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Determining Relationships between Union Membership and Injury and Fatality
Rates

By

Madelyn Street

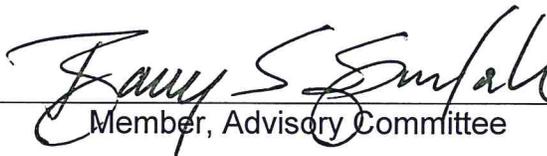
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Determining Relationships between Union Membership and Injury and Fatality
Rates

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Submitted to the Faculty of the Graduate School of
Eastern Kentucky University
In partial fulfillment of the requirements
for the degree of
MASTER OF SCIENCE
August, 2017

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DEDICATION

This thesis is dedicated to
my Mom and Dad
for showing me the moon,
and then inspiring me to go further.

ACKNOWLEDGMENTS

I would like to acknowledge Carol Ruppel for teaching me that page number requirements are not scary as long as you have something interesting to write about. Linda Frost and Sara Zeigler deserve credit for their guidance when writing my undergraduate honors thesis and teaching me about the research process. I would like to thank Earl Blair and Barry Spurlock for their support in completing this thesis. Finally, I would like to thank Scotty Dunlap for steering me in the direction of Occupational Safety. His guidance and support throughout this Master's program continues to present itself in the gift I receive each day in finding a career that interests and challenges me. He deserves additional recognition for guiding me through and to the end of this process.

ABSTRACT

In under two centuries the labor union transformed the American workplace, improving wages, benefits, employee engagement, and safety. In more recent years, the government and other organizations have caught up in focusing on safety. Countless studies have been conducted and determined that unions have a significant positive impact on safety compared to work environments absent of a union. Using Bureau of Labor Statistics data for 2006-2015, an investigation into the trends of union membership and injuries and fatalities reported in the United States was conducted. It was determined that there was not significant correlation between increased union membership and improved safety in fatalities and recordable injuries reported. On the contrary, there was evidence that increased union membership correlated with an increase in fatalities and recordable injuries on a national level. On a state by state basis there were significantly more states showing a positive correlation compared to very few showing evidence in support of past studies conducted claiming that unions have significant impact in improving safety metrics.

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CHAPTER 1

INTRODUCTION

Background

Labor unions began forming during the late 19th century as the industrial revolution created working conditions that subjected workers to long hours, unsafe working environments, and poor wages. As more labor unions began to form and organize, great strides were made in ensuring that the American worker was able to earn an honest living in a safe environment. By the early 20th century the U.S. Department of Labor was formed by President William H. Taft ensuring that action would be taken to monitor employers and employees alike. Less than a decade following Taft's signature creating the Department of Labor, the Federal Compensation Act was put into place giving rights to those workers that were sick or injured. In 1935 the National Labor Relations Act gave workers the ability to collectively bargain with their employers and refuse work or strike under unsafe conditions (Grossman, n.d.).

Three years later in 1938 the 40 hour work week was established; employers were required to pay overtime after 40 hours in addition to creating child labor laws and establishing a minimum wage. In the following decades, the Department of Labor continued to make great strides in areas such as equal opportunity, discrimination, equal pay, and the creation of the Occupational Safety and Health Administration (Grossman, n.d.).

The U.S. government continues to work on creating better conditions for the American workforce, a job that was originally left to the labor unions. The

Occupational Safety and Health Administration (OSHA), since its establishment in 1971, has worked diligently to respond and proactively address the safety and health issues impacting the workers of the United States. Working closely with OSHA, many other organizations have been established as key players in the safety of the United States.

As the government has developed into the 21st century adapting to the needs of a growing society and workforce, so has the purpose of the labor unions formed over a hundred years ago. It is important to differentiate between private and public sector labor unions. Private sector unions fall under the National Labor Relations Act that was put into place in 1935 while public sector unions are governed on a state and local level giving them the ability to negotiate with local politicians (Modern Labor Organizations, n.d.). The National Labor Relations Act encouraged the use of collective bargaining to work with businesses towards better wages, benefits, and environments. In addition to what the National Labor Relations Act has done in regulating and placing parameters around the union process, individual states have put their own regulations in place monitoring both private and public sector unions. While there may be different governing acts and regulations between public and private sectors, all unions share similar goals and collective bargaining strategies regardless of their target audience. For the purpose of this research, union groups will be analyzed as a collective group including all public and private sectors.

Both union and non-union environments have been identified to have positive and negative impacts on the labor force. Specifically noted are the

impacts of the union on productivity, wage, work environment, and specific to this research, safety. It is widely understood and accepted that unions were created and continue to exist for the purpose, among other things, of protecting the American workforce. It is also assumed by many that unions continue to play this vital role. However, with the establishment of the Department of Labor, OSHA, and many other regulatory or standards setting organizations, a question arises about specific aspects of unionization. Can unions still be given credit for improving working conditions, or has there been a shift in workplace culture to include safety without the influence of a union?

