WORKING
PAPER

What Kinds of Injuries Do OSHA Inspections Prevent?

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PREFACE

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ABSTRACT

In order to better understand the process by which OSHA inspections may reduce injury rates, this study examines the types of workplace injuries and illnesses that decline after OSHA penalty inspections and after particular standards are cited. This study replicates an earlier study, but uses a different and more recent data set, inspections in Pennsylvania manufacturing firms from 1998 to 2005. The current study confirms the earlier findings that (a) OSHA inspections could affect injury types that were not directly related to its standards; and (b) among OSHA standards, personal protective equipment citations were most clearly linked to the prevention of injuries. These findings indicate that the organizational response to inspections has to be considered in assessing enforcement impacts. It also confirms that workers' use of personal protective equipment deserves a high priority from both private and public safety officials.

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INTRODUCTION

This paper presents estimates of the impact of Occupational Safety and Health Administration (OSHA) penalty inspections in manufacturing on the prevention of different types of injuries. It also looks at the impact of citing firms for violations of particular standards. Through these analyses, it tries to increase our understanding of the impacts of OSHA enforcement and to suggest ways that its preventive role could be strengthened.

A number of other studies have contributed estimates of the effects of OSHA's enforcement program. Some have done so by examining whether industries where OSHA inspects more frequently and levies more penalties show improvements in injury and illness rates relative to industries that get less attention (Viscusi, 1979; 1986, Bartel and Thomas, 1985). Others have linked establishment-level data from the BLS Survey of Occupational Injuries and Illnesses (SOII) with OSHA inspection records to see whether rates go down when individual workplaces get inspected or penalized (Scholz and Gray, 1991, Gray and Scholz, 1993, Gray and Mendeloff, 2005). Based primarily on evidence from these establishment-level studies (all of them limited to the manufacturing sector), inspections with penalties have been shown to reduce the lost workday injury rate; however, the impact declined steadily from the early 1980s through the 1990s and largely disappeared at workplaces with over 250 employees.

Unlike these others, this paper investigates the process through which OSHA inspections lead to the prevention of injuries. It does so by asking two questions:

- What types of injury events do inspections prevent?
- What particular violations of standards, when cited and abated, are associated with reductions in injuries and illnesses?

Only one earlier paper (Mendeloff and Gray, 2005) has examined these questions. It used a data set created by merging the SOII establishment-level data with OSHA inspection records from 1992 through 1998. The general finding was that OSHA inspections were associated with reductions in injury rates for injuries that were not associated with OSHA standards as well as those that were. However, perhaps the most striking finding was that when OSHA cited firms specifically for violations of personal protective equipment standards, injury rates declined over a range of different injury types.

The finding regarding the violation of personal protective standards seemed important enough to call for an attempt to replicate it with a different data set. Therefore this study linked OSHA inspection data to establishment-level injury and illness data (from workers' compensation first reports) for the manufacturing sector in Pennsylvania from 1998 through 2005. As we explain below, this data set represents small establishments much more fully than the SOII. Thus in addition to being more recent, it focuses on a different sample of firms. We find that the relatively high effectiveness of citing PPE standards appears in this data set as well, although some other findings were different from those in the earlier study.

Information that compliance with some standards has particularly strong effects on injury prevention should be useful both to OSHA and to safety managers generally in terms of setting their priorities.

DATA AND METHODS

Unemployment Insurance Data

We obtained unemployment insurance data, which covers virtually all employers in the State, and provides quarterly information on number of employees, number of years in business, location, and industry (SIC and NAICS) codes.[1]

Pennsylvania Worker's Compensation System Data

This dataset contains detailed information about all injuries occurring at workplaces for which a First Report of Injury was submitted. The report includes the employer's name and contact information; the employer's federal Employer Identification Number (EIN); the standard industrial classification code; date of the claim; date of the injury; nature, cause, and body part involved with injury; and information about lost work time and pay.

