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A Comparative Analysis of the Relationship Between Employee Perceptions of an Organizational Leader's Commitment to Safety and Actual Injury Rates in a University Setting

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A COMPARATIVE ANALYSIS OF THE RELATIONSHIP BETWEEN EMPLOYEE PERCEPTIONS OF AN ORGANIZATIONAL LEADER'S COMMITMENT TO SAFETY AND ACTUAL INJURY RATES IN A UNIVERSITY SETTING

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DEDICATION

This work is dedicated to my wife Teresa, who has supported my seemingly endless quest for continuing education throughout our 29 years of marriage, and my daughter Katie, who provides insight and inspiration for me each and every day.

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I would like to acknowledge the sacrifice and contributions my parents made in supporting my initial foray into college and not giving up on me when I faltered, but instead encouraging me to continue.

I would like to thank a litany of teachers and mentors who have touched and guided me throughout my life, believing that anything is possible if you work hard and keep learning. These people instilled in me the understanding that, as humans, we will fail at times, but we must also be able to laugh at and learn from our mistakes and emerge stronger and more determined to ultimately succeed, and, in the end, make a difference.

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PREFACE

Tuesday, December 23, 1980, presented as a crisp, clear day with ample sunshine. Two young Emergency Medical Technicians sat in a temporary medical facility on a major construction site in southern Kentucky. At approximately 9:20 AM a frantic voice echoed across the portable radio stating, “Man down at the power plant.” As the technicians hurriedly grabbed for trauma kits and hardhats, a follow-up question came through: How bad? The one-word response caused a collective pause: fatal.

A 63-year-old worker, along with his great nephew and another younger worker, had traveled to the site to install specially fabricated colored metal panels around the upper portion of the power plant building. The leader stood on a swinging scaffold 40 feet above the ground; the others would hand the roughly four foot square panels over the edge of the roof and help place them to be fastened.

Based on reports from witnesses, a gust of wind caused the elder worker to lose his balance and fall backwards from the scaffold to the ground. Despite a timely response and rapid transport, the individual expired at approximately 10:25 AM. The trio of workers had planned to leave the site at 10:30 AM to return home to Mississippi for the Christmas holiday.

At the time of the accident, the worker wore a fall prevention belt but did not have the end secured to the building or scaffold. While the medical personnel attended to the worker, the site safety director looked on and made a statement that ultimately changed the life and world view of at least one of those present: “I saw him not tied off yesterday; I guess I should have said something.”

At the time of this incident, the site safety director held the sole responsibility for enforcing safety rules among contractors. He had placed himself in the key leadership

role for safety. Had he chosen to address the issue the previous day, the incident might well have not happened. Had a culture of compliance existed, the expectation may well have led to a safer mindset among the affected worker and others across the project.

Out of this example of poor safety leadership emerged at least one advocate who remains true to a self-commitment made that morning, to never fail to confront such issues when observed. It is my hope that this research and dissertation helps to further those efforts.

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The purpose of this study was to explore the correlation between employee perceptions of their supervisor's commitment to safety (safety climate) and the actual rate of occupational injuries among the same employees. The study also aimed to examine the relationship between the employee perceptions of their supervisor's leadership practices and the supervisor's safety climate rating. In addition, this study examined the potential influence of employee demographic factors on their responses to survey questions.

This research study sought to answer three primary questions: (1) Does a significant correlation exist between employee perceptions of his supervisor's commitment to the health and safety of workers and actual injury/illness rates within an organization? (2) Does a significant correlation exist between specific leadership practices of supervisors and their safety climate ratings as perceived by their employees? (3) Is there a significant difference in employee views on safety climate and leadership practices of their supervisor based on employee demographic variables including gender, education level, skilled versus non-skilled positions, time in position, or shift assignment?

Previous studies of similar construct focused on industrial settings such as manufacturing, construction, and oil and gas exploration. This study focused on workers engaged in maintenance type functions within the non-industrial setting of a university. The construct and findings of this study has applicability in a variety of settings including healthcare, general business, etc. Developing an understanding of the role that

supervisors play in actively driving safety programs that affect their subordinates provides valuable insight into elements of supervisor selection and training.

A survey instrument was developed utilizing a combination of previously validated “safety climate” questions, along with selected general leadership questions. A 7- point Likert scale was employed for the safety climate and leadership practices questions. Demographic questions were included to provide critical data for application for research question three. In addition, three questions were included to solicit data regarding each respondent’s injury experience for the previous 12 month period.

The findings of this study, while in several instances not yielding statistically significant data, support several key assertions that appear to have relevancy in the study and practice of the critical importance of leadership in providing a safe workplace. A strong correlation emerged between participant responses to safety climate and general leadership actions questions, demonstrating the interrelationship of leadership to safety. In addition, the findings indicated that demographic factors including gender, education level, length of service, and assigned work shift had negligible effect on employee views of their leaders.

The results of this study provide useful information regarding the influence of supervisor’s actions upon the safety performance of their employees. In addition, the study helps validate the relationship of general leadership practices of supervisors to the overall safety climate of their work groups. While additional research into the concept and practical application of safety climate as a predictor of safety performance should be undertaken, the findings of this study add to collective knowledge of the subject.

CHAPTER I : INTRODUCTION

In 2011, 4600 active workers in the United States died as a result of occupational injuries and illnesses. Another 1.18 million received injuries that resulted in their absence from work at least one day, with the average number of days lost per individual being eight (U.S. Department of Labor, 2012). These statistics do not represent an anomaly; conversely, the numbers represent an average year in the world of work in the U.S.