One note should be made as this research is conducted: this topic is not intended to argue for or against a labor union, but will focus on gathering of trended and correlated data over the last 10 years to determine if there is a significant relationship between the union and safety metrics. Furthermore, this research will not only focus on the overall national impact to the workforce protected under unions, but will also delve into a state-by-state breakdown of relationships. If unions do significantly impact the health and safety programs implemented in workplaces, there should be significant data and trends indicating that union membership improves safety metrics.

Statement of the Problem

It has been argued by many that for a safety program to be successful there must be management participation, employee engagement, and effective training. Furthermore, in many cases that a union can significantly aid in creating an atmosphere that breeds these pieces of the health and safety puzzle;

specifically in regards to the efficacy of ensuring a safe work place (Morantz, 2015). The United States government has developed the Occupational safety and Health Administration and the National Institute for Occupational Safety and Health (NIOSH) to ensure the safety of the United States workforce. Private organizations have been created for the purpose of writing standards, assisting in developing programs, training, and improving workforce safety programs. Therein the question lies regarding the necessity of a labor union to protect our workers and the relationship held between a labor union and safety data.

It has been identified that there are multiple scenarios in which a union can benefit the safety programs put in place through OSHA and other organizations. There is evidence indicating that unions encourage incident reporting, have a better understanding of their rights, and show higher rates of participation. This evidence would indicate that a labor union is a very positive influence on creating a safe workplace across the United States. However, there are also cases in which non-labor union work locations have excellent safety programs, training, and methods for participation and engagement. There is little research that has been conducted to determine if a union is integral in the safety process. There have been many case studies looking at specific unions, but overall in the United States there is little evidence to determine if union participation has any correlation with reported safety metrics.

Purpose of the Study

During a decline in union participation, little research has been conducted to determine if a union is essential for the safety process, and does, in fact,

create a safer workplace that is reflected in national data. OSHA, other regulatory organizations, and standard setting groups have taken responsibility for enforcement and requirements of employers, but there is a lack of understanding and research surrounding the significance a union plays from the aspect of safety.

The purpose of this study is to determine if there is a role for a union in the safety process in our modern day of safety processes. This research will focus on safety data from the Bureau of Labor Statistics (BLS) and whether it is found that union participation reflects lower fatality and injury rates.

Potential Significance

The potential significance of the study can provide impactful data for the role of a union in the safety process and ensuring the safety of our workforce on both a national and state level. Evidence could be used to further understand the role of unions in the modern workforce and their relationship between membership and fatality and injury rates.

Assumptions

It will be assumed that all labor unions have a similar set of goals pertaining to the safety of their workforce. Additionally, an assumption will be made that all reporting of data to the BLS is true and accurate.

Limitations

There has been no specific data collected for union recordable injuries reported or fatalities on a national data. Assumptions of correlation and relationships will be made.

Safety culture is a very delicate and nuanced topic. Without doing a case-by-case study it will be difficult to make any detailed conclusions for specific locations. Additionally, it will be difficult to determine if specific unions breed improved safety metrics or if it is a combination of the employer and union relationship.

Finally, metrics reported for injuries and fatalities are required and regulated by the government. However, it is widely accepted that while these metrics show what incidents have occurred in the workplace, they do not show how well a program is preventing incidents. An incident prevented cannot necessarily be recorded. With that in mind, lagging metrics cannot be the single indication of how well a safety program is functioning.

Organization of the Study

An introduction giving background into the history of labor unions will be presented to allow for context of the study. In addition to the background portion of this section, there will be justification for the research, potential implications of the results, and any assumptions or limitations of the study.

The literature review will provide a glimpse into past research conducted relating to union safety, employee engagement, and safety culture. This will provide additional academic context for the research question regarding the safety justification for the union. This section will show the need for national data collection.

A description of the methodology will be outlined explaining collection of selection of data sources, collection of the data, and clear explanation of the research questions and hypothesis.

Reporting of the research and analysis will provide the results of statistical analysis.

The discussion section will describe final implications of the study, and any relevant significance moving forward for safety professionals, employers, and employees.

CHAPTER 2

LITERATURE REVIEW

A trend can be identified when sifting through past research conducted concerning the topic of unions in comparison to non-union environments. Many studies have been conducted analyzing the voice of employees in non-union versus union environments. Additionally, the majority of studies do not take into consideration a large pool of data or the impact on the United States workforce as a whole. Studies have been conducted looking at specific industries or a single organization.

A large concern for employees and researchers is that without the strength of union representation, employees will not have the ability to report concerns, bargain wages, and report grievances. Outside of wage disputes, many of these concerns could be safety or health related. When discussing safety culture and grasping a full understanding of the perception of safety within a company, it is important for employees to have the ability to voice their opinions and express concerns. This research will provide information from a variety of sources outlining the role that a union can play in the voice of employees, whether found to be positive or negative. Many researchers argue that the union provides a sophisticated method for which they can voice their concerns which, in turn, leads to safer environments and increased safety culture.

According to Benson (2000) the field of human resource management has played an integral role in protecting the voice of workers and providing them alternate mechanisms to express concerns without the presence of a formal

union. According to Dundon (2007, p.31), “non-union voice approaches are likely to become further embedded and underpinned by a managerial discourse that seeks legitimization and authority.” This seems troubling in that it implies that without the union there is likely influence or an agenda from management. However, it can be argued that national labor unions have an agenda of their own.

