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Non-Reporting of Work Injuries and Aspects of Jobsite Safety Climate and Behavioral-Based Safety Elements Among Carpenters in Washington State

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Background *Declining work injury rates may reflect safer work conditions as well as under-reporting.*
Methods *Union carpenters were invited to participate in a mailed, cross-sectional survey designed to capture information about injury reporting practices. Prevalence of non-reporting and fear of repercussions for reporting were compared across exposure to behavioral-based safety elements and three domains of the Nordic Safety Climate Questionnaire (NOSACQ-50).*
Results *The majority (>75%) of the 1,155 participants felt they could report work-related injuries to their supervisor without fear of retribution, and most felt that the majority of injuries on their jobsites got reported. However, nearly half indicated it was best not to report minor injuries, and felt pressures to use their private insurance for work injury care. The prevalence of non-reporting and fear of reporting increased markedly with poorer measures of management safety justice (NOSACQ-50).*
Conclusions *Formal and informal policies and practices on jobsites likely influence injury reporting.* Am. J. Ind. Med. 58:411–421, 2015. © 2015 Wiley Periodicals, Inc.

KEY WORDS: carpentry; construction work; injury reporting; safety justice; injury surveillance

INTRODUCTION

Background

There have been marked declines in reported work-related injuries and illnesses over the last couple of decades based on capture in traditional surveillance resources [Azaroff et al., 2004; BLS, 2013]. However, there is no guarantee — or even expectation any longer — that work-related events are adequately captured in standard U.S. sources of injury surveillance such as the Survey of Occupational Injury/illnesses of the U.S. Bureau of Labor Statistics or through workers' compensation (WC) records. Failure to adequately capture work-related injuries and illnesses has been attributed to changes in reporting requirements [Friedman and Forst, 2003; Welch et al., 2007], under-reporting on the part of employers, which could be willful or due to failure to understand reporting requirements [Azaroff et al., 2002; U.S. House of Representatives, 2008; Wuellner and Bonuato, 2014;], as well as failure of workers to report events for a variety of reasons ranging from administrative hassles to fear of retribution [Rosenman et al., 2000; Azaroff et al., 2002; Shannon and Lowe, 2002; Fan et al., 2006; U.S. House of Representatives, 2008; GAO, 2009; Lipscomb et al., 2013].

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Consequently, it is not entirely clear that the decline in rates of reported work injuries reflects improved safety or under-reporting or a combination of the both.

Behavioral-based safety (BBS) efforts are designed to entice workers to behave safely. Program elements vary, but focus is on changing worker behavior rather than job exposures [Lessin et al., 2010]. They include things such as personal or group incentives for lower injury rates and punishments or sanctions for unsafe activities or injuries such as post-injury drug testing. It is not always clear if the intent of such programs is truly to increase safety or just to lower injury reporting. We previously surveyed union carpenter apprentices in the U.S. Midwest to explore relationships between the reporting of work-related injury and specific elements of behavioral-based safety programs such as the provision of a variety of incentives or disincentives. While we observed minimal evidence of associations between the reporting of injuries and incentive programs, the apprentices gave numerous examples of disincentives to the reporting of work injuries including fear of reprisal for reporting [Lipscomb et al., 2013].

While safety climate is defined in different ways, it is generally recognized as a collective appraisal of perceptions of safety practices and procedures that include implicit as well as explicit policies. Further, safety climate is sometimes viewed as a more proactive means of fostering safety than the reactive behavioral-based programs [Seo et al., 2004; Kines et al., 2011]. In this study, we were specifically interested in assessing relationships between select domains of safety climate and behavioral-based safety programs and failure to report injuries or fear repercussions for so doing. We wanted to do this by exploring safety practices and injury reporting practices from the perspective of construction workers with experience in the field.

We invited active union carpenters in the State of Washington to participate in a mailed survey designed to collect information on elements of BBS, aspects of safety climate [Kines et al., 2011], injury experiences, and injury reporting practices. This study was part of a larger project focused on understanding and improving surveillance of occupational injuries among union carpenters in the State of Washington [NIOSH Cooperative Agreement #U600H009761, McCoy et al., 2013; Schoenfisch et al., 2013; Lipscomb et al., 2014] who have had an evident decline in reported work injury rates over the last couple of decades that could suggest improvements in occupational safety [Lipscomb, Kalat and Dement, 1996; Lipscomb, Li, and Dement, 2007; Lipscomb et al., 2013; 2014; McCoy et al., 2013; Schoenfisch et al., 2014].

METHODS

In the summer of 2013, a roster of 6,000 carpenters who had worked union hours in the State of Washington in the previous 12 months was obtained from the Carpenters Trusts of Western Washington (CTWW). CTWW is a jointly trusteed (labor/management) health care trust through which union carpenters receive health and retirement benefits. Contractors who hire union workers contribute negotiated payments to the trust for each hour of union carpenter work. Taft–Hartley Funds, such as this one, provide a means for individuals who work for numerous employers over the course of their career to receive more sustained health insurance and to accrue retirement benefits; both are benefits construction workers can often lack [CPWR, 2002]. These union carpenters do a wide variety of construction work including light and heavy commercial construction (road-ways, bridge work, high-rise), as well as residential building, drywall installation, millwrighting, and piledriving. They include a mix of journey level carpenters and apprentices.