In the earlier analysis, Mendeloff and Gray utilized Bureau of Labor Statistics (BLS) Survey of Occupational Injury and Illness data on injury and illness cases with "days away from work." Here we use Pennsylvania Worker's Compensation First Reports on "lost-time" injuries and illnesses. These categories are equivalent, both including cases with 1 or more days away from work after the day of the injury or illness. Due to slightly different injury cause codes, it was necessary to create a crosswalk from BLS injury codes to the Worker's Compensation codes (see Appendix Table 5). This match was relatively straightforward as the injury codes were very similar between the datasets. For example, the BLS event code "Struck by objects or equipment" matched well with "Struck/Injured by (Falling Object, Hand tool or Machine in Use, etc.)."

OSHA Integrated Management Information System (IMIS)

OSHA's IMIS contains data on all federal OSHA inspections since 1972 and inspection data from all of the states where inspections are conducted by states under section 18(b) of the Occupational Safety and Health Act of 1970 since 1990. Included variables are the establishment name and address, employment, union status, and industry, as well as the opening date of the inspection, the nature of the inspection (health or safety, comprehensive or limited) and what triggered it (programmed, complaint, accident, follow-up, etc). It also includes information about the degree of severity of any cited violations and the corresponding penalty.

In our dataset, we used data from programmed inspections (based on industry hazardousness), complaint inspections (based on written worker complaint about a hazard); and referral inspections (based on a health inspector's referral to a safety inspector, or vice versa). Most inspection types fall into one of these three categories: among the 13,953 inspections conducted at manufacturing firms in Pennsylvania between 1995 and 2007, 61.6 percent were programmed, 27.6 percent were complaint, 5.2 were referrals, and 5.6 were other (mostly accident investigations or follow-ups). Because follow-up investigations tend to focus on re-examination of a single intervention and do not usually require an investigation of the entire workplace, we excluded these from our analysis. We also excluded accident investigations because of reverse causation in these instances; injuries tended to cause investigations rather than vice versa.

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[1] Coverage is universal except for some agricultural employers, some employers of domestic workers, and employers of family members in sole proprietorships.

Procedure for Linking and Creating Analytic Datasets

The data used here came from three different sources: 763,429 injury records from the Pennsylvania Workers Compensation system (WC), 12.8 million quarterly employment records from the Pennsylvania Unemployment Insurance system (UI), and 21,998 inspection records from federal Occupational Safety and Health Administration data (OSHA). These datasets were linked together at the facility level, based on unique facility numeric identifiers and matching based on a facility's name-address information, using matching techniques developed in Fellegi and Sunter (1969) and described in Gray (1996).

Both the UI data and the WC data contained the federal Employer Identification Number (EIN) for the facility, although for many WC records the EIN was missing. We initially linked together those UI and WC records with the same EIN, rejecting (a few) cases with very different name-address information in the two datasets. We then took the non-linked WC records and used name-address matching to link them to the UI data. The inspections in the OSHA data were then linked to the UI data, using name-address matching. Some facilities in the UI data appeared to change their EIN over time, so we also used name-address matching within the UI data to ensure that our analysis included the full history of inspections and injuries at each facility.

This matching process was successful, linking 654,057 (85.7 percent) of the WC records and 16,740 (76.1 percent) of the OSHA records to unique UI facilities. We considered only single-facility firms, due to complications in identifying specific facilities in the WC data for a multi-facility firm, which eliminates about 20 percent of the UI facilities. We also limited the data to manufacturing facilities, since they tend to have more stable (and better-defined) locations, reducing the sample from 473,683 facilities to 22,186 single-facility manufacturing firms operating in Pennsylvania. These facilities had a total of 70,721 WC injury records and 7,467 OSHA inspections.

From these 22,186 firms (168,759 firm-years of data), we reduced our sample to only those firms that had a presence in the UI data for four or more consecutive years in order to complete a longitudinal analysis. This reduced the number of firms in our dataset to 17,811 (159,258 firm-years). We then excluded any observations that occurred before 1997 or after 2005 (a time period during which we did not have injury data), which reduced the number of firm-years to 103,953. Finally, because OSHA does not conduct programmed inspections at firms with less than ten employees, we restricted our sample to include those firms with ten or more employees, further reducing our sample to 9,150 firms and 47,427 firm-years. After some preliminary analysis, we reduced our sample again to those firms with 20 to 250 employees, resulting in a total of 5,720 firms and 28,374 firm-years in our final analysis dataset.