Similarly, Cooke (1994) analyzed employee participation in various groups within union and non-union environments. The goal of this research was to determine if unions were enabling employees to participate more within their company. Often, in both union and non-union environments there are formal safety committees or groups that discuss concerns and improvements. It was found through this study that both in union and non-union environments there was participation, but the value achieved from participation varied. Specifically, results that were particularly meaningful were that participation within a union environment was most beneficial to a company and employee alike when the union did not have a group-based pay structure.

In a study conducted in the construction industry in regards to safety in union versus non-union environments it was found that the argument could be made that unions were safer than non-union environments (Dedobbeleer, Champagne, & German, 1990). However, in their research it was found that the union populations were significantly older. This information could play a large role in safety metrics and it would be difficult to draw conclusions on the role of the union within occupational health and safety under the parameters used in

their study. The limitations in this study raise questions about the legitimacy of the union being the causal factor or if it actually had to do with the age of the employees in the workforce.

Morantz (2015) indicated that unions can have positive influence on safety and health through five specific avenues of communication. Also addressed were many topics similarly discussed, such as the possibility that the presence of a union can have a debilitating effect on productivity, turn-over, job-skills, absenteeism, and safety related metrics. This claim is supported by research dating back decades describing the job bidding system associated with many union environments. In these described environments, union employees often bid to move to new jobs that they are both unqualified and unfit to perform. This ability to bid based on seniority versus qualifications is linked with increased incident rates (Appleton and Baker, 1984). Morantz (2015) detailed a union's potential to effectively communicate job safety, educate, influence behavior, and enforce regulatory requirements. However, in her research there is little evidence that these potentials make up the majority of current union cultures (Morantz, 2015). A few notable highlights showing the difference between union and non-union environments are the knowledge of regulatory requirements, worker rights, and overall health and safety law. Her final remarks predicted an outcome that while there is great potential for the union to have a positive impact and implement the tools described, there is almost no evidence in the data that indicates the union improves health and safety.

Sinclair, et. al. (2010) found that safety culture in a union can be directly related to the perceived safety culture of the union and, more specifically, what the perception of safety is from the direct supervisor of a union. Their research focused on understanding the drivers behind safety culture in a union environment and if perception impacted their participation, reporting, and overall feelings towards safety in the workplace. The overwhelming conclusion favored safety in an environment that had worker perception that safety was important from the supervisory level. One thing of note was that the perception of the importance of safety from the upper management level was not considered integral (Sinclair, et. al, 2010). A common theme in all safety program recommendations is that there must be buy in from management. This research echoes the need for the employee to see an indication of value in their own personal safety.

Weil (1991) described the role of unions in implementing health and safety regulations and was examined to determine if unions are essential in ensuring that programs are implemented. The research specifically highlighted that union environments face higher scrutiny and are therefore more compliant and safer. While this research is dated, it provides an interesting perspective. The idea that unions are under more scrutiny and have a higher rate of inspections is one that has not been otherwise identified. The argument is made that OSHA does not have the ability to cover all workplaces within the United States, and that union locations are a subset that can be easily identified. Additionally, Weil noted that for any OSHA regulation to be properly implemented there must be employee

involvement. The union presents a much greater ability for employees to be actively involved in their safety program. A final point of interest in Weil's research is the finding that both unions and OSHA are "better organized to deal with safety and health in larger rather than small establishments (p. 34)." In other words, OSHA and unions design their systems for a large workforce, but when faced with a smaller business may not be applicable.

Morantz (2013) focused on a specific industry and labor force when determining if unions increase the safety of workers. The mining industry and the United Mining Workers of America were the focus of her analysis and trending of safety data. The analysis argued that safety increased by a notable percent based on a reduction in fatalities and traumatic injuries. Additionally, the research noted that there is an increase in less traumatic injuries which led her to believe that unions not only improve safety, but also improve reporting incidents. A trend in research can be found here and in previously noted articles that unions, typically, ensure better trained and a more engaged workforce. Safety culture can be drastically improved through the unionization of the labor force.

Gillen et. al. (2002) focused on the construction industry and perceived safety culture when addressing the differences in union and non-union labor forces. Their research indicated a positive relationship between safety culture analysis and the perception of safety, especially in the unionized locations. It is important to note that there was a strong relationship between perceived safety culture and the role of management in addressing safety concerns in both union and non-union environments. This information couples with previously cited

research in that management must have a presence in establishing safety programs and culture regardless of union status. This concept is widely accepted in literature concerning corporate culture and establishing safety programs. Management participation and buy in is critical.

A leading argument in favor of a labor union is that there is a stronger opportunity for employee engagement, participation, and overall understanding of rights in the workplace. Butler (2005) explored avenues within the non-union labor force to imitate these characteristics of the union environment. The general findings of this research echo that it is incredibly difficult, if not impossible, to replicate the voice created by the labor union.