In strictly business terms, the National Safety Council estimated that on average, an occupational fatality occurring in the U.S. results in an economic loss of $1.39 million. Non-fatal serious occupational injuries resulted in an average cost of $54,000. By applying these estimates, one can view the potential financial impact of occupational fatalities alone in 2011 approached $6.394 billion, while serious non-fatal injuries accounted for $63.72 billion (National Safety Council, 2012). The estimated impact of these events in monetary terms, while substantial by most reasonable standards, remains little more than a fleeting thought to most business and public service leaders, until of course an incident strikes one of their employees or affects a friend or family member.

Background

Many accidents result either directly or indirectly from the carelessness of employees. An injury can directly occur when an employee purposely bypasses a machine guard and is injured by a moving component. Employees also incur injuries from indirect actions such as one employee removing and failing to replace a guard, resulting in a second employee contacting a hazard.

Developing concrete methods for controlling the human element in relation to occupational injuries remains somewhat an enigma. No clear consensus exists regarding where the lines of demarcation for ownership of safety should lie between the employer

and the worker. Most leaders of U.S. organized labor and many government officials have long taken the position that the employers assume the total burden for the safety of workers, and individual workers should assume no fault or responsibility for their actions relative to their own safety or the safety of their coworkers (Hammer, 1981).

The regulatory view relative to responsibility for safety in U.S. organizations, under the purview of the federal or state Occupational Safety and Health programs, resides in the Code of Federal Register 1910, Occupational Safety and Health Act: SEC. 5. Duties:

(a) Each employer --

(1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees;

(2) shall comply with occupational safety and health standards promulgated under this Act.

29 USC 654

(b) Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct. (U.S. Department of Labor, 1970)

Although management under the law has the ultimate responsibility for providing a safe and healthy workplace, the employee also has a duty to "comply" with all applicable safety rules and standards (U.S. Department of Labor, 1970). This divergent perspective regarding accountability for safety, particularly in unionized workplaces, many times results in a stalemate of sorts where real issues and hazards exist unchecked

whether mechanical, physical, or human, resulting in lingering hazards and repeated occurrences of injuries.

While an argument exists for both sides of this issue, a more relevant question surfaces amid the fray: How do some heavily unionized companies maintain world-class levels of safety performance? The answer may reside in examples such as Alcoa Corporation, E.I. DuPont, and General Motors Company L.L.C.

Krause (2001) discussed the influence of Paul O'Neill, who became CEO of Alcoa in 1987. He would later become Secretary of the Treasury of the United States. When O'Neill took over the company, he faced many challenges ranging from labor issues to low shareholder returns on investments.

Krause (2001) contended that O'Neill turned around Alcoa by establishing a climate where employees were viewed as the strength of the company. Safety and accident prevention become a top priority across the entire company. Alcoa distinguished itself from other companies by setting a visible goal of "zero" injuries. More important, O'Neill held his executives personally accountable for the accidents that occurred in their respective facilities. Ultimately, the accountability factor applied to the welfare of employees brought the United Steel Workers Union to the party as a true joint partner in the company safety efforts.

O'Neill brought a similar influence to General Motors when he assumed a position on the board of directors in 1983. Near the end of his first meeting, O'Neill asked a key question: "Where's the safety report?" This seemingly simple question proved to be a pivotal moment because the implications appeared obvious to top leaders. They honestly did not know the status of employee safety within their own company.

The actions that the Chairman, CEO, and President of GM took in response turned a tense moment of uncertainty into a path to leadership that included a lasting partnership with the United Auto Workers and a position as the leader in safety performance of all automotive companies both U.S. and foreign (Simon & Frazee, 2005).

The E. I. DuPont Corporation stands as another example of strong organizational leadership of safety. Former President Thomas Jefferson encouraged E.I. DuPont to establish a gunpowder manufacturing operation in the United States. DuPont apprenticed under the Chief of the Royal Powder Works in France before moving to America (Klein, 2009).

DuPont established his powder works in Delaware in 1803, and from the beginning established a unique approach to safety that remains a cornerstone of operations for DuPont Corporation today. DuPont understood from experience the inherent dangers involved in making, storing, and shipping gunpowder. He recognized that the responsibility for safety had to reside with every person in the organization from the newest employee to himself as the owner (Klein, 2009).

To support his interest in displaying the importance of safety, DuPont took a very unique approach in building his family home in the center of the powder works. This move served to enhance his responsiveness and oversight of the operation and also to serve as a sign to his workers that by and large the plant was a safe place to work and also to live. These two examples provide evidence that positive leadership actions focused on the safety of employees can affect significant, lasting change in the largest of organizations, even with the added complexity of a union environment as in the cases of Alcoa and General Motors (Klein, 2009).

In order to better protect their workers from the risks they face every day, organizational leaders must understand the critical importance of establishing a strong institutional focus on safety. The power to foster a positive organizational safety culture and climate resides not with the safety professional; the responsibility lands squarely on the shoulders of the management team from the top down to the first line supervisor. Establishing a positive safety climate most assuredly helps nurture an environment where people value the opportunity to recognize potential hazards and work together to collectively identify means and methods to accomplish the tasks at hand with the least amount of risk possible.