Analysis Variables

For descriptive purposes, we calculated injury rates as the number of injuries reported via Workers' Compensation first reports divided by the number of employees during that year (as determined by the UI records). We also calculated injury rates for specific injury types, following the methods of Mendeloff and Gray (2005). (See Table 1 for a distribution of injury types by year.)

For modeling purposes, we log-transformed the number of injuries (adding one to the rate in order to be able to transform values of zero) and calculated the change in log of the number of injuries between the year of analysis and the year before. This calculation also equals the log of the ratio of this year to the prior year's number of injuries. This form of the injury outcome is comparable with earlier work and is effective in coping with the strong skew in the injury counts and the high proportion of zero counts. Under particular conditions, this form of the outcome is approximately equal to the percent change in injury rates. However, the attributes of this data already mentioned along with the integer nature of the data mean that this form of the outcome does not closely approximate percent change. To enhance the interpretability of significant coefficients, we applied a recycled prediction motivated method to back-transform the model coefficients directly to a percent change scale and we report these estimates, with corresponding confidence intervals, in the text. In general, the results on the percent change scale were approximately twice as large as the estimated coefficients on the transformed scale used in the models. The findings on the transformed scale in the models are appropriate for comparison to earlier findings. While we refer to the prior research findings as percent changes, as they are reported, it is unclear whether this is the correct scale on which to interpret those findings.

The back transformed estimates were obtained by making three calculations. The first calculation was to use the model to estimate the outcome on the transformed scale twice for each observation: first setting the relevant inspection with a penalty variable to one and second setting it to zero. These predicted outcomes on the transformed scale were algebraically back transformed to estimate predicted injury counts in the current year using actual counts in the prior year. For each observation, one of these two predicted counts was the actual count observed, the one corresponding to the observed penalty status, and the other is the estimated 'missing counter-factual' for the penalty status not received. In the final step, we calculated the difference in the means of the predicted injury counts under each penalty condition and divided the difference by the mean injury count under no inspection with a penalty. This procedure results in an estimate of the percent change in injuries associated with the OSHA inspection variable of interest. To obtain the confidence intervals we repeated the procedure using the upper and lower confidence bounds on the initial coefficient of interest.

Table 1.
Reductions in Sample Size based on Exclusion Criteria

Restriction	Firms	Firm-years
All data	473,683	
Single-facility manufacturing firms	22,186	168,759
At least four consecutive years of data	17,811	159,258
Only 1997-2005	17,811	103,953
Firms with 10 or more employees	9,150	47,427

Table 2.
Percent of Total Injuries in Our Sample, by Injury Type and Year

Injury Type	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
Struck - by	12%	12%	10%	12%	11%	12%	13%	12%
Caught - in	8%	8%	7%	7%	7%	7%	8%	8%
High Fall	3%	4%	4%	4%	4%	4%	4%	4%
Eye Abrasion	5%	4%	5%	3%	3%	4%	4%	4%
Toxic Exposure	3%	4%	4%	3%	3%	3%	4%	4%
All A	*32%*	*32%*	*30%*	*29%*	*28%*	*30%*	*33%*	*33%*
Exertion	28%	27%	27%	28%	29%	29%	33%	30%
Struck Against	5%	6%	5%	7%	6%	8%	9%	9%
Fall Same Level	4%	4%	4%	3%	3%	3%	3%	4%
All B	*36%*	*37%*	*36%*	*37%*	*38%*	*40%*	*45%*	*43%*

Our main explanatory variable of interest is whether there had been an inspection that resulted in a penalty being levied in the current of prior year. Indicators for citations of specific standards were created by determining whether a particular standard was cited at an establishment during the year of analysis or the year before the analysis. We created these variables for the same standards evaluated by Mendeloff and Gray (2005): standard 1910.132 (General requirements for Personal Protective Equipment), 1910.212 (General requirements for all Machines—Machine Guarding), 1910.0303 (Electrical wiring), 1910.0178 (Industrial trucks) and 1910.0157 (Fire extinguishers). These standards were chosen because the first two were expected to have a preventive effect, while the latter 3 were not, mainly because the injuries they cause were believed to be too rare to allow an effect to be discerned. Thus these 3 standards were included to provide some degree of discriminant validity; if abating violations of those standards is also associated with injury reduction, then something else may be going on rather than the preventive effect of abating a particular hazard.