Conclusions

There is a vast amount of research covering various aspects of unions and whether their role positively or negatively impacts workplace safety. At the conclusion of this research it is intended that it be determined if the presence of a union has a direct relationship with fatality and injury trends across the United States. Further, it will be discussed if the positive implications discussed in the above review of current literature can be supported through trended data.

In summary, current literature argues in favor of unions and their role in creating a safe work environment. Aspects of the recommended injury and illness prevention program are present throughout the research including training, employee engagement, understanding of rights, and management participation. However research has not analyzed current safety and union

information to determine if modern day trends indicate that a union is required for reduction in fatalities and reported injuries.

CHAPTER 3

METHODOLOGY

Research Question

One research question guided this research. Is there contemporary evidence that indicates unions are necessary for improved safety based on Bureau of Labor Statistics data?

Data Collection

Using the Bureau of Labor Statistics annually reported metrics, a critical analysis was conducted to determine a relationship between union membership and recordable injuries, fatalities, and overall employment. The data were presented for the United States and then further broken down by state to determine if there were trends within each individual state. The data collected began in 2006 and concluded in 2015. The categories were chosen for consistency in reporting across states and the year range was selected due to it being the largest range of available data for each state. States with incomplete or missing data are noted in Chapter 4 - Research.

Procedure

Statistical analysis of each state and the United States as a whole were conducted to assess the relationship between total union membership and the categories of OSHA reported injuries and fatalities. Trends focused on two separate relationships. First, the percent change of each category (union membership, total employment, fatalities, and recorded injuries) was calculated

per state. Averages and standard deviation were presented in addition to calculating correlation between each category.

Second, each state was broken down to determine relationship within the state. Correlation coefficients were calculated between union membership and fatalities, union membership and recordable injuries, and union membership and total employment. Table 1 categorizes the strength rating for correlation ranking. Correlation Coefficients were presented to determine if positive or negative relationships in one category translated further into other categories.

Table 1. Correlation Coefficient Strength Determination

Correlation Coefficient	Strength Rating
-1	Exact negative correlation
-0.7	Strong Negative Relationship
-0.5	Moderate Negative Relationship
-0.3	Weak Negative Relationship
0	No relationship
0.3	Weak Positive Relationship
0.5	Moderate Positive Relationship
0.7	Strong Positive Relationship
1	Exact Positive Correlation

It has been widely accepted that injury and illness prevention programs will drastically improve safety within the workplace and the ability to identify hazards. OSHA has outlined what it sees as ideal for developing a health and safety program. In addition to the suggested injury and illness prevention program components delineated by OSHA, there have been other organizations

and standards written that provide tools to create a health and safety program. The vast majority of unions have for many years focused significant efforts on protecting the safety of their workers. From this assessment, conclusions will be drawn to determine if a relationship between union participation impacts the health and safety of the nation's workforce that is reflected in fatality and recorded injury metrics. Conclusions will be drawn for the United States as a whole and for each state.

CHAPTER 4

RESEARCH

Quantitative Analysis

Overall United States data was collected for the total workforce, union membership, total fatalities, and number of reported fatalities. Data was collected from 2006 to 2015. Table 2 shows totals collected for each year:

Table 2. United States Total 2006-2015

Year	Total Employment	Union	Fatalities	Recordable
2006	128237	15359	5,840	4,085.40
2007	129767	15670	5,657	4,002.70
2008	129377	16098	5,214	4,634.10
2009	124490	15327	4,551	4,140.70
2010	124073	14715	4,690	3,883.60
2011	125187	14764	4693	3,807.40
2012	127577	14366	4,628	3,769.10
2013	129110	14528	4,585	3,753.30
2014	131431	14576	4,821	3,675.80
2015	133743	14795	4,836	3,658.50

Source: Bureau of Labor Statistics, 2017

The correlation coefficient is used to determine relationship between two variables. Table 1 describes the method in determining strength of correlation. Positive correlation was shown for the relationship between union membership and fatalities, and union membership and reported recordable injuries, while no correlation was indicated between total employment and union membership. Correlation coefficients were .65, .89, and .02, respectively. Figure 1 shows trend lines for union membership, fatalities, and recordable injuries within the United States 2006-2015. Note that fatalities and injuries are reported on the secondary Y-Axis.