Understanding the Problem

The realization that, on average, 12 workers in the U.S. leave home each day and do not return as a result of occupational fatalities causes reflection on the part of many, particularly those individuals tasked with implementing programs and policies focused on protecting workers. Leaders must begin to understand how so many workers sustain injuries in a country with copious safety and labor laws along with cutting edge safety technologies (U.S. Department of Labor, 2013). Exploring the causal factors involved in the majority of occupational fatalities lends one to conclude that the answer resides not in the laws or machinery, but within the workers, managers, and ultimately senior leaders themselves.

Machine guards and safety hazard warning signs do not prevent a worker from injury if they remove or otherwise bypass a machine guard or ignore posted warnings. A comprehensive safety system must strive for higher level safeguard that constantly separates workers from potential hazards, regardless of human actions or inactions.

Deming (1986) contended that management directly controls 94 % of all quality problems within a typical organization. Deming further insisted that quality defects within a production system can be prevented if management assumes responsibility and then unites, trains, and empowers all employees toward a "constancy of purpose" focused on "continuous improvement." Deming's 14 Obligations of Management readily apply to the area of safety, specifically to the concept of an integrated safety system. Salazar (2006) relate the similarities present between quality and safety within an organization. Management must assume responsibility for preventing injuries within their respective "span of control." Leveraging sound leadership practices, organizational leaders must involve their subordinates utilizing a combination of training and active engagement.

Modern safety management theories, including "Behavior Based Safety," focus on the need to engage the employees and leaders and continually redirect their attention to safety. Many organizations attempt to drive safe behaviors through extensive training, worker team empowerment, or employee safety incentive programs, all of which have found their place in the quest for safer workplaces. Individually these initiatives will have some positive effect on the safety of a workplace, but in most cases the impact of any one alone proves relatively short lived, and ultimately the organization's injury rate improvements reach a plateau or increase. To sustain a positive behavior-based safety program, leaders must engage personnel at all levels of the organization to consistently practice safety (Geller, 2001).

Ansari and Modarress (1997) provided examples of several major American corporations that have demonstrated sustained safety improvement. The companies included: DuPont, Allied Signal, Proctor and Gamble, 3M, General Electric, IBM,

Boeing, and Kaiser Aluminum. They further identified executive leadership as a primary driver of successful safety programs: "...most business executives now share the realization that the foremost factor in becoming a world-class safety performer is strong commitment and meaningful leadership by top management. Creating world-class safety performance requires unquestioned commitment by the executive leadership towards safety" (p. 391).

The key difference between these successful entities and others with less successful safety programs resides in their leadership structure and programs. These organizations have a fundamental understanding that no program will work consistently without positive leadership at all levels. While top executive support for safety is critical to set the tone for the organization, all leaders down to the first-line supervisor be committed to safety and demonstrate this commitment on a continual basis (Ansari & Modarress, 1997).

The premise that the first-line supervisor holds a critical importance as the primary interface with workers serves as the basis for the construct of this research. In essence the perceptions held by the average worker toward a supervisor with regard to the supervisor's safety leadership acumen and actions may serve as the best barometer of the overall environment of safety within the organization as a whole. It stands to reason that the supervisor must demonstrate a clear commitment to worker safety through communication and other actions to positively influence worker perceptions (Krause, 2008).

Worker Safety in Non-Industrial Environments

The preponderance of safety regulations along with safety related research and literature focus on safety in manufacturing and other industrial environments, due primarily to the fact that these settings contain more workers engaged in activities that involve hazardous equipment or processes. This higher level of potential risk and exposure of workers to hazards has historically produced higher injury rates among these workers.

While settings such as educational institutions, healthcare facilities, and other non-industrial settings may not garner the same level of attention regarding injury potential, within the operations of these entities employees engage in regular work activities including facilities maintenance, housekeeping, construction, lawn and grounds maintenance, etc. The workers assigned to these activities, though smaller in overall numbers when compared to those in industrial settings, face similar hazards based upon the tasks assigned. A concern resides in the potential for leaders at universities and other non-industrial entities to underestimate the risks that workers in their maintenance and support functions face, due to an overall perception that general conditions within their operations pose limited risk.

Theoretical Framework

This study will focus on the validity of safety climate measures as a predictor of injury frequency within a given organization. While this work will utilize a similar construct to previous endeavors, it will be seminal with regard to the focus on a non-industrial setting.

Chapter II will provide insights into the impact of organizational culture and climate safety in general terms, with a focus on the more specific sub-set of safety climate, relative to the overall safety performance of an organization. The body of prior related research will provide the foundation, framework, and rationale for the development of the overall research construct.

Research Questions

The proposed research will attempt to determine if a correlation exists between an employee's perceptions of the supervisor's commitment to the safety of workers in their charge and the actual occurrence of injuries within the surveyed group.

The research design consists of a paper survey that will be distributed and collected during regularly scheduled employee staff meetings. A member of the Environmental Health and Safety staff will hand out the survey.

Three primary research questions form the foundation of this research:

1. Does a significant correlation exist between employee perceptions of his supervisor's commitment to the health and safety of workers and actual injury/illness rates within an organization?
2. Does a significant correlation exist between specific leadership practices of supervisors and their safety climate ratings as perceived by their employees?
3. Is there a significant difference in employee views on safety climate and leadership practices of their supervisor based on employee demographic variables including gender, education level, skilled versus non-skilled positions, time in position, or shift assignment?

Rationale and Significance of This Study

While research exists related to both supervisors' leadership actions and safety climate and the respective effects on organizational safety, the focus to date has included primarily manufacturing, construction, heavy industry, and oil and gas exploration. At the time of this writing no studies emerged that explored the concept of safety climate or the application of safety climate measures in a non-industrial setting.