We also produced variables for several covariates for which we controlled in the model. These included the difference between the change in log-transformed employment during the year of analysis and the year before and the change in log-transformed employment last year and two years ago.[2] Why do we use that formulation? Theory suggests that the level of injuries increases when more inexperienced workers join a firm. The crude measure of that increase would be the change in the number of employees. Because our dependent variable is the change in the number of injuries, we need to look at the change in the number of employees from last year to this year as well as at the change from last year to the year before that. We also employ control variables for the year and the 2-digit Standard Industry Classification (SIC).

Statistical Methods

Univariate statistics and frequencies were calculated for the variables of interest in order to describe our sample. Appropriate transformations were made based on these results.

Models

The basic model takes the following form:

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[2] change in change of log employment = log((number of employees $_t$ / number of employees $_{t-1}$) / (number of employees $_{t-1}$ / number of employees $_{t-2}$))

Change in Log Number of Injuries $= a_1 + b1$*(Inspection with Penalty)* $+ c_1$*(Change in the Change of Log Employment) + SIC2[indicator variables] + YEAR[indicator variables]*

In replication of earlier work, the dependent variable is the change in the log of the number of injuries (by cause of injury). This form of the variable enables us to model the data efficiently and to compare our results to earlier findings. The additional steps described above were used to aid interpretation of significant coefficients as percent changes in injury counts. We ran linear regression models predicting changes in the various injury types, those that Mendeloff and Gray hypothesized would be more related to OSHA standards: *struck by objects*; *caught in objects or machinery*; *fall from heights*; *eye abrasion*; *toxic exposure*; and a pooled count of these injuries, and those that Mendeloff and Gray hypothesized would be less related to OSHA standards: *exertion*; *struck against object*; *fall to the same level*; and a pooled count of these injuries.

In the first analysis, the main explanatory variable is inspection with penalty, indicating whether the establishment had any OSHA inspections with penalties during this year or last year. Control variables include the change in the annual log change in the number of employees, two-digit manufacturing Standard Industrial Classification codes (using SIC 20, Food and Kindred Products, as the referent group), and year (using 2005, the most recent year, as the referent group).

In a second analysis, we evaluated the outcomes mentioned above, but using indicators for citations of specific standards (during the current or previous year) as predictors. These standards included *machine guarding*; *personal protective equipment*; *electrical wiring*; *forklift trucks*; and *fire extinguishers*. In these analyses of different standards, we did not distinguish whether a penalty had been assessed either for the individual violation or for the inspection in which it was cited. We again controlled for change in change of log employment, year, and industry codes.

RESULTS

Table 3 examines the impact of inspections with penalties on changes in various types of injury rates, using a sample that includes all single-establishment manufacturing firms in Pennsylvania with between 20 and 250 employees. The back-transformation of the coefficient on the inspection with a penalty variable represents the annual percent change in the particular injury rate associated with an inspection with a penalty. As the inspection with a penalty variable applies to firms in both the current and prior year, the cumulative effect of the inspection with a penalty over two years is obtained by doubling the annual coefficient.

After controlling for change in change in log employment, industry categories, and year, we find significant annual reductions in injuries resulting from being struck by various types of objects (-0.014), being caught in objects or machinery (-0.013), and from bodily exertion (-0.040) associated with inspections that imposed penalties during this year or last year. Overall, these coefficients translate to back-transformed results of a 4.2 percent (0.6 percent, 7.8 percent) annual reduction in the pooled injury rate of those injury causes that are more closely related to OSHA standards and a 7.3 percent (3.2 percent, 11.3 percent) annual reduction in the pooled injury rate of those injury causes that are less closely related to OSHA standards. Over the two year period, these amount to a cumulative 8.3 percent decrease and 14.3 percent decrease over two years for injury types that we labeled as more or less related to OSHA standards, respectively. Thus, injury reductions are larger for the category of injuries we have labeled less related to OSHA standards. The broad outline of these results is similar to that found by Mendeloff and Gray (2005), although the results for more detailed injury categories differ. As they are here, the coefficients for both the “All A” and “All B” categories were negative and statistically significant in their earlier work, and the coefficient for the “All B” category was about 50 percent larger than the “All B” coefficient. Compared to the earlier work, the “All A” coefficient is about 25 percent larger and the “All B” coefficient is about 43 percent larger. In contrast, the only specific injury category where the effect is statistically significant in both analyses was the exertion category. In the earlier analysis the effects on eye abrasions and toxic substances were significant; in this analysis, the reductions for struck-by and caught-in injuries were significant. Shaded cells in Table 3 indicate significant findings from the prior research on the same coefficients.