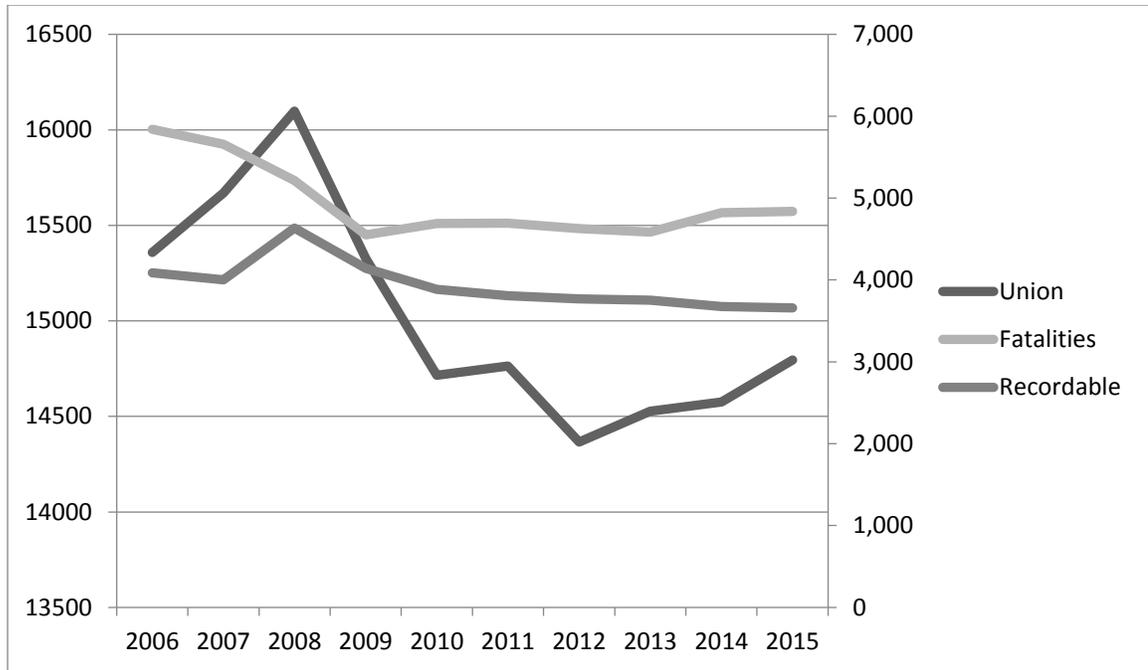


Figure 1. United States Union, Fatalities, & Recordable Rates 2006-2015
 Source: Bureau of Labor Statistics, 2017

Data was then collected for each state, including Washington D.C., and was reported for total workforce population, union population, fatalities, and recordable injuries from 2006 to 2015. Percent change from 2006 to 2015 were calculated comparing the change in total population employed, total union employees, number of fatalities, and total reported recordable injuries. All data collected were reported for all industries and work type. The total percent change information can be found below in Table 3.

Upon first look, the data indicates some important trends in our nation surrounding recordable, fatalities, employment rates, and percent of the employed population that are members of unions. To begin, only one state in the last ten years has had an increase in number of reported recordable injuries. The U.S. is trending in the right direction in regard to workplace injuries.

Table 3. Total Percentage Change 2006-2015

	Employed	Union	Fatalities	Recordable
Alabama	-3%	12%	-30%	-30%
Alaska	9%	-3%	-69%	-30%
Arizona	3%	-30%	-38%	-35%
Arkansas	2%	0%	-5%	-23%
California	8%	9%	-28%	-22%
Colorado	7%	18%	-45%	*
Connecticut	0%	9%	16%	-35%
Delaware	4%	-12%	-47%	-17%
District of Columbia	36%	40%	14%	1%
Florida	4%	38%	-24%	*
Georgia	1%	-8%	-10%	-10%
Hawaii	4%	-14%	-40%	-26%
Idaho	10%	24%	-5%	*
Illinois	-2%	-9%	-17%	-29%
Indiana	1%	-15%	-22%	-32%
Iowa	1%	-14%	-15%	-32%
Kansas	2%	11%	-29%	-28%
Kentucky	-3%	9%	-33%	-30%
Louisiana	10%	0%	-5%	-11%
Maine	-6%	-7%	-25%	-29%
Maryland	5%	-16%	-35%	*
Massachusetts	9%	-3%	5%	-9%
Michigan	-5%	-26%	-15%	-37%
Minnesota	3%	-8%	-5%	-30%
Mississippi	4%	0%	-20%	*
Missouri	0%	-19%	-30%	-25%
Montana	8%	8%	-20%	-24%
Nebraska	6%	3%	-12%	-16%
Nevada	10%	6%	-10%	-28%
New Hampshire	3%	-2%	38%	*
New Jersey	1%	-23%	10%	-26%
New Mexico	-2%	-21%	-41%	-34%
New York	2%	3%	-31%	-18%
North Carolina	7%	-2%	-11%	-29%
North Dakota	17%	-5%	52%	*

Table 3. (Continued)

	Employed	Union	Fatalities	Recordable
Ohio	-5%	-17%	5%	*
Oklahoma	8%	-5%	0%	*
Oregon	4%	11%	-49%	-26%
Pennsylvania	3%	0%	-28%	*
Rhode Island	-3%	-11%	-40%	*
South Carolina	10%	-31%	23%	-24%
South Dakota	9%	5%	-43%	*
Tennessee	6%	-5%	-27%	-32%
Texas	15%	6%	8%	-1%
Utah	14%	-18%	-30%	-22%
Vermont	-7%	6%	-36%	-18%
Virginia	8%	45%	-36%	-30%
Washington	7%	-9%	-20%	-24%
West Virginia	-6%	-18%	-56%	-23%
Wisconsin	4%	-42%	-17%	-33%
Wyoming	11%	0%	-6%	-4%
Average	4.56%	-2.56%	-18.31%	-23.82%

Source: Bureau of Labor Statistics, 2017

*Data Unavailable

Overall, there was an average decrease in percent of recordable injuries of 23.82% (s=9.43%). Closely related to the recordable injury data was that of fatalities reported by state. 82% (42) of states reported a decrease in the number of workplace fatalities, an average decrease of 18.31% (s=23.05%). In addition to the decrease in injury and fatality totals, there was an average of 4.56% (s=7.05) increase in the number of people employed in each state. 40 states reported an increase in the population employed while 11 reported a decrease.