This study will contribute to the existing body of research related to safety climate in general and, more specifically, the applicability of safety climate measures as an indicator of organizational safety performance in the form of occupational injuries and illnesses. The inclusion of an assessment of employee observations of general leadership actions will provide a substantive cross-reference to the potential impact of leadership on safety climate within the groups surveyed.

Nature of Study

The survey tool used in this study includes general demographic questions related to length of employment, assigned shift, gender, education level, job type, and experience level of the participant's supervisor. Nine questions related to safety climate make up the core of the instrument. These questions have emerged from a variety of studies based on a seminal research project, as detailed in Zohar (1980). Eleven questions related to general leadership observations were added to the instrument to bolster the overall validity of the findings.

Finally, three specific questions related to the injury history of the participants were included to solicit data aimed at drawing a comparison of the individual participants assessment of supervisor focus on safety, or safety climate, with their personal history of injuries within the preceding 12 months.

Limitations of Study

The study will focus on one staff department at a single regional comprehensive university. The subject department performs a variety of functions including general maintenance, housekeeping, and grounds maintenance. The selection of a staff department opposed to an academic functional area will make the findings of the study more applicable to other non-manufacturing settings with similar staff support functions. The findings of the study have limits due to a potential lack of geographic, cultural, ethnic, and/or gender diversity that may exist within the organization sampled.

Definitions

Occupational safety and related areas tend to use a variety of specific terminology. The following section includes definitions in an effort to provide clarity of meaning of selected terms as utilized in this work:

Behavior Based Safety - concept of safety management that focuses on the actions of people and methods to modify the behaviors that are deemed to result in employee injuries or that allow unsafe-conditions to exist within an organization (Geller, 2001).

Disabling Injury - injury that results in an employee being unable to perform the normal job functions resulting in modified job assignments and/or lost work days (Industrial Accident Prevention Association, 2007).

OSHA - Occupational Safety and Health Administration is a division of the U.S. Department of Labor that was established with the passage of the Williams-Steiger Act in 1970. The legislation, also known as the OSH Act, established a greater regulatory role for the federal and state governments in assuring that employers provided a workplace free of recognized hazards (Walter, 2011).

Occupational Fatality - death of a worker that occurs while performing normal job functions or arises out of exposure to a hazard that occurs while engaged in normal work activities (U.S. Department of Labor, 2001).

Occupational Injury or Illness - injury or occupational related illness that occurs while performing normal job functions or arises out of exposure to a hazard that occurs while engaged in normal work activities (U.S. Department of Labor, 2001).

Organizational Safety Culture - "The product of the individual and group values, attitudes, competencies and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety programs" (Mansdorf, 1999 p. 1).

Safety Climate - Zohar (1980) provided a view of safety climate as "…a summary of molar perceptions that employees share about their work environments" (p. 96).

Summary

Many leaders struggle with how to improve the safety of their organizations and better protect their employees. While many programs and practices for safety management exist, their overall effectiveness remains bound to the ability of the organization's leadership team to effectively implement and maintain a level of continuous improvement. Leaders must accurately assess and interpret the state of safety within their organizations. Providing leaders with effective tools to help unravel the layers of complexity associated with organizational dynamics, particularly in a specific area such as employee safety, is essential to furthering efforts at injury prevention.

Utilizing survey instruments to assess safety climate has been proven to serve as a valid predictive indicator of employees' perceptions of an organization's overall focus on safety (Zohar, 1980). Research in this subject area to date has remained focused primarily on manufacturing and other industrial settings. Expanding the body of existing safety climate research into additional categories of organizations can provide valuable supportive data regarding the versatility of such measures as an indicator of effective safety leadership.

CHAPTER II : REVIEW OF THE LITERATURE

Introduction

This chapter will provide supportive data relative to the topic of safety climate as a predictive indicator of the potential for occupational injuries in a given workgroup. Safety climate, as defined in the seminal work of Zohar (1980), focuses on the perceptions of employees in a workgroup regarding their supervisors' focus on their safety.

Simard and Marchand (1995) provided insight into the concept that workers perceptions of the relative safety within their workgroups is influenced by a variety of multilevel factors, including the actions and reactions of their first-line supervisor, along with the perceived commitment of senior leadership toward safety. Their findings indicated a direct correlation between the level of effectiveness of the supervisor and senior leaders in promoting a work environment focused on safety of workers within their workgroups and the level of satisfaction the workers felt toward their safety. Griffin and Neal (2000) reported similar findings in a study of Australian manufacturing and mining facilities, noting that safety resides as a "higher order factor" (p. 347) that affects the overall worker perception of the work environment. In addition, the study noted a strong relationship between safety climate and worker compliance with safety rules and participation in safety related activities across the organizations studied.

Theoretical Framework

The theoretical framework for this literature review centers on first exploring the history of occupational safety from the late 1800s to the present in order to provide a panoramic view of events that have helped shape worker safety in the present day. Second, the review chronicles the general concepts and selected research regarding the

topics of organizational culture and climate in general. The third segment of the review will delve into the more specific and primary focus area of safety climate and provide insight into its construct, measurement, and practical implications for organizations.

The 1980 study by Zohar serves as the starting point for research related to the assessment of safety climate and for utilizing the resulting data as a predictive indicator of occupational injury proclivity within specific organizations. While the selected studies differ somewhat in setting, survey instrument, or approach, they share a common thread, in that they focus on the concept that organizational leaders have the greatest potential to influence the safety climate of an organization.