The survey that was sent to these carpenters included questions related to their demographics and work experience, work injury experience and the reporting of such. Items inquiring about exposure to behavioral-based safety programs — such as incentives to lower injury reporting, punishments or demerits for unsafe activities and rewards for safety activities — came from a survey we used previously with union carpenter apprentices in the Midwest [Lipscomb et al., 2013]. Comments of apprentices in free text fields from this earlier survey were used to formulate a series of ten items, on which we wanted to specifically seek opinions from this group of carpenters. As before [Lipscomb et al., 2013], the end of the survey included one open-ended item inviting participants to tell us about 'anything they felt we should be aware of that influences safety on construction jobsites, the reporting of work-related injuries, or use of your health insurance benefits.'

Three of seven dimensions (21 items) of the Nordic Occupational Safety Climate Questionnaire (NOSACQ-50) were assessed; *management safety justice*,*work group safety priority*, and *peer safety communication*. Minor changes in wording were made to make the items more culturally relevant for these workers. In the development of the NOSACQ-50, the rationale for inclusion of each of these chosen domains was theoretically justified and had relevance to practices of injury reporting that we wished to explore [Kines et al., 2011]. The Nordic team described how the management safety justice construct stemmed from the premise that there are benefits to a just culture, where workers are able and prepared to report errors, and where there are also clear acknowledgements of what is and is not acceptable behavior. They further described how work norms that accept risk may play a detrimental role in regard to other safety efforts. Lastly, for communication to enhance safety, the developers described the need for 'open and rich' safety communication among workers, as well as between workers and management. Respondents were asked to indicate on a 4-point Likert scale their level of agreement (strongly disagree to strongly agree). Examples included items such *as*

'management looks for causes, not guilty persons, when an accident occurs' (management safety justice), *'we will accept dangerous behavior as long as there are no accidents'* (worker safety priority), and *'we take each other's opinions and suggestions concerning safety seriously'* (peer safety communication).

The survey was mailed to each carpenter with a letter explaining the study and providing information regarding informed consent. Non-respondents were approached a second and third time. Signed informed consent was not required with consent implied by return of the survey. Participants received a $20 gift card to a local grocery store to help compensate for their time. All procedures were approved by the Duke University Medical Center Institutional Review Board.

Straightforward descriptive statistics were used to describe the population and the prevalence of their responses. Log-binomial regression (SAS Version 9.3) was used to calculate prevalence ratios and 95% confidence intervals, in order to explore relationships between the reporting of injuries and the three safety climate constructs, as well the behavioral-based safety practices on jobsites. Adjusted models were constructed using a backwards elimination strategy; no variables with a *P*-value of less than 0.10 were removed in this approach. The free text entries were transcribed and entered into an Access database; content analyses allowed the identification of major themes that arose from the comments offered by the participants.

RESULTS

In October of 2013, 6000 surveys were mailed to union carpenters who had worked in the State of Washington at any time in the year 2012. Of those, 222 were returned undeliverable leaving a total of 5,778 who were assumed to have received the mailing. A total of 1,155 completed surveys were received by March of 2014 representing a response rate of twenty percent (20%). Prevalence data reported here are based on the answers provided for each item.

Respondents' ages ranged from 19 to 74 years with a mean age of 48 years (median 50 years, SD 10.9 years). They had been in the union from less than a year to over 50 years (mean 18 years, median 16 years, SD 11.8). Almost all of the respondents (n = 1,074; 94.5%) had worked in carpentry for over 5 years. Most of respondents described their current role as a journeyman carpenter (n = 626; 55.3%) or a foreman (n = 438; 38.7%), while only 6.0% (n = 68) were current apprentices. The vast majority of respondents reported having experienced a work-related injury (n = 958; 84.5%) at some time in their carpentry career. Most carpenters who had been injured reported they had sought medical care for their injury (848; 73.4%) and about half (n = 548; 47.5%) were absent from work beyond the day of injury. Most had reported the event to their supervisor or employer (n = 700; 73.1%) and about half reported the injury through WC (n = 569; 49.3%).

When asked about their current workplace specifically, three-quarters of respondents (76.2%) felt they could report injuries to their supervisor or foreman without worrying about how it might affect their job (Table I). Two-thirds of workers felt that injuries on their jobsite were reported most or all of the time; approximately 12% felt they were rarely or almost never reported. Post injury drug testing was common on sites where these carpenters worked (77.5%), while the prevalence of exposure to other behavioral-based safety efforts ranged from 15.3% for rewards to supervisors for low injury reports to 36.7% for policies of discipline for not reporting injuries. Participants were given the option of checking 'Unsure' in regard to whether their current jobsite had the behavioral safety elements. Unsure responses varied from 7–28% and were highest for knowledge of supervisor incentives (28%), absenteeism policies that punished workers for 'too many days away from work' (25%), and safety coaching programs (22%). Subsequent reports are based on those who definitively answered 'Yes' or 'No.'