Finally, 28 states reported a decrease in the number of employees that were members of a union with 4 states reporting no change. The average change from 2006 to 2015 was a 2.56% (s=16.94%) decrease in union members. Of the 40 states that showed an increase of population in employment, 21

showed a decrease in union participation and 4 showed no change in union membership. Of the 11 states that reduced their employment population, 4 increased union membership and the remainder showed a decrease.

The correlation coefficient was calculated to establish any possible relationship between employment, unions, fatalities, and recordable injuries from 2006 to 2015 in the United States. Table 4 shows the correlation coefficient calculated for the total percent change from 2006 to 2015 considering employment, union membership, fatalities, and reported recordable injuries.

Table 4. Correlation Coefficient – Total Percentage Change 2006-2015

	Employment	Union	Fatalities	Recordable
Employment	1			
Union	0.375449792	1		
Fatalities	0.361653596	0.00753383	1	
Recordable	0.593983649	0.34841324	0.340202196	1

Source: Bureau of Labor Statistics, 2017

In this case there is a weak positive relationship between the percent change of total employment and percent change of total union membership. Similarly there is a weak relationship between percent change in union membership from 2006 to 2015 and the percent change in recordable injuries. There is no indication of relationship in the percent change from 2006 to 2015 of union membership and fatalities.

Following the analysis of total percent change, each state was broken down to determine if there was a relationship between the trend over 10 years between employment, union membership, fatalities, and recordable injuries. Correlation coefficients were calculated and reported for each in Table 5. All industries and populations were included. Note that there was not sufficient

recordable injury data for Colorado, Florida, Idaho, Mississippi, New Hampshire, North Dakota, Rhode Island, and Tennessee.

Table 5. Correlation Coefficient by State 2006-2015

State	Union and Recordable	Union and Fatality	Union and Employment
Alabama	-0.38	-0.49	0.15
Alaska	-0.29	0.32	0.31
Arizona	0.87	0.64	0.48
Arkansas	0.46	0.48	0.59
California	-0.03	-0.08	0.35
Colorado	*	0.02	0.85
Connecticut	0.33	0.29	0.50
Delaware	0.77	-0.02	0.23
District of Columbia	-0.26	-0.07	0.47
Florida	*	0.04	0.58
Georgia	-0.48	-0.01	0.24
Hawaii	0.84	0.28	0.57
Idaho	*	0.51	0.24
Illinois	0.54	0.35	0.17
Indiana	0.82	0.75	0.54
Iowa	0.30	0.27	-0.10
Kansas	-0.46	-0.38	0.20
Kentucky	-0.45	-0.05	0.63
Louisiana	-0.50	0.12	0.17
Maine	0.76	0.36	0.69
Maryland	0.61	0.43	-0.43
Massachusetts	0.45	-0.05	-0.27
Michigan	0.93	-0.15	0.66
Minnesota	0.74	0.38	-0.33
Mississippi	*	0.68	0.50
Missouri	0.73	0.79	0.28
Montana	-0.40	-0.02	0.50
Nebraska	0.26	0.34	-0.56
Nevada	0.61	0.27	0.79
New Hampshire	*	-0.67	-0.34

Table 5 (Continued)

State	Union and Recordable	Union and Fatality	Union and Employment
New Jersey	0.94	0.08	0.07
New Mexico	0.84	0.00	0.64
New York	0.33	-0.08	0.81
North Carolina	0.50	0.30	-0.04
North Dakota	*	0.06	-0.23
Ohio	-0.70	-0.01	0.76
Oklahoma	0.13	0.41	0.52
Oregon	-0.39	-0.25	0.22
Pennsylvania	0.57	0.52	-0.18
Rhode Island	*	-0.10	-0.29
South Carolina	0.52	-0.02	-0.58
South Dakota	*	-0.10	-0.06
Tennessee	0.36	0.06	0.54
Texas	-0.26	0.18	0.44
Utah	0.17	0.16	-0.83
Vermont	-0.54	0.18	0.22
Virginia	-0.91	-0.77	0.76
Washington	0.63	0.32	-0.04
West Virginia	0.64	0.60	0.49
Wisconsin	0.73	-0.22	-0.44
Wyoming	0.33	0.40	-0.57

Source: Bureau of Labor Statistics, 2017

Overall, there were 13 states that indicated a negative correlation between unions and recordable injuries reported, 1 with no correlation, 29 states had a positive correlation, and 8 states had insufficient data. In comparing union membership and fatalities it was found that 7 states indicated a negative relationship, 18 showed an insignificant correlation, and 26 states showed a positive correlation.