The Evolution of Safety in the U.S. – Lessons in Leadership

> When the Railway Safety Act was being considered in 1893, a railroad executive said that it would cost less to bury a man killed in an accident than to put air brakes on a car. This railroad executive probably was not a malicious man. In all probability he believed in God, was a good husband and loving father, and patted his dog when he came home. He would have done anything to avoid injury to his family or dog, but the safety of other individuals was considered only in monetary terms. (Hammer, 1981, p.1)

Such a statement today would most likely bring rapid and staunch rebuke; however, at the time the statement received little attention based on the norms of business.

While broad-based standardized governmental records of occupational injuries did not commence in the U.S. until 1970, some examples exist of injury data focused on specific industries, such as mining and railroads, as early as the 1800s. References to comparative data regarding fatalities between similar industries in the U.S. and countries

such as Great Britain appear as early as 1890, as noted by Aldrich (2010). In the period of 1890-1905, American mines had fatality rates between 2.52 and 3.53 per thousand workers, depending on the type of coal being mined. The reports further indicate that, during the same period, British mines posted fatality rates between 1.28 and 1.61 per thousand employees.

An interesting point exists, in that the U.S. fatality rates increased from 2.52 in the period of 1890-1894 to 3.53 during 1900-1905, while the British rates decreased from 1.61 to 1.28 per thousand during the same periods. One would ask, Why the variance between the U.S. and Great Britain? Fundamental differences existed in the nature of mining in the U.S. and Great Britain during this period; chiefly coal in Great Britain resided much deeper in the earth than most U.S. coal. This logistical fact resulted in the British mines being more costly and difficult to establish; these issues led the British mining companies to invest more in mine structures and to conduct mining operations in a more patient manner in order to extract the most coal from each mine. This combination of monetary investment and slower timeline resulted in a safer working environment (Aldrich, 2010).

Conversely, the typical U.S. veins of coal formed much closer to the surface and existed in many different areas of the country. These facts led many U.S. mining companies to operate in a much less methodical manner, using less expensive methods to shore the mine walls and roofs and more explosives to extract the most coal in the shortest time period. These conditions and methods, coupled with practices such as pay based on the amount of coal extracted versus an hourly rate, made the U.S. operations substantially less safe than those in Britain (Aldrich, 2010).

Aldrich (2010) noted similar disparity in fatality rates between British and U.S. railroad workers during the same time period. Rates among U.S. railroaders were almost twice those of their British counterparts. The greatest influencing factor that accounted for the higher rates on the U.S. railroad related to the investment in installing safety equipment such as automatic couplers and air braking systems. In short, the British simply put more money toward safer trains and safer work practices than did their counterparts at U.S. railroads.

Many other examples throughout the 20th century reflect apparent callousness toward the welfare of workers by business leaders. These actions appear as a primary factor leading to the rise of the labor movement in the United States. Reynolds (1989) discussed the impact of the election of Franklin Roosevelt to the presidency in 1932. The country remained in the Great Depression. Roosevelt negotiated the passage of The National Industrial Recovery Act of 1933, which eased many restrictions on corporations regarding anti-trust issues such as setting standard wages and prices in a collaborative manner.

Citing concerns of safety in the workplaces along with other poor working conditions, the Act also included a trade-off for labor leaders in sections 7A that guaranteed workers the right to form unions with leaders of their choosing. The initial reactions from leaders, such as Alford Sloan at General Motors, included the establishment of internal employee committees to review issues such as working conditions. Sloan and other industrial leaders did not attempt to disguise the purpose of these committees. They maintained focus on the need to address employee concerns and

ultimately deny the union's key issues on which to rally workers and establish a power base.

The committees succeeded with regard to general working conditions. However, the financial issues proved too much and ultimately led to a rise in membership across most unions, including the United Auto Workers. While the safety of workers remained a structural component of the overreaching topic of working conditions, ironically, safety did not appear as a primary bargaining issue in the early days of modern U.S. unionism.

Following contentious and lengthy strikes against General Motors in the late 1930s, the UAW established a wide-reaching agreement that secured its place as the sole employee representative body for almost all GM facilities. Safety emerged as a pivotal issue in later agreements. It became one of a sacred few issues for which the union could call a strike. These actions elevated worker safety by making it a critical trump card for the union as leverage for all manner of negotiations (Reynolds, 1989).

Evidence of understanding of the impact of occupational injuries and illnesses appeared in descriptions by Tolman and Kendall (1913):

> It is the general opinion of the engineering profession that one-half the accidents in the United States are preventable, and that a conservative estimate of the annual number of accidents which result fatally or in partial or total incapacity on the part of the worker may be placed at 500,000. (p. 2)

Early prevention efforts by companies included widespread use of personal protective equipment such as footwear, safety glasses, and outer garments, all barriers aimed to shield workers from physical hazards in the environment. Companies also

began to explore methods of protecting workers from moving machinery and equipment through machine guards and physical barriers (Rittenberry, 2007).

A distinct evolution of safety theory and practice appeared with the passage of early workers' compensation laws and a transformation of the legal system; companies assumed more accountability for financial support of injured workers. As a result of the increased economic impact, companies began to explore ways to improve worker safety, primarily based on financial reasons. Additional influences included the creation of organizations such as the National Fire Protection Association (NFPA) in 1896 and the National Safety Council (NSC) in 1913. These non-profit organizations brought together key groups, including academics and business leaders to develop standards and operational guidelines and best practices to make workplaces safer (Aldrich, 2010).