Table 3.
Effect of Inspections with Penalties on Injuries at Single-Establishment Manufacturing Plants, 1998-2005, 20-250 Employees: Regression Model Coefficients and p-values

	A: Related to OSHA standards						B: Unrelated to OSHA standards			
Variables	Struck By	Caught In	High Fall	Eye Abrasion	Toxic Exposure	All A	Exertion	Struck Against	Fall Same Level	All B
Intercept	0.004	0.020	0.003	0.008	0.006	0.030	0.031	0.01	0.003	0.036
	0.645	0.011	0.596	0.169	0.271	0.022	0.023	0.082	0.664	0.015
Inspection with penalty this year or last year	**-0.014**	**-0.013**	-0.006	-0.004	0.003	**-0.023**	**-0.040**	-0.002	-0.005	**-0.040**
	0.047	**0.028**	0.196	0.307	0.476	**0.024**	**<0.001**	0.580	0.444	**0.001**
Change in Change in Log Employment	0.013	0.011	0.002	0.004	0.007	0.027	0.016	0.003	0.011	0.024
	0.002	0.002	0.536	0.082	0.006	<0.001	0.007	0.209	0.001	<0.001
R2	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.002	0.003

Notes: Other variables in our model included year and industry codes.
Shaded coefficients and p-values indicate that this coefficient was also significant in Mendeloff and Gray, 2005.

Table 4.
Violations Cited Among Inspected Single-Establishment Manufacturing Firms with 20-250 employees, 1998-2005

Standard	Coverage	Number of Violations
1910.0212	General Machine Guarding Requirements	625
1910.0132	General PPE requirements	164
1910.0303	Electrical Wiring	223
1910.0178	Industrial Trucks	191
1910.0157	Fire Extinguishers	88

Table 4 outlines the number of times each standard we examined was cited during 1998 through 2005. Table 5 uses the same set of employers and examines the impact of violations of these specific standards (regardless of whether or not penalties were levied in the inspection) on the different types of injury rates After controlling for the change in change in log employment, industry categories, and year, we find violation of the Personal Protective Equipment (PPE) standard associated with significant reductions in three specific injury types being caught in objects or machinery (-0.027), foreign matter in the eye (-0.030), and bodily exertion (-0.048). These were the same 3 categories with significant coefficients for the PPE standard in the Mendeloff and Gray study.

Unlike the earlier study, we do find one other negative and significant coefficient—the association of the electrical wiring standard to a reduction high falls (i.e., falls from heights). In 3 other cases there are statistically significant (at the 0.10 level) *positive* coefficients, implying that citations of these standards increased injuries. With 10 different regressions for each standard, we tend to view these associations as either due to chance, non-causal, or both; but they could indicate that there are correlations with other standards that we have not included in these analyses.

When we back-transform the coefficients in Table 5 to obtain percentage change estimates, we find a 10 percent (0.9 percent, 18.7 percent) annual reduction in the pooled injuries that are more closely related to OSHA standards and a 19.5 cumulative change over two years. For the 3 specific injury categories affected by the PPE standard (being caught in objects or machinery, foreign matter in the eye, and bodily exertion), there are cumulative reductions of between 9.8 and 17.6 percent over two years.

In contrast to the larger effect of penalty inspections on the category of injuries less related to standards, we find that citations of PPE violations have a greater effect on injury categories more related to OSHA standards.

