.07	14.58	14.32	13.56	13.36
Earnings	31.03	27.12	26.67	27.29	26.97
Monthly hours worked	134.88	146.61	143.51	147.73	145.79
Tenure: Less than 1 year	0.31	0.34	0.35	0.34	0.34
Health (t–12)					
Sick leave months	0.32	0.58	0.36	0.54	0.38
UI months	0.32	0.43	0.40	0.50	0.44
Total doctor fees	1.66	2.18	18.73	18.24	15.31
Industry / Broad workplace type (d)					
Farming, industry, raw materials	0.14	0.00	0.02	0.11	0.11
Construction	0.06	0.00	0.00	0.07	0.06
Restaurant, services, sales	0.24	0.11	0.09	0.12	0.12
Communication	0.03	0.00	0.01	0.00	0.01
Finance & real estate	0.05	0.01	0.01	0.01	0.01
Research & analytical	0.05	0.00	0.01	0.01	0.01
Teaching	0.09	0.08	0.11	0.05	0.05
Medical	0.18	0.34	0.27	0.20	0.17
Creative and recreational	0.04	0.00	0.02	0.01	0.01
Other industry	0.12	0.46	0.46	0.42	0.45
Occupation (d)					
Nurse, doctor	0.04	0.06	0.06	0.02	0.02
Teacher	0.09	0.17	0.16	0.07	0.07
Customer service clerk	0.06	0.02	0.02	0.02	0.01
Service worker	0.04	0.06	0.06	0.05	0.04
Care worker	0.08	0.11	0.12	0.09	0.09
Artisanry & machinery	0.05	0.00	0.00	0.08	0.08
Driver	0.02	0.02	0.02	0.03	0.03
Cleaner	0.04	0.01	0.01	0.02	0.02
Construction worker	0.04	0.00	0.00	0.06	0.06
Other	0.54	0.55	0.56	0.55	0.57
Firm characteristics					
Public sector	0.33	0.80	0.66	0.50	0.43
Firm size: <20 workers	0.35	0.23	0.27	0.19	0.25
Firm size: 20–100 workers	0.31	0.44	0.40	0.40	0.37
Firm size: >100 workers	0.34	0.33	0.33	0.42	0.37
Observations	512,989	6,615	6,615	55,032	55,032

Notes: The table reports descriptive means for treated and control samples among the main cohorts of workplace violence and accident victims, measured at event date 0. The sample covers injuries that occurred between 2008 and 2017. Column (1) presents averages for the Danish working-age population. Column (2)–(3) reports averages for violence, while Columns (4)–(6) show corresponding averages by injury category for accidents. Monetary values are in 1,000 dkk.

Table B.2: Police reported cases with perpetrator

	(1) mean
Perpetrator characteristics	
Colleague perpetrator (d)	0.04
Age perpetrator	31.68
Age diff: ≥–10 yrs (d)	0.20
Age diff: –10–0 yrs (d)	0.18
Age diff: 0–10 yrs (d)	0.22
Age diff: ≤10 yrs (d)	0.40
Gender-based (perpetrator–victim)	
Male–male (d)	0.60
Male–female (d)	0.30
Female–male (d)	0.03
Female–female (d)	0.07
Type of crime	
Public crime (d)	0.47
Simple violence (d)	0.24
Threat (d)	0.10
Robbery/theft (d)	0.04
Serious violence (d)	0.09
Sexual crime (d)	0.02
Observations	7,775

Notes: The table summarizes characteristics of police reported workplace violence cases that identify a perpetrator. Column (1) reports sample means for each variable. Age differences are defined as perpetrator age relative to the victim's age at the time of the incident.

Table B.3: Descriptive statistics, Danish Working Environment and Health (AH) Survey

	(1) Men mean	(2) Women mean
Exposure in last 12 months		
Experienced mobbing (d)	0.11	0.12
Experienced violence (d)	0.03	0.09
Experienced threats (d)	0.06	0.11
Experienced sexual harassment (d)	0.01	0.04
Source of sexual harassment		
Colleague (d)	0.65	0.40
Manager (d)	0.23	0.21
Other worker (d)	0.16	0.03
Client or customer (d)	0.44	0.74
Observations	55,852	63,759

Notes: The table reports descriptive statistics from the Danish Working Environment Survey (*Arbejde og Helbred*, AH). Entries are sample means of indicator variables measuring self-reported workplace harassment and violence during the past 12 months, reported separately for men and women. Categories describing the source of sexual harassment are conditional on having experienced sexual harassment. Data comes from four survey waves: 2012, 2014, 2016 and 2018.