The U.S. Department of Labor, established in 1913, began to look at a variety of issues related to U.S. workplaces. Their primary focus for most of the 20th century included wages, working hours, child labor, workers compensation, etc. The passage of the Occupational Safety and Health Act in 1971 served as a milestone, putting forth national standards for safety in the workplace (Board on Health Sciences Policy, 2013).

Most significant regulatory efforts came as a result of major incidents that drew attention to unsafe conditions or practices. No incident proved more pivotal than the Triangle Shirtwaist Fire of 1911. The factory location in New York City made the Saturday afternoon incident a spectacle for the public and news media alike. In addition, the majority of the victims were young women, portrayed as helpless pawns in the various news accounts. This fact alone helped fuel public outrage. Another element involved the number of victims that jumped to their death from the ninth and tenth floors

of the factory. When graphic photos of victims in the air or on the sidewalks where they landed appeared in major newspapers and magazines, a morbid anger arose followed closely by calls for new laws and regulations (Cornell University, 2011).

The investigation found numerous fire and life safety issues, some considered violations of existing fire codes, others that codes had not yet been established to cover. In the aftermath of the Triangle fire, the city, State of New York, and even national standards-making organizations such as NFPA enacted code revisions to address fire escapes, fire doors, stairwell enclosures, and building fire sprinklers among others. Ultimately, the high loss of life in the Triangle Fire could have been mitigated if the supervisors/managers of the operations had not locked the fire exits and reconfigured the exits left open to allow only one person at a time to move through them. The managers took each of these actions to assure that no worker left the work area without permission and that workers could be closely scrutinized as they exited to prevent theft of cloth or clothing (Cornell University, 2011).

Key Factors Affecting U.S. Safety Performance

Many individuals, groups, movements, innovations, and significant historical events receive credit for improving the overall safety of workers today. The more notable groups include the onset of formal collective bargaining of unions, the establishment of the Occupational Safety and Health Administration, and innovations in safe design of machinery and equipment (Manuele, 1997).

Reynolds (1989) documented several key factors related to the various unions' influence on health and safety, beginning in the 1930s. Union leaders such as Walter Ruether, head of the United Auto Workers, made very aggressive stands against Ford and

General Motors. Both companies fought the concept of union organization, viewing unions as an outside influence that would disrupt their operations and negatively impact their companies, and leveraged their political capital to enlist police and even the National Guard to fight the union organizers.

West (1986) provided examples of the primary factors that combined to help drive the successful organization of General Motors Workers in Flint, Michigan, and led to a pivotal point in modern union history, the sit-down strike of 1936-37. There appeared several issues that topped the workers' lists of grievances including wages, production rates, work rules, general working conditions, and worker safety. While some politicians appeared sympathetic to the concept of unions, they could not support the efforts of the unions based upon wage issues alone because the workers at Ford and General Motors were paid better than those at most other companies. Safety and working conditions became the cornerstone of union organizers and the primary source of leverage in the form of a basis for the threat of strikes. The threat of work stoppage based on working conditions in turn forced companies to negotiate on all fronts including wages.

Miller (1984) provided insight into the continued influence of unions on safety, particularly their focus on supporting the efforts of OSHA and other governmental entities in developing new technology approaches to worker protections. The perception that unions push employers to provide improved safety for their members remains a critical tool for both organizing additional union members and for maintaining support for unions with politicians that see union members as a key group of voters.

OSHA itself stands as one of the greatest influences on U.S. worker safety, as reported by Bartel and Thomas (1985). The study focused on direct and indirect effects

of OSHA regulations on safety. While the findings of this particular study indicated no direct correlation between the establishment of OSHA and reductions in injury rates among the organizations studied, the research revealed substantial indirect impacts on the evolution of safety systems and safety compliance. OSHA activities have resulted in company leaders and workers gaining increased knowledge of potential hazards and related options for controlling them. This indirect effect has impacted the overall severity of injuries and a company's ability to proactively identify the most serious threats to workers prior to occurrence. Ultimately, the term OSHA has become synonymous with worker safety and safety compliance. These influencing factors have combined to improve the overall safety of work environments and have helped facilitate a steady decrease in occupational fatalities and serious injuries. (U.S. Department of Labor, 2008).

Another key factor that has greatly influenced safety in the workplace resides in the advancement of technologies related to safe design of equipment and processes. Prior to the application of a variety of engineering control principles aimed at safeguarding the worker and improving productivity, machines were built to perform the tasks intended and the safety of the worker addressed after installation through manual machine guarding and personal protective equipment. The application of hazard control technologies such as automatic equipment shutdown devices triggered when a worker enters a potential danger zone of a piece of equipment, make the manufacture of the equipment more cost effective, while also improving worker safety (Manuele, 1997).

The roles of unions, OSHA, and innovative technologies on workplace safety have been substantial. A very strong inner-relationship exists between each of the three factors. Unions played a major role in the establishment of OSHA and continue to have a

great influence on safety standards development and enforcement strategies within the agency. The need to find a balance between compliance with OSHA standards and the ability to operate industrial machinery and equipment in a cost effective manner have driven the evolution of advanced safety related technologies (Fadier & Garza, 2006).