Table 5.
Effect of Specific Violations (this year or last year) on Injuries at Single-Establishment Manufacturing Plants, 1998-2005, 20-250 Employees: Regression Model Coefficients and p-values

	A: More related to OSHA standards						B: Less Related to OSHA standards			
Violation Type	Struck By	Caught In	High Fall	Eye Abrasion	Toxic Exposure	**All A**	Exertion	Struck Against	Fall Same Level	**All B**
Machine Guarding	0.009	-0.013	-0.009	-0.003	-0.007	-0.018	-0.014	0.008	0.001	-0.011
	0.436	0.218	0.228	0.650	0.355	0.299	0.421	0.293	0.887	0.571
PPE	-0.023	**-0.027**	-0.001	**-0.030**	-0.006	**-0.055**	**-0.048**	-0.010	0.020	-0.029
	0.205	**0.084**	0.937	**0.005**	0.577	**0.033**	**0.073**	0.355	0.212	0.322
Electrical Wiring	-0.015	0.010	**-0.019**	-0.011	0.007	-0.019	-0.036	-0.009	-0.010	-0.038
	0.340	0.466	**0.059**	0.254	0.500	0.389	0.124	0.361	0.464	0.137
Forklift Trucks	0.001	0.012	**0.021**	0.004	0.013	0.042	-0.001	<-0.001	0.015	0.004
	0.958	0.451	**0.063**	0.691	0.264	0.111	0.971	0.993	0.341	0.903
Fire Extinguishers	-0.032	-0.020	-0.005	**0.028**	0.010	0.006	0.008	**0.022**	-0.007	0.011
	0.789	0.247	0.696	**0.022**	0.424	0.843	0.869	**0.073**	0.668	0.734
R2	0.001	0.001	0.001	0.001	0.001	0.003	0.002	0.001	0.002	0.002

Notes: Other variables in our model included change in change of log employment, year, and industry codes.
Shaded coefficients and p-values indicate that this coefficient was also significant in Mendeloff and Gray, 2005.

DISCUSSION

The findings of this paper generally agree with those in the prior study by Mendeloff and Gray (2005), which looked at national data in the previous decade. Perhaps most importantly, the relatively large impact on injuries of citing PPE standards is found here again. Citing the standard on machine guarding remains unassociated with changes in injuries where the worker is caught in running machinery. Citing the electrical wiring standard is associated with reductions in falls to a lower level; the causal link here is harder to understand.

One pattern that was also found in the earlier study was that when looking at the impact of a penalty inspection (regardless of which particular standards were cited), the injury types that seem most affected are categories with large numbers of injuries, but not those that bear a particularly close relationship to OSHA standards. Most noticeably, the "exertion and bodily reaction" injuries show the largest declines, even though OSHA has no standards bearing directly on the risks that cause these events. On the other hand, when we look at citations for specific standards, regardless of whether there was a penalty cited in the inspection or for that specific violation, there is more of a tendency for the effects to show up in injury categories that are more closely related to the standard (e.g., eye injuries and PPE).

We believe that these patterns may reflect a dual impact of penalty inspections. First, there is an effect on many types of injuries as the firm responds to the negative signal of a penalty and tries to upgrade its general safety efforts. Second, there is also a more targeted response to the particular deficiencies that have been cited. One implication of the first impact is that the preventive effects of inspections are not necessarily limited to those hazards addressed by OSHA standards.

The impact of citing a standard also depends upon the role it plays in safety. We interpret the difference in impact between the PPE standard and the machine guarding standing as an indication of the broader range of injuries that the former applies to. But if that was all there was to it, we should probably still expect to see a link between the citations for machine guarding and a reduction in "caught-in" injuries. That we do not suggests that the probability that an injury results from a given machine guarding violation is small, both absolutely and relative to the effect of a PPE violation.

As in the prior study, the three injury categories where citations of PPE standards reduced injuries were *caught-ins*, *bodily reaction and exertions*, and *eye injury*. The absence of an effect on injuries due to "exposures to harmful substances and the physical environment" is troubling. But it is worth noting that the earlier study did not find an impact when it looked at establishments with fewer than 250 employees, but did find a strong impact in the sample that included all sizes of firms. The current analysis is restricted to firms with fewer than 250 employees and in addition the firm size distribution is shifted toward much smaller firms than that of the prior study. These differences may explain the lack of an effect on toxic exposures and also reinforce that the impact of violations of PPE standards on the other injury types seem to hold throughout the firm size distribution.

One limitation of this study is that we do not control for all other standards that may have been cited in addition to or instead of the five we focus on here. Including firms where other standards but none of these five were violated in the comparison group makes our results conservative, but not controlling for other standards that may have been violated in addition to one or more of the five we focus on could lead to misleading results. This may account for the anomalous findings such as citations for violations of the fire extinguisher standard being associated with increases in eye injuries.