To explore associations between reporting practices and elements of behavioral-based safety programs, prevalence of injury reporting was dichotomized; injuries were considered to not be reported often if they were reported 'some of the time' or less frequently. Prevalence, prevalence ratios, and adjusted prevalence ratios of <u>not</u> reporting often and of feeling you <u>could not</u> report injuries to your supervisor without fear of reprisal are presented by whether workers were exposed to different BBS programs on their current worksite (Table II). The prevalence of not reporting injuries was 30% higher on sites where cash or prizes were offered to groups for low injury reporting (aPR = 1.3, 95% CI 0.98, 1.7), and over two times higher when workers faced discipline for reporting injuries (aPR = 2.2; 95% CI 1.8, 2.6). Prevalence of not reporting was lower on sites that provided rewards for participating in safety activities (a PR = 0.67; 95% CI 0.50, 0.90), had safety coaching (aPR = 0.76; 95% CI 0.59, 0.88) or a policy of discipline for not reporting injuries that occurred (a PR = 0.78; 95% CI 0.62, 0.99). The prevalence of not reporting without fear of reprisal was 4 times higher on sites that had policies/threats of discipline for sustaining an injury (aPR = 4.0; 95% CI 3.1, 5.2) and the prevalence was 30% lower on sites that offered rewards to workers for participation in safety activities (aPR = 0.67; 95% CI 0.49, 0.91).

NOSACQ-50 scores for management safety justice, worker safety priority, and peer safety communication ranged from 1–4, with higher scores considered more favorable safety climate (Table III). As expected the three domains were correlated; Pearson correlation coefficients ranged from 0.48–0.54 (*P*-values <0.0001). Measures of internal reliability were acceptable (Cronbach's alpha

TABLE I. Prevalence of Experiences With Rewards, Incentives, and Injury Reporting in Current Workplace, Union Carpenter Survey Respondents Washington State, 2013

	Prevalence percent (n)[b]
Type of program[a]	
Post injury drug testing	77.5% (879)
Policy of discipline for not reporting injury	36.7% (415)
Safety coaching that focuses on workers risky or unsafe behaviors	33.0% (372)
Rewards for taking part in safety activities, identifying hazards, or correcting unsafe practices	30.6% (345)
Offered cash/prizes to individuals for no injury	29.1% (331)
Absenteeism policy that can result in discipline for too many days away from work	20.4% (232)
Offered cash/prizes to group for low injury reporting	20.4% (232)
Policy of discipline or threats of discipline for injury	16.5% (186)
Rewards to supervisors for low injury reports	15.3% (174)
Injury reporting	
Can report injuries to your supervisor or foreman without worrying about how it will affect your job	76.2% (856)
How often workers report job injuries in your current workplace	
All the time	20.2 % (219)
Most of the time	46.3% (502)
Some of the time	21.6 % (234)
Rarely	7.9% (86)
Almost never	4.0% (43)

[a]Programs are not mutually exclusive.
[b]Percentages based on number who responded to each item; those who responded Do not know are not included in total.

0.66–0.84) and comparable to those initially reported on the NOSACQ-50 scales [Kines et al., 2011].

These safety climate measures were cut into high, medium, and low scores (based on dividing the distribution of responses for each domain in approximate thirds) to explore their relationship with not reporting often and fear of reprisal, just as done with the BBS measures described above. For each measure, the prevalence of not reporting injuries was higher when workers reported lower safety climate (Table IV). The effect was most pronounced for management safety justice with prevalence of non-reporting 3.5 times higher on sites with low (versus high) safety justice (aPR = 3.5; 95% CI 2.4, 4.9). Lower peer safety communication and worker safety priority were both associated with higher prevalence of not being able to report without fear, but participants on sites with poorest management safety justice were over 6 times more likely to report fear of reporting (aPR 6.3; 95% CI 3.7, 10.5) than those with the highest levels of safety justice. Results are presented for all carpenters regardless of their role as an apprentice, a journeyman, or a foreman. We had little participation from apprentices and the parameter estimates in the regression model were exactly the same for journeymen carpenters and those who were working as foremen.

Opinions and experiences of these workers over the past 5 years are summarized in Figure 1. Three quarters of these carpenters thought there should be regulations to protect workers from being fired for a predetermined period of time after an injury, and two thirds felt speed of work negatively influenced safety. Over 50% agreed that too many workers are afraid they will be terminated for an injury, but the same proportions disagreed that incentive programs lead to under-reporting of injuries or that the current economy makes it harder to report. Almost half (47%) reported that carpenters felt pressured to use their own insurance for medical care for work injuries. Few (23%) agreed that "you are looking for another job if you get hurt" or that it was best not to report any injury (13%), while nearly half (49%) felt it was best not to report minor work-related injuries.