Organizational Culture

Argyris (1955) first documented the concept that an organization consists as an "aggregate of parts" that come together to form the "organized whole" (p. 2). In basic terms, the people within the organization, both leaders and employees alike, bring their collective personalities, life experiences, and worldviews with them every day.

Schneider, Ehrhart, and Macey (2013) provided a general description of organization culture as: "shared basic assumptions, values and beliefs" (p. 362). They further noted that these elements of culture "characterize the setting" and are perpetuated to new members of the organization through communication of "myths and stories" (p. 362).

Rousseau (1990) provided a view of culture as a process within the organization where individuals share their respective values, beliefs, and norms. Some members readily share their perspectives, while others quietly process the inputs of the day. Each individual way, whether covert or overt, adds input to the collective culture through words and actions. While leaders may have a greater level of influence due to their positions, one should not discount the power of the lowest level member of the organization to influence the overall culture. Organizations by nature have unique complexities derived from the vast divergence of individual personalities, styles, and traits. These elements merge into a dynamic structure that forms the culture of the

organization. The shaping of this structure through leadership practices determines the ultimate culture of a given organization.

Schneider, Brief, and Guzzo (1996) provided several critical observations concerning organizational culture. Their works focused on the concept that the collective beliefs and values of the members of an organization yield the ultimate culture of that organization.

They further surmised that organizational culture results from “firmly implanted beliefs and values” (p. 5) within the members of a group.

Marcoulides and Heck (1993) developed a research model that defined six core elements within the overall construct of organizational culture. These elements include organizational structure, organizational values, task organization, organizational climate, employee attitudes, and organizational performance. Understanding the components that form the overall culture of an organization provides an opportunity for researchers to dissect the larger construct into separate structural elements. This micro view aids in understanding the implications of culture on specific operational areas of a specific organization.

Organizational Climate

Litwin and Stringer (1968) described organizational climate as measureable properties within the working environment that appear as indirect and direct paths to the members of the organization and influence individual behaviors. The authors further contended that organizational climate results from the sum of individual perceptions of those working in an organization. Schneider, Ehrhart, and Macey (2013) concluded that

organizational climate relates directly to employees and their perceptions of the work environment.

Organizational climate results from individual beliefs and stems from employees' interpretations of the assumptions, philosophies and values that comprise the cultural norms within an organization (Brown & Brooks, 2002). Sowpow (2006) proposed that organizational climate arises from organizational culture and can provide insight into the current state of the organization. Organizational climate relates to the environment that affects the behavior of the employees. It deals with the way(s) employees make sense out of their environment (Reichers & Schneider, 1990).

Taking a more micro view of organizational culture and climate focused specifically on the area of employee safety provides the basis for this study. In order to affect change within an organization, one must understand the present-day dynamics that reside within the group. Exploring the specific concept of safety climate requires a foundation provided through a review of prior research. Understanding the elements of safety climate and the opportunities to quantify and document it for a specific organization will provide a roadmap for this research.

The Concept of Safety Climate

Zohar (1980) first detailed the concept of organizational climate specifically focused on employee safety. His study focused on a number of manufacturing facilities in Israel, and he found a positive relationship between facilities having robust safety programs and lower incidents of accidents. From this seminal work, the specific term "safety climate" found a lasting place in the lexicon of academic studies regarding leadership of safety in organizations. Zohar further surmised that an organization's

leaders' commitment to the safety of the employees in their charge "is a major factor affecting the success of safety programs in industry" (p. 10).

Further references to safety culture and climate provide evidence of the importance of a leader's actions relative to making safety a priority within the organization. The fundamental premise relates to the specific organizational emphasis that exists regarding the expectations for employees to perform tasks in a safe manner. These expectations play a critical part in how employees view the safety climate of their workplace (Zohar, 2000).

Hofmann and Stetzer (1996) noted that safety climate has a direct correlation to safe or unsafe behaviors in employees. Krause (2008) concluded that management at its basic level includes motivation, coordination, and providing direction to employees to accomplish established objectives. How supervisors interject safety into these management elements has a direct effect on the safety climate of the organization.

Safety climate involves a collective of factors. These include management values, organizational practices, organizational communications, and employee engagement in safety (Neal, Griffin & Hart, 2000). Leaders need to understand that each of these factors must exist in a positive way to support a perception of safety in the view of the employee in order to establish and maintain a positive safety climate.

The key to the application of safety climate as a tool for leaders resides in their ability to measure the safety climate within an organization and then utilize the data to develop a useful snapshot of the organization. At least five studies have purported a predictive application between safety climate and future safety performance within an

organization (Cooper & Phillips, 2004; Gillen, Baltz, Gassel, Kirsch, & Vaccaro, 2002; Hoffman & Mark 2006; Hofman & Stetzer, 1996; Zohar, 2000).

The Relationship between Leadership and Safety Climate

Ultimately, the positives of good leadership and the negatives of poor leadership have received ample attention in the literature. Great leaders have resurrected downtrodden businesses and countries; and at times, one can argue the world itself, in the case of World War II. Most of the great leadership moments in history emerged from the poor leadership that preceded them.

Kozlowksi and Doherty (1989) noted that early theorists (Blake & Mouton, 1964; Indik, 1968; Lewin, 1951; Likert, 1967; Litwin & Stringer, 1968; McGregor, 1960) regarded leadership as an important organizational factor that affected employees' perceptions of climate. Momeni (2009) concluded that a leader's behavior has a great influence on employee attitudes, behaviors, emotions, morale, and perceptions. Thus, an examination of the literature suggests that a leader's behavior can potentially result in the creation and continual survival of a positive, thriving organizational climate in a non-profit organization.

Leaders define the key operating principles of their organizations, including not only the formal business practices, policies, and procedures, but also the informal operating culture and climate of their organizations. The climate elements that influence their organization's functions also serve as the key factors that dictate the quality of the working environment. In order to shape an organization in a positive manner, leaders must understand the primary elements of organizational culture. Sorting through this data can prove somewhat problematic due to the existence of many plausible theories related

to the subject developed from extensive academic research over several decades (Zohar & Luria, 2005).

In many cases the ability of a strong leader to establish a set of positive organizational values and operating norms provides a basis for the beliefs of individual members of the organization. Examples can be seen of leaders establishing and maintaining such cultures reflected in recognition of companies as “best employers” coupled with positive overall business performance (Smith, 2012).

Krause (2008) discussed the potential for contribution of supervisors to the safety performance of their respective workgroups. He discussed their role as a “natural proxy” for senior leaders. Many supervisors do not approach safety in a positive manner because “their role in safety is poorly understood” (p. 1). The influence of the supervisor emerged in much earlier works, such as those of Fleishman, Harris, and Burtt (1955), who recorded a direct correlation between subordinate views of supervisory consideration and “the number of trips to the dispensary for treatment of injuries sustained while at work” (p. 63).

Lewin (1951) found that leadership styles directly impacted organizational climate. It would appear reasonable to extend the concept to safety climate as a subset of the overall organizational climate. Similar findings emerged in research by Dunbar (1975), where results implied that subordinates’ view of their leader’s interest in their safety and general welfare appeared to be strongly influenced by the actions of the supervisor.

A reasonable assumption can be made that the first-line supervisor would wield the greatest level of influence on subordinates. The supervisor spends the greatest amount

of time as a leader of the group and generally communicates both positive and negative information to the employee. The leader's actions theoretically will have the greatest impact on the work environment of the average employee.

Understanding the concepts of leadership styles, along with an analysis of research on the potential effects of a leader's approach to interactions with subordinates, provides valuable insight into the direct impact of leaders on the safety climate of the workgroup they lead. Bass and Steidlmeier (1999) introduced the concepts of transactional and transformational leadership tendencies. Transactional leaders tend to lead subordinates to complete assigned tasks through a system of anticipated rewards or recognition, while transformational leaders guide subordinates through a more persuasive model based on positive relationships and common goals and objectives (Hater & Bass, 1988).

Zohar (2002) explored the relevance of supervisors' leadership tendencies to the safety climate and injury mediation capabilities of a workgroup. Transformational leaders tend to exhibit stronger leader-follower interaction which positively influences the perception of the leader's concern for the wellbeing of subordinates, and in turn the overall safety climate of the workgroup. The common attributes of a transformational leader tend to send a stronger message regarding the importance of safety by reducing the power-distance between supervisor and subordinates.

Zohar (2002) continued by addressing the effects of transactional leaders on the safety climate of a workgroup. Transactional leaders tend to adopt a style of hard-and-fast rules that subordinates must follow to maintain order within the workgroup. This style of leadership at the group level promotes an atmosphere based on strong individual

relationships and promotes more feelings of nameless workers, which tends to send negative or mixed messages regarding the importance of worker safety.

Parry and Proctor-Thomson (2002) reported similar observations regarding perceived integrity of leaders based on style or tendencies. Transformational leaders build feelings of trust and ultimately cultivate a higher level of respect from their subordinates, which translates to integrity as a leader.

Bass and Steidlmeier (1999) stated that subordinates see true transformational leaders as authentic and ultimately ethical. The authors further observed that many transactional leaders attempt to display certain behaviors related to transformational leaders, but without the true underpinnings of leadership. A label of "pseudo-transformational leadership" (p.186) is applied to this phenomenon. The authors call into question the innate ethics of leaders engaged in the practice.

More recent works on leadership traits and styles, such as Lefton and Buzzotta (2004), provide compelling arguments against the practice of aligning individual leaders into restrictive categories such as transactional or transformational. The primary contention for using broader dimensional assessment models versus more restrictive categories resides in the concept that human behavior is both multi-dimensional and variable-dependent based upon a variety of factors. The authors advocate categorizing the behaviors of leaders or their leadership style based on a four-quadrant dimensional model that includes dominant-hostile (Autocratic), submissive-hostile (Unassertive), submissive-warm (Easygoing), or dominant-warm (Collaborative).

The case presented by Lefton and Buzzotta (2004) contended that the assessments of leaders should focus on individual behaviors as opposed to generalized labels such as

transformational or transactional. The premise set forth contends that, once a person (superior, peers, or subordinate) affixes a label on a co-worker, it tends to remain. Moreover, the tendency exists to see the behaviors or actions in a person that fit the label. If one looks at the underling behavior(s) of individuals in specific circumstances, it becomes easier to understand why they act or react in a certain way and, more importantly provides the opportunity to affect positive change focused on the behaviors.

More recent works such as presented by Heifetz (2010) proposed a concept of flexible or "adaptive" work. This approach is rooted in two primary assumptions. The first explored the erroneous assumption that the connection between leaders and followers is an "absolute and inherently logical structure" (p. 505). The complexion of leader-follower interactions takes on a variety of forms with truly effective leaders transforming one-time followers into co-leaders focused on the tasks at hand. The second assumption addressed the variability of leadership dynamics based upon the "context of problems and challenges" faced