In summary, the 19 percent decrease in injuries related to OSHA standards over the two years that followed the citation of PPE standards should probably encourage OSHA and other safety managers to give a very high priority to maintaining compliance with that standard.

APPENDIX

Table 6.
Crosswalk from Bureau of Labor Statistics Injury Event Codes to Worker's Compensation Cause of Injury Codes

WORKER'S COMPENSATION – CAUSE OF INJURY CODES	COMPARABLE BLS EVENT CODES
BURN OR SCALD-HEAT OR COLD EXPOSURE	
Burn-Acid Chemicals	310-339 (Exposure to harmful substances or environments)
Burn-Contact with Object	
Burn-Cold Objects or Substances	
Burn-Temperature Extremes	
Burn-Fire or Flame	
Burn-Steam or Hot Fluids	
Burn-Dust, Gases, Fumes, Vapor	
Burn – Welding Operations	
Burn – Radiation	
Burn-Abnormal Air Pressure	
Electrical Current	
Burn – Miscellaneous	
CAUGHT IN OR BETWEEN	
Caught In-Machinery	031 (Caught in or compressed by running machinery)
Caught In-Object Handled	030 (Caught in or compressed by objects or equipment)
Caught In-Collapsing Materials (Slides of Earth)	
Caught In or Between-Miscellaneous	
FALL OR SLIP INJURY	
Fall or Slip-From Diff Level	110-129 (Falls to lower level)
Fall or Slip-From Ladder	
Fall or Slip-From Liquid	130-139 (Falls on same level)
Fall or Slip-Into Openings	110-129 (Falls to lower level)
Fall or Slip-Same Level	130-139 (Falls on same level)
Slipped, Did Not Fall	
Fall or Slip-Fall, Slip, Trip, NOC	
Fall or Slip-On Ice or Snow	
Fall or Slip-On Stairs	110-129 (Falls to lower level)
STRAIN OR INJURY BY	
Strain/Injury By-Continual Noise	210-239 (Bodily Reaction and Exertion)
Strain/Injury By-Twisting	
Strain/Injury By-Jumping	
Strain/Injury By-Holding or Carrying	
Strain/Injury By-Lifting	
Strain/Injury By-Pushing or Pulling	
Strain/Injury By-Reaching	
Strain/Injury By-Using Tool or Machinery	
Strain/Injury-Miscellaneous	

WORKER'S COMPENSATION – CAUSE OF INJURY CODES	COMPARABLE BLS EVENT CODES
Strain/Injury-Wielding or Throwing	
Strain/Injury By-Repetitive Motion	
STRIKING AGAINST OR STEPPING ON	
Stepping on/Striking-Moving Parts of Machine	010-019 (Struck against object or equipment)
Stepping on/Striking-Object Being Lifted or Handled	
Stepping on/Striking-Sanding, Scraping, Cleaning Operations	
Stepping on/Striking-Stationary Object	
Stepping on/Striking-Sharp Object	
Stepping on/Striking-Miscellaneous	
STRUCK/INJURED BY	
Struck/Injured By-Fellow Worker	020-029 (Struck by objects and equipment)
Struck/Injured By-Falling or Flying Object	
Struck/Injured By-Hand tool or Machine in Use	
Struck/Injured By – Motor Vehicle	
Struck Injured By – Moving Parts of Machine	
Struck/Injured By – Object Being Lifted or Handled	
Struck/Injured By –Object Handled by Others	
Struck/Injured By – Miscellaneous	
Struck/Injured By – Animal or Insect	
Struck/Injured By – Explosion or Flare Back	
MISCELLANEOUS CAUSES	
Mis-Absorption, Ingestion or Inhalation, NOC	310-339 (Exposure to harmful substances or environments)
Misc-Foreign Matter (Body) in Eye(s)	053 (Rubbed or abraded by foreign matter in the eye)
CUT, PUNCTURE, SCRAPE INJURED BY	
Cut, Injured By-Broken Glass	
Cut, Injured By-Hand Tool, Ute	
Cut, Injured By-Object being Lifted or Handled	
Cut, Injured By-Powered Tool	
Cut, Injured By-Miscellaneous	

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