A total of 611 carpenters (52.9%) provided written comments to the open ended item. Also of note, 21 carpenters called the principal investigator directly to expound on survey items and to be sure we adequately understood their concerns and issues. These were not necessarily individuals with 'an axe to grind.' In fact, one reported how helpful the Department of Labor and Industries (which oversees the Washington state-run workers' compensation program) had been and what great rehabilitation services he was receiving after a serious injury. However, they all felt that the issues were important and that we needed to understand more than could be explained on the survey. The free text comments and phone calls clearly demonstrate wide diversity in the experiences and perceptions of the respondents. Carpenters offered both positive and critical comments about safety on jobsites and influences on the reporting of injuries. They also provided interesting insight into the motivations behind the

TABLE II. Prevalence and Prevalence Ratios[a] of Injuries Often *not* Being Reported and Feeling you *Cannot Report Without Fear of Reprisal* by Behavioral-Based Safety Programs on Current Jobsite

	Injuries often NOT reported Prevalence (%)	PR (95%CI)	Adjusted PR (95%CI) [b]	CANNOT report without fear Prevalence (%)	PR (95%CI)	Adjusted PR (95% CI) [b]
Offered cash/prizes to individuals for no injury						
Yes	26.4	0.70(0.57, 0.87)	–	21.0	0.83 (0.65, 1.1)	–
No	37.4	1		25.2	1	
Offered cash/prizes to group for low injury reporting						
Yes	29.3	0.82 (0.65, 1.0)	1.3 (0.98, 1.7)	23.0	0.97 (0.74, 1.3)	–
No	35.9	1	1	24.3	1	
Rewards to supervisors for low injury reports						
Yes	32.5	0.97 (0.76, 1.2)	–	30.2	1.5 (1.2, 2.1)	–
No	33.4	1		20.6	1	
Policy/threats of discipline for injury						
Yes	56.8	2.2 (1.8, 2.6)	2.2 (1.8, 2.6)	55.3	4.1 (3.2, 5.3)	4.0 (3.1, 5.2)
No	26.0	1	1	14.2	1	1
Policy of discipline for not reporting injury						
Yes	27.6	0.72 (0.60, 0.88)	0.78 (0.62, 0.99)	22.6	0.97 (0.71, 1.3)	–
No	38.2	1	1	24.1	1	
Post injury drug testing						
Yes	33.0	0.86 (0.68, 1.1)	–	23.9	1.1 (0.77, 1.5)	–
No	38.6	1		22.6	1	
Punished for absenteeism						
Yes	40.0	1.3 (1.1, 1.6)	–	34.5	2.0 (1.6, 2.6)	–
No	29.9	1		17.3	1	
Safety coaching						
Yes	27.5	0.70 (0.57, 0.86)	0.76 (0.59, 0.88)	21.8	0.91 (0.71, 1.2)	–
No	39.3	1	1	24.0	1	
Rewards for safety activities						
Yes	25.1	0.63 (0.51, 0.78)	0.67 (0.50, 0.90)	18.8	0.69 (0.54, 0.89)	0.67 (0.49, 0.91)
No	39.8	1	1	27.2	1	1

[a]Prevalence ratios compare reporting practice and fear of reporting among those exposed to each aspect of behavioral-based safety compared to those who were not exposed.
[b]Models adjusted for other behavioral-based variables; absence of a PR (–) indicates variable was not included in model (*P*-values > 0.10).

behaviors of injured workers. A group of major themes clearly emerged in reading the participants' comments.

1) There is huge variability in how work is done and how safety is approached across job sites and employers. Workers describe varied conditions from 'overboard safety' that hinders work process to totally ignoring safety.

A good company will place heavy emphasis on safety and safe practices. They will adhere to safety in doctrine and in practice. All accidents are avoidable if foreseeable.

Safety is a job to job thing. Some jobs are over safe and some have no safety at all.

Safety on jobsites and employer programs are as diverse as the industry. Often employer violations are dismissed or over looked.

I work for a company that cares about its workforce. That means more than I can say. That said I'll do my very best to take care of my crew and our subs. Having done this for years promotes a better working relationship between contractors and owners. It is a win-win.

I work with a great crew and we are a great team.

The difference between good employers and bad is vast. The attitudes of carpenters are hard to change. The "safety culture" of my company rules out people making their own risk judgments and as such is incompatible with real respect for workers. At the same time it's far better than callousness and negligence.

1. Safety is sometimes for show; some contractors speak about safety, but do not follow through and workers resent this.

TABLE III. Individual NOSACQ-50 Domain Scores Based on Current Workplace, Union Carpenter Survey Respondents, Washington State, 2013

Domain	Respondents	Mean	Std Dev	Range	Cronbachs alpha
Management safety justice	1117	2.78	0.40	1.5-3.5	0.66
Worker safety priority	1123	2.90	0.58	1.0-4.0	0.84
Peer safety communication	1119	3.11	0.35	1.4-3.6	0.70

Safety on the job is always preached by management. Very rarely do any of them mean it. Most of them won't provide the equipment needed. When you ask for it they will ignore you. If you're persistent they will lay you off. Unfortunately, these standards have become the norm in our industry.

Safety should never be a program. It should be a culture established from the top down. All too often management and owners don't practice what they preach. This leaves safety programs subject to scrutiny and doubt by workers. This also leads to a lack of trust.

1. Speed is problematic in construction work. Specifically, these carpenters described how safety and production pressures do not mix well and are constantly traded off on construction sites. They also spoke of economic pressures in recent years that influenced their work.

[You need to realize] how hard the schedule is pushed affects safety and how important it is on most jobs in the last couple of years. If you would not do a task because of safety concerns it was not unusual to be told there are people waiting at the [union hiring] hall for your job.

Work is not as plentiful as it used to be. Everyone is scared to lose their job. Shortcuts = accidents.

1. There are both subtle and overt pressures not to report injuries. Under-reporting/non reporting of minor work injuries is described as more common, and the carpenters gave examples for their motivation for such behavior.

[There is] huge pressure not to report and use our own insurance to keep rates down.

I know of many dedicated employees who have intentionally hidden facts from doctors in order to have their personal insurer cover costs for an on-the-job injury. Most of them were supervisors including me. We did not want to negatively affect workers' compensation rates.

Minor cuts, scrapes, bruises, muscle strains we keep to ourselves. [I have] seen too many carpenters laid off due to possible work-related claims or being labeled high risk.

TABLE IV. Prevalence and Prevalence Ratios[a] of Injuries Often *not* Being Reported and Feeling you *Cannot Report Without Fear* of Reprisal on Current Jobsite by Three Domains of NOSACQ-50

		Injuries often NOT reported Prevalence (%)	PR (95%CI) [a]	aPR (95%CI) [b]	CANNOT report without fear Prevalence (%)	PR (95%CI) [a]	aPR (95%CI) [b]
Management safety justice							
	Low	62.7	5.1 (3.8, 7.0)	3.5 (2.4, 4.9)	54.8	10.9 (6.7, 17.7)	6.3 (3.7, 10.5)
	Mediu	29.4	2.4 (1.7, 3.4)	2.0 (1.4, 2.9)	16.8	3.3 (1.9, 5.5)	2.4 (1.4, 4.1)
	High	12.1	1.0	1.0	5.3	1.0	1.0
Worker safety priority							
	Low	56.4	3.2 (2.5, 4.1)	1.7 (1.3, 2.3)	44.1	4.2 (3.1, 5.8)	1.4 (1.0, 2.0)
	Medium	28.5	1.6 (1.2, 2.1)	1.1 (0.84, 1.5)	17.9	1.6 (1.1, 2.4)	0.88 (0.61, 1.3)
	High	17.1	1.0	1.0	10.3	1.0	1.0
Peer safety communication							
	Low	64.7	3.2 (2.5, 4.1)	1.4 (1.1, 1.7)	55.0	6.2 (4.3, 8.9)	2.2 (1.5, 3.2)
	Medium	36.7	1.8 (1.4, 2.3)	1.1 (0.87, 1.4)	28.0	3.2 (2.2, 4.5)	1.8 (1.3, 2.5)
	High	19.6	1.0	1.0	8.6	1.0	1.0

[a]Prevalence ratios compare reporting practice and fear of reporting among those with high, medium, or low measures of safety climate domains.
[b]Models include all three safety climate domain measures.

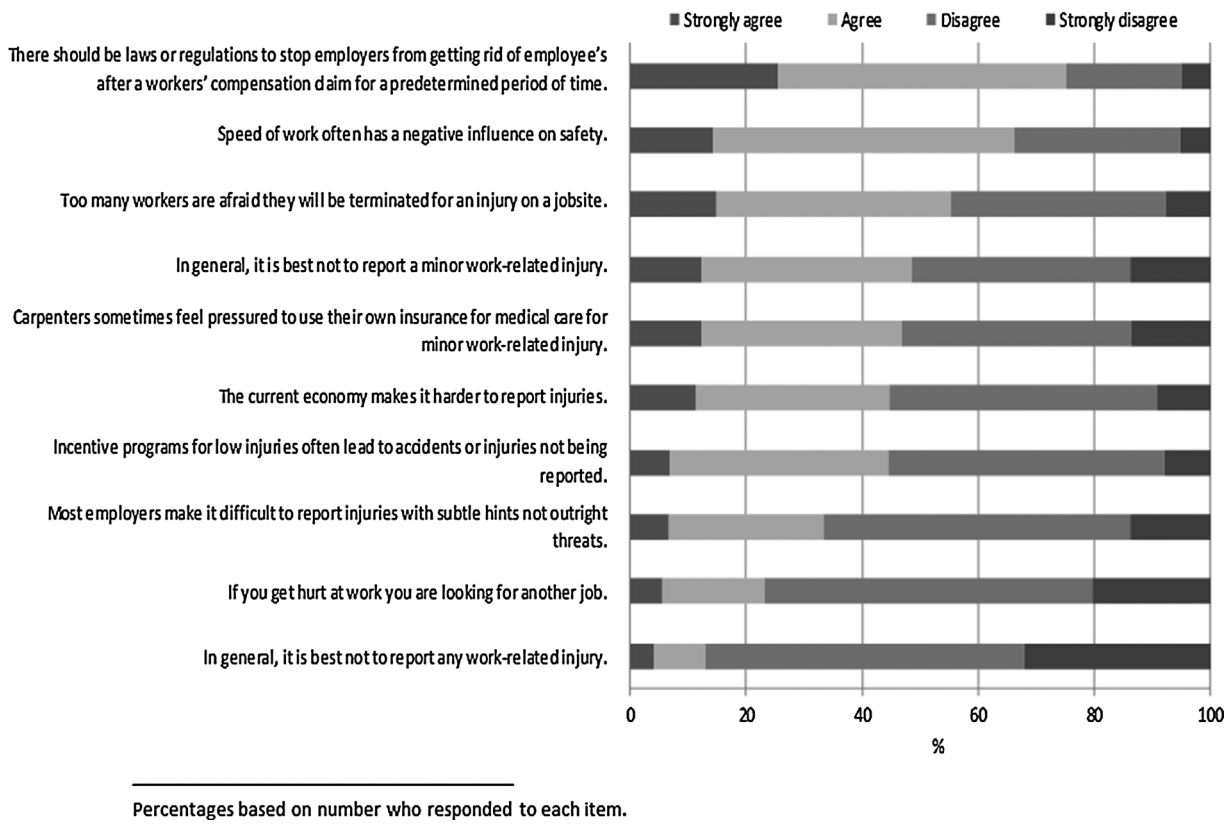


FIGURE 1. Opinions and experiences (expressed as percentages) in last 5 years working as a carpenter, union carpenter survey respondents in Washington State, 2013.

There are a lot of unemployed carpenters for union contractors to choose from. An injured worker is a liability on the jobsite for the contractor. The exception is if you work steady for one contractor, then you are less likely to face consequences for being injured.

Carpenters work so hard and fast every single day, rain or shine, we are always getting small injuries, nobody reports small injuries. You would be reporting every 2 or 3 weeks. There is little room for profit in this recession.

Many workers are often scared to report injuries due to the fear of losing their job. It was worse as the economy fell. The lack of available jobs made it scarier to report an injury, as it would be harder to find another job. Another downfall is some injuries are not immediately visible.

The safety program is set up to protect the company, not the workers. Layoffs for getting hurt are common, and if it's not serious then most of us use our own insurance.

Many times we patch each other up at a first aid station and go back to work if the injury isn't too bad. We try not to report injuries unless they are serious to keep the contractors insurance down. Cheaper insurance means lower bids and more work for the contractor and in turn benefits the carpenters.

Carpenters always tend to downplay their injuries because you're always worried about getting black-balled, not able to work in your area anymore because of the stereotyping of injuries that has always taken place.

Many companies do not want a [OSHA] 'recordable,' so they talk the worker into not taking the doctor's advice so it's a first aid. Many people fear losing their job and being labeled as a hazard.

1. Some examples of frank injustices perceived or experienced by these workers were described.

I injured my back while working for a large self-insured construction company. I was pressured to not file a W.C. claim, and the company directly paid for my initial treatment and laid me off as soon as the doctor released me to full duty.

Many serious injuries are cumulative i.e., backs, hearing, carpal tunnel, bad knees. That can make them harder to report let alone treat. Labor and industries cast doubt to say nothing of the contractors. Treatment becomes delayed at best and not at all sometimes.

I feel being sent home for any amount of days after reporting an injury is stupid and should not be allowed. If I get hurt, punishment shouldn't happen to me for reporting it.

Shit runs down hill… supervisors understand that they are responsible for safety and that to follow rules takes longer. The shift has been to train people on the rules, so they are personally responsible, and then to expect the people to not follow the rules so the job is completed faster. If an injury occurs the person that is injured and didn't follow the rules is held personally responsible for not following the safety rules. To keep employed you need to produce a lot, so you have to break the rules.

[What is bad] is not the direct but the indirect influence of a company to have workers not report injuries or lose their jobs. [I] have personally seen supervisors "layoff" workers on their way to the emergency room to get medical treatment. It tells workers do not report any injuries.