CHAPTER 5
DISCUSSION & IMPLICATIONS

Discussion

In addressing the correlation coefficient for each state it is important to note that a negative correlation indicates that as one rate increases the corresponding rate will decrease. When discussing a positive correlation, as one rate increases corresponding rates will also increase. Keeping that in mind, the data presented many unique indicators regarding unions compared to recordable injuries and fatalities reported for each state between 2006 and 2015.

In the United States' overall trended data, there are obvious correlations between union membership and fatalities, and union membership and injuries reported. Both correlation coefficients reported moderate to strong correlations based on the strength determination depicted in Table 1. This correlation shows that as union membership decreases during the 10 year period overall fatalities and recorded injuries also decrease. This correlation does not support the claims that are made throughout prior studies indicating that unions significantly impact health and safety programs and improve metrics when examining the United States as a whole. Further analysis of the reported totals indicated more evidence for this claim, but more specific to certain states.

When considering the percent change reported for each state from 2006 to 2015 it is important to take the average and standard deviation into consideration. There is a wide spread of percentages of change reported among states. However, what is interesting about this breakdown is that 82% of states

reported a decrease in workplace fatalities and 55% reported decrease in union membership. At first glance, this would indicate a possible discrepancy in the claim that unions directly influence safety and overall have better safety programs and metrics.

Further analysis into the state percent change average correlation between union membership and fatalities shows there was not a similar correlation compared to the United States as a whole. There was little correlation indicated at all, thus demonstrating that there are significant discrepancies in the relationships that unions have between membership and fatalities and recorded injuries among states. The correlation between average percent change in union membership and fatalities maintained a positive correlation, but fell into the weak correlation categorization having a moderate relationship bordering on being considered strong. Considering claims that unions drastically improve safety, positive correlations and no correlation found indicate flaws in that claim.

Moving further into the percent changes reported, over half of the states reported a decrease in union membership totals from 2006 to 2015, while 40 states showed an increase in population employed. The correlation between percent change in employment and union membership was still reported as a weak positive relationship because states showing increased union membership showed significantly larger membership increases compared to the decrease shown in other states. The relationship between union membership and total employment will be further assessed using a state-by-state analysis.

In assessing correlation on a state level, there were significant relationships identified. These relationships are illustrated in more detail in the correlation relationships delineated in Table 5. Histograms were used to show each correlation and the range of values found. Interestingly each histogram shows a greater positive relationship.

Looking first at union membership and recordable rates, there were 13 states that showed a negative relationship. Of these 13 states, 10 also showed a negative relationship between union membership and fatality rates indicating that in these 10 states there is the possibility that unions have a positive impact on safety. Figure 2 shows a histogram of the correlation coefficients comparing state union membership and total state recordable injuries from 2006 to 2015. 29 states show positive correlation, 1 showed little to no correlation, and 13 states showed significant negative correlation. Eight states reported no recordable injury data from 2006 to 2015. There are overwhelmingly more states that indicate as unions decline so do recordable injuries reported, further giving evidence against the claim that unions considerably improve safety metrics.

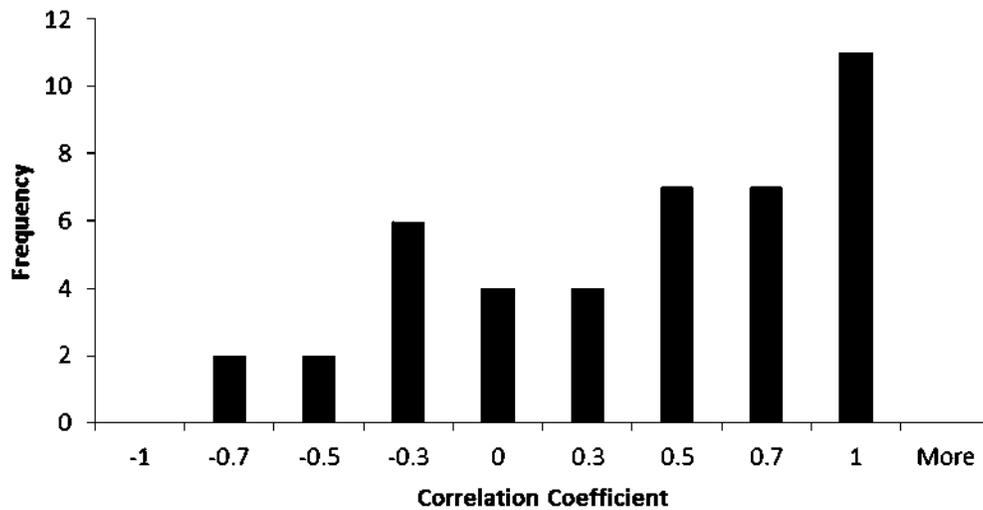


Figure 2. Coefficient Correlation Strength: State Union Membership & Total State Recordable Injuries 2006-2015
 Source: Bureau of Labor Statistics, 2017

Similarly, all states that reported negative relationships between union membership and fatalities also showed a negative relationship between union membership and recordable injuries. Figure 3 illustrates the distribution of correlation coefficients for all 50 states and the District of Columbia when trending state union membership and total state fatalities from 2005 to 2015.