Table B.4: Effect of workplace injury on health outcomes

			Doctor fees					
	Sick leave		Total		Physical specialist		Psychological	
	(1) Violence	(2) Accident	(3) Violence	(4) Accident	(5) Violence	(6) Accident	(7) Violence	(8) Accident
$1.treated \times 1.post$	0.049***	0.042***	206.392***	223.655***	7.420	53.388***	76.877***	20.019***
	(0.002)	(0.001)	(22.935)	(7.179)	(8.447)	(2.657)	(7.180)	(1.762)
Outcome mean	0.046	0.042	1819.563	1507.882	215.159	167.808	88.077	44.015
Observations	1,073,982	8,871,694	262,962	2,222,104	262,962	2,222,104	262,962	2,222,104

Robust standard errors in parentheses. Outcome mean shows the average for the subgroup prior to the incident.
*** p<0.01, ** p<0.05, * p<0.1.

Notes: The table reports treatment coefficients from a static difference-in-differences regression, comparing health outcomes between injured workers and a matched control group. The independent variable, $1.treated \times 1.post$, equals one if an individual is observed in the same month or later following an injury. The dependent variables are sick leave (monthly frequency), total doctor fees (yearly frequency), physical doctor fees (yearly frequency) and mental doctor fees (yearly frequency). Results are presented separately for injuries caused by violence and accidents. The control group is matched on year, age, education, tenure, and working hours. The outcome mean corresponds to the average of the outcome variable in the two years prior to the incident. The statistical model includes individual fixed effects and post-treatment fixed effects. Standard errors are clustered at the matched group level.

Table B.5: Effect of workplace injury on employment and earnings
(low health effect sample)

	Earnings		Employed		Employed at old establishment	
	(1) Violence	(2) Accident	(3) Violence	(4) Accident	(5) Violence	(6) Accident
$1.treated \times 1.post$	-0.110***	-0.058***	-0.022***	-0.016***	-0.066***	-0.018***
	(0.039)	(0.010)	(0.010)	(0.003)	(0.017)	(0.005)
Outcome mean	0.994	0.996	0.929	0.931	0.666	0.701
Observations	203,116	2,244,864	203,116	2,244,864	203,116	2,244,864

Robust standard errors in parentheses. Outcome means show the average prior to the incident.
*** p<0.01, ** p<0.05, * p<0.1.

Notes: The table reports treatment coefficients from a static difference-in-differences regression, comparing earnings and employment outcomes between injured workers and a matched control group. The treatment indicator, $1.treated \times 1.post$, equals one from the month of injury onward. The sample is limited to a group of workers who experienced limited health-effects after violence, expressed as the bottom 25 percentile group for the impact on doctor fees. Results are reported separately for violence- and accident-related injuries. The control group is matched on year, age, education, tenure, and working hours. Earnings are normalized by pre-injury earnings (event time -1). All specifications include individual fixed effects and post-treatment fixed effects, with standard errors clustered at the individual level.

Table B.6: Workplace types based on 2-digit NACE codes

NACE code	NACE definition	Workplace types
01–03	Agriculture, forestry and fishing	*farms, fishing vessels, fish farms*
05–09	Mining and quarrying (incl. support services)	*mines, oil and gas sites, quarries, drilling sites*
10–33	Manufacturing; repair and installation of machinery and equipment	*food plants, textile mills, chemical plants, metal workshops, machinery and vehicle plants*
35–39	Utilities; water and waste management	*power plants, utilities, water treatment, waste and recycling facilities*
41–43	Construction	*building contractors, civil engineering sites, electrical and plumbing firms*
45	Wholesale and retail trade and repair of motor vehicles	*car dealerships, vehicle repair garages*
46	Wholesale trade	*wholesale warehouses, distribution firms*
47	Retail trade	*retail stores, supermarkets, specialty shops*
49	Land transport and pipelines	*public transport operators, bus depots, freight terminals*
50	Water transport	*shipping companies, ports, ferry operators*
51	Air transport	*airlines, airports, air cargo terminals*
52	Warehousing and transport support	*warehouses, logistics hubs*
53	Postal and courier activities	*postal offices, sorting centers, courier depots*
55	Accommodation	*hotels, hostels*
56	Food and beverage service activities	*restaurants, cafés, bars*
58	Publishing activities	*publishing houses, book and journal publishers*
59	Film, TV, sound and music production	*film studios, TV production companies, music studios*
60	Programming and broadcasting activities	*radio stations, television broadcasters*
61	Telecommunications	*telecom providers, network operations*
62	Computer programming and IT consultancy	*software firms, IT consultancies*
63	Information service activities	*data centers, web hosting firms*
64–66	Financial and insurance activities	*banks, financial institutions, insurance companies*
68	Real estate activities	*real estate agencies, property management firms*
69	Legal and accounting activities	*law firms, accounting and audit offices*
70	Head offices and management consultancy	*corporate headquarters, management consultancies*
71	Architecture, engineering and testing	*architectural firms, engineering consultancies, testing labs*
72	Research and development	*research institutes, R&D laboratories*
73	Advertising and market research	*advertising agencies, market research firms*
74	Other professional and technical activities	*design studios, technical consultancies*
75	Veterinary activities	*veterinary clinics, animal hospitals*
77	Rental and leasing activities	*rental firms, leasing companies*
78	Employment activities	*employment offices, staffing agencies*
79	Travel and reservation services	*travel agencies, tour operators*
80	Security and investigation activities	*security firms, guarding services*
81	Building and landscape services	*building maintenance, cleaning firms, landscaping services*
82	Office and business support activities	*call centers, administrative service providers*
84	Public administration and defence	*government offices, police, courts, prisons*
85	Education	*schools, colleges, universities*
86	Human health activities	*hospitals, clinics, GP practices*
87	Residential care activities	*residencies, nursing homes, care facilities*
88	Social work without accommodation	*day centers, social service offices, home-care providers*
90	Arts and entertainment	*theaters, concert venues, studios*
91	Libraries, museums and cultural activities	*libraries, museums, archives*
92	Gambling and betting activities	*betting shops, gambling venues*
93	Sports and recreation	*gyms, sports facilities, amusement parks*
94	Membership organisations	*trade unions, professional associations*
95	Repair of computers and household goods	*electronics and household repair shops*
96	Other personal services	*hair salons, laundries*
97	Households employing domestic personnel	*private households with domestic workers*
98	Household production for own use	*households producing goods and services for own use*
99	Extraterritorial organisations	*embassies, international organisations*

Notes: Workplace types are defined using the first two digits of the NACE classification. Examples are illustrative and not exhaustive.

Table B.7: Occupational groups based on 2-digit DISCO codes

DISCO	Occupational group	Examples of occupations
11	Senior officials and executives	*chief executives, senior public officials, top managers*
12	Administrative and commercial managers	*HR managers, finance managers, office managers*
13	Production and services managers	*production managers, operations managers, service managers*
14	Hospitality, retail and service managers	*hotel managers, retail managers, restaurant managers*
21	Science and engineering professionals	*engineers, natural scientists*
22	Health professionals	*medical doctors, dentists, pharmacists*
23	Teaching professionals	*teachers, lecturers, educators*
24	Business, administration and sales professionals	*economists, management consultants, sales professionals*
25	ICT professionals	*software developers, IT analysts*
26	Legal, social and cultural professionals	*lawyers, sociologists, cultural professionals*
31	Science and engineering associate professionals	*laboratory technicians, engineering technicians*
32	Health associate professionals	*nurses, medical assistants, therapists*
33	Business and administration associate professionals	*accounting technicians, administrative assistants*
34	Legal, social and cultural associate professionals	*social workers, legal assistants*
35	ICT technicians	*IT support technicians, network technicians*
41	General office clerks	*secretaries, office clerks*
42	Customer services clerks	*call-center agents, customer service staff*
43	Numerical and registry clerks	*bookkeeping clerks, data entry clerks*
44	Other clerical support workers	*administrative support staff*
51	Personal service workers	*waiters, hairdressers, personal care workers*
52	Sales workers	*shop assistants, salespersons*
53	Care workers	*childcare workers, care assistants*
54	Protective services workers	*police officers, firefighters, security guards*
61	Skilled agricultural and horticultural workers	*farmers, horticultural workers*
62	Skilled forestry, fishery and hunting workers	*forestry workers, fishers*
71	Building trades workers (excl. electrical)	*carpenters, masons*
72	Metal, machinery and related trades	*machinists, welders*
73	Precision, handicraft and printing trades	*jewelers, printers*
74	Electrical and electronic trades	*electricians, electronics technicians*
75	Food processing, woodworking and garment trades	*butchers, bakers, tailors*
81	Stationary plant and machine operators	*process operators, machine operators*
82	Assemblers	*assembly line workers*
83	Drivers and mobile plant operators	*truck drivers, equipment operators*
91	Cleaners and helpers	*cleaners, housekeeping staff*
92	Agricultural, forestry and fishery labourers	*farm labourers, forestry labourers*
93	Labourers in construction, manufacturing and transport	*construction labourers, factory labourers*
94	Food preparation assistants	*kitchen assistants*
95	Street and related sales and service workers	*street vendors*
96	Refuse workers and other elementary workers	*waste collectors, manual labourers*
01	Armed forces officers	*military officers*
02	Armed forces non-commissioned officers	*sergeants, corporals*
03	Armed forces occupations, other ranks	*enlisted military personnel*

Notes: Occupational groups are defined using 2-digit DISCO codes. Examples are illustrative and not exhaustive.