We are encouraged at [XX] not to report any injuries that are work related. I know of some carpenters who use their own health insurance for fear of being fired by the office. I know of one carpenter who broke his wrist and said he did it at home, so that the foreman would not lose his safety bonus for that job. I know that when I got injured they asked me to wait to see if it would heal without medical treatment.

Any contractor that claims they never terminated an employee for an on the job injury is lying. The largest contractor I worked for in the last 40 years has a great safety program... and on the surface you are led to believe you will not be retaliated against if you are injured. That could not be farther from the truth.

1. They wrote of difficulty maintaining work with aging in this industry.

You can be replaced by a young person who is stronger but not smarter. They are pushing out the 50 and over crowd slowly but surely. This needs to stop. We were young once and learned from our elders. It needs to be that way.

I know of one journeyman who was fired by upper management because he turned 55, and that was too much of a risk for the company.

1. There were also numerous reports that overall safety has improved over time.

I have been at this a long time. I have seen many changes in the construction industry towards safety...most for the good. I do believe if injuries are caused by the employer they should pay but a worker should be responsible for his/her actions.

Overall, employees do not fear retribution or punishment for [reporting injuries]. In general I would say that safe practices and culture of safety has improved significantly over the past few years with injuries declining as a result.

I think most contractors realize being safe is saving them money. I think most contractors didn't think so 20 years ago. Time and thinking/education is helping to solve some issues of the past.

Jobsites and work are slowly getting smarter and safer.

In my opinion each employee knowing they can trust fellow employees and management to be "on the team" striving for safety is the single most important factor in improving jobsite safety. People have to feel "safe" in reporting injuries and unsafe conditions in order to be safe in the bigger picture. I've been with the same company for 19 years so I have an obvious bias toward this company but I think our safety program works exceptionally well.

DISCUSSION

Through a cross-sectional survey of active union carpenters, we sought to better understand influences on the reporting of work-related injuries. While the majority of these predominantly-journeyman carpenters felt that they personally could report work-related injuries to their supervisor without fear of retribution, and most felt that the majority of injuries on their jobsites got reported, over 20% did not feel this was the case. It is also worth noting that we inquired about reporting behaviors of the carpenters themselves. We had no information on whether injuries that were reported would have actually been filed as a workers' compensation claim or made it to an OSHA log regardless of whether they met those reporting criteria. The reporting to a supervisor certainly does not guarantee that these things will occur.

In describing what influenced the non-reporting of injuries, carpenters recognized the emphasis on keeping workers' compensation costs down, in part for the company to secure bids (and subsequently their own employment). Nearly half of participants indicated it was best not to report minor injuries, and they felt pressures to use their private insurance for work injury care. These findings have important, though not new, implications for the utility of commonly-used sources of work-related injury and illness data in occupational safety and health research. They are consistent with well-described limitations of such data that continue to impede the characterization of and trends in occupational hazards among workers in the construction industry [Shannon and Lowe, 2002; Fan et al., 2006; Rosenman et al., 2006; Dong et al., 2007; Friedman and Forst, 2007 Bhattacharya and Park, 2012]. Further, they add to the understanding of construction workers' patterns of care seeking for work-related injuries both within and outside of the WC system, supporting the continued use of other sources of health outcomes data — e.g., private health insurance claims and self-report - when studying work-related conditions [Lipscomb et al., 2006; Koehorn et al., 2006; Lipscomb et al., 2009a and 2009b; Schoenfisch et al., 2013].

The prevalence of exposure to elements of BBS was higher than what we observed among apprentice carpenters in the Midwest, but the relationships of injury reporting to aspects of BBS were very similar [Lipscomb et al., 2013]. Worksites that had subtle and overt policies or practices of punishment, or that threatened punishments, when workers reported an injury had higher prevalence of injuries not being reported and workers feeling they could not report without fear. In contrast, rewards for participation in safety activities and safety coaching were both associated with greater prevalence of reporting. We previously concluded that behavioral-based safety program effects were likely to be highly context specific [Lipscomb et al., 2013], but we did not have resources to explore details of how these different elements might be operationalized on jobsites. For example, coaching might be a first step in a disciplinary action that follows with warnings, suspension or termination. Coaching that takes place outside the context of discipline could have vastly different effects on workers behaviors, safety, and injury reporting.

The NOSACQ-50 safety climate measures demonstrated consistent associations with reporting practices and fear; we cannot say the same would be found with other measures of safety climate. Most notably, poorer levels of management safety justice were strongly associated with lower prevalence of reporting and higher fear of retribution. Although less marked, similar patterns were observed for the domains of worker safety priority and peer safety communication. Participants provided concrete examples of behavioral-based safety practices and reflections of safety climate measures through their own words. In particular, participants spoke of the fear of job loss that has been previously described [Lessin and McQuiston, 2012; Lipscomb et al., 2013]. In recounting temporary and permanent layoffs following a work-related injury or injury reporting, they highlighted the danger of being labeled as 'high risk' or 'a liability' or even 'safety conscious' to a contractor, particularly in a work environment where one can easily be replaced.

The issues raised by carpenters in this study are remarkably consistent with many of those of apprentices in the Midwest [Lipscomb et al., 2013]. They demonstrate a wide diversity of experiences and perceptions that are not surprising given the way construction work is organized with carpenters often working for many different contractors/subcontractors over the course of time. Just as contractors' and supervisors' practices can influence workers' post-injury reporting, participants offered examples of the context of work in the construction industry and other work practices that influence the provision of a safe work environment and risk of injury. It is clear that production pressures influenced safety; participants recounted tight work schedules, work speed, and the need to take 'shortcuts' to get work done on time. Consistent with the declining injury rates we have observed broadly in this cohort [McCoy et al., 2013], effective safety endeavors had gradually been improving over time. Participants attributed this, at least in part, to employers' realization of the financial gains that can come with improved worksite safety. However, participants discerned safety 'programs' from true safety practices, and they were resentful of and reluctant to trust management that 'doesn't practice what they preach.'

We secured almost full participation from apprentices in the Midwest who were approached through their classrooms and given time to complete the survey [Lipscomb et al., 2013]. In contrast, in this study we had a response rate of 20% among all carpenters in Washington who were approached to participate in this mailed, written survey. Clearly the questions we were exploring were important to those who responded — the number of people who volunteered additional detail or called is unusual, as was the volume of text they provided. We did secure responses from carpenters in the predominant types of work these carpenters perform (drywall installation, residential building, commercial projects, piledriving, etc.). However, we cannot assume the participants are a representative sample of union carpenters in Washington. A number of characteristics of the respondents indicate that they were a select group. We essentially drew a group of journeymen and foremen who had been in carpentry for over 5 years; most had experienced a work-related injury sometime in their career. However, having drawn largely from an injured population may simply be reflective of career prevalence of injury in this high risk industry [Dong et al., 2014]. The respondents were on average a decade older than expected based on prior work [McCoy et al., 2013]. Although the results reported here cannot be generalized to the entire population of carpenters we approached, we believe the perspective of workers with both industry - and injury - experience is valuable, and certainly timely, in light of the need to address the health of older workers and retention of experienced workers and mentors in this dangerous industry that is of international importance [Welch 2009; Burdorf, 2012; Hengel et al., 2012; Schwatka et al., 2012].

While we have no data that allow us to speak to effects of safety climate on injury incidence, the three NOSACQ-50 domains that we explored were associated in a dose response fashion to perceptions of jobsite injury reporting and fear of retribution for reporting — most notably management safety justice. The NOSACQ-50 was designed to be used as a group level, rather than an individual, measure and the analyses at the group level could have been particularly enlightening. However, we had no information on who these carpenters were working for or with whom.

Despite its limitations, the study builds on our own prior work and adds to the literature focused on work injury reporting practices. We used a mix of items that have been used before with construction workers including the well-validated safety climate dimensions of the NOSACQ-50 tool

[Kines et al., 2011], and we invited open comments, an invitation embraced by over half of the respondents.

CONCLUSIONS

The carpenters who responded to this survey provide quite clear evidence of under-reporting of work injuries, particularly those of a more minor nature, and significant concerns about repercussions of reporting. Production pressures are considerable and these carpenters had a keen awareness of issues faced by the contractors for whom they worked and sought to improve their bottom line. While not highly prevalent, non-reporting and fear of reporting were markedly higher in the face of poor management safety justice. It is not surprising that workers who do not feel they are going to be given a fair shake are less likely to report their injuries. The findings are consistent with marked variability across construction worksites that involve injustices as well as improvements in safety over time.

Given the observed relationships, future efforts are warranted to explore relationships between reporting practices and other elements reflective of safety climate (e.g., the other NOSACQ-50 domains: management safety priority, management empowerment, worker safety commitment, worker trust in safety system efficacy) which for this mailed survey we felt length was prohibitive to include. It would also be useful to have group level measures, as designed [Kines et al., 2011], that would allow us to compare perceptions of co-workers and management for which we had no input.

For the hazardous construction industry, surveillance of work related conditions remains a national priority [NRC and IOM, 2004; NORA 2008; AOEC/SOEH, 2009], and this study highlights many factors that can influence accurate procurement of such. Consequently, from a public health perspective, research efforts to understand risk factors for these preventable events and develop effective means of addressing them are hampered. Efforts are needed to improve accuracy of injury reporting. Our findings also provide an indication of the importance of information secured directly from those who do the work as we seek to understand epidemiologic patterns of work injuries. When work-related injuries are not reported — as Lessin and McQuiston [2013] state — it "not only affects individual workers who may not get the medical care they need or compensation they deserve, it also allows unhealthy and unsafe conditions to persist" (emphasis added). It is worth noting that the messages here likely have applicability within other construction trades and outside of the construction industry as well.

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We provide the questionnaire as an online appendix.

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