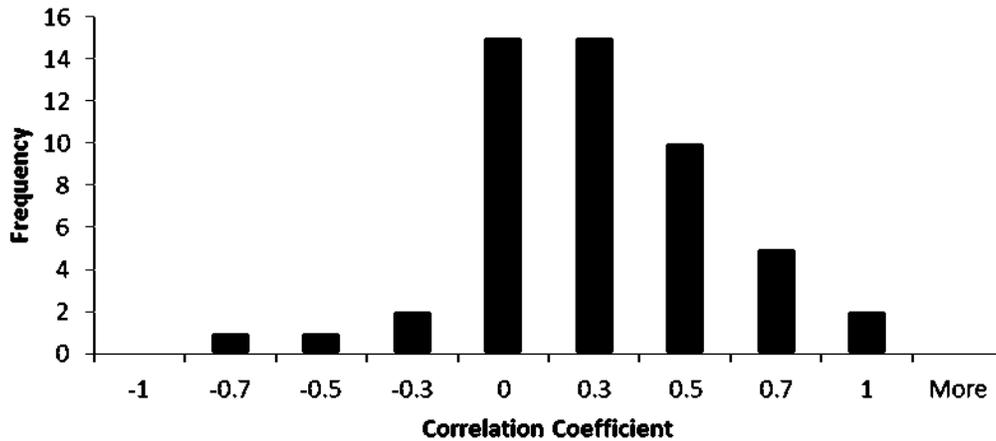


Figure 3. Coefficient Correlation Strength: State Union Membership & Total State Fatalities 2006-2015
 Source: Bureau of Labor Statistics, 2017

Figure 4 illustrates the distribution of correlation coefficients between union membership and total employment population for each state and the District of Columbia from 2006-2015. When comparing the correlation coefficient between union membership and employment totals, of the 12 states with negative correlations, 9 of those states reported a positive relationship between union membership and total recordable injuries reported (the remaining 3 states had no data). This would indicate that as employment rises, union membership rises, and so do injuries in those 9 states. Of the 34 states with a positive relationship between employment and union memberships, 20 showed a positive relationship with fatalities.

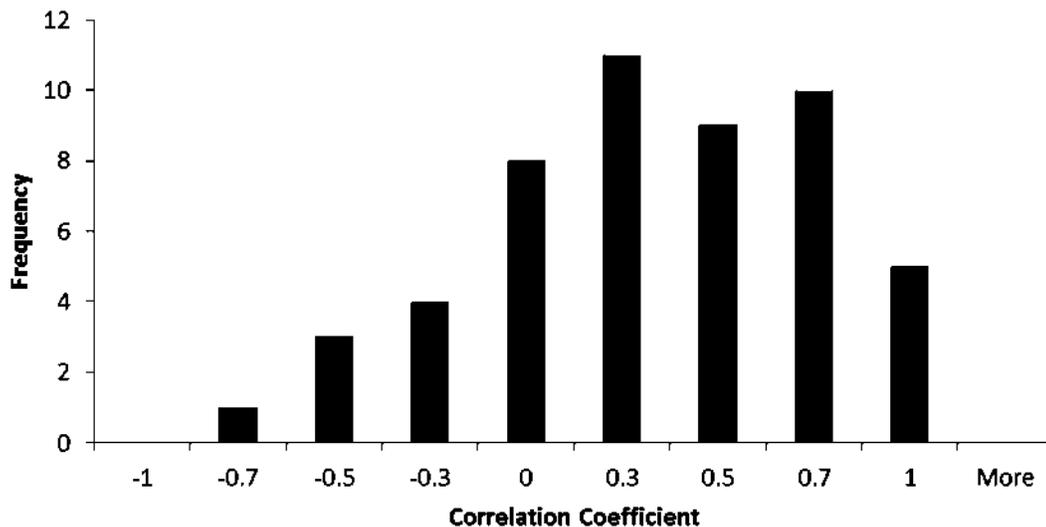


Figure 4. Coefficient Correlation Strength: State Union Membership & Total State Employment 2006-2015
 Source: Bureau of Labor Statistics, 2017

Conclusions

Overwhelmingly, past research argues that unions can play an integral role in the safety process. Their influence throughout history has taken the United States in great strides toward improved working conditions, better wages, and improved workplace culture. However, as the government has shifted its focus toward safety, standards and best practices are developed, and safety culture throughout the United States has improved, there is no longer significant evidence for the last ten years that would indicate that unions in and of themselves impact safety performance. Unions may have the possibility to improve safety in a wide variety of ways, but the BLS data does not support a direct influence of unions on workplace safety performance. Only 4 states showed above a moderate positive correlation in both the union membership and fatalities category, and the union membership and recordable injuries category.

In looking at the United States as a whole it was indicated that there is a strong positive correlation between union membership and recordable injuries reported and a moderate correlation between unions and fatalities. On a state level, there were outliers that showed little to no correlation, and a small group that showed negative correlation, but the majority favored a positive relationship between union membership and safety data.

Furthering this research could be a deeper look into specific industries, union, or geographic regions. There could be even stronger implications on a more detailed level if research was conducted at a more granular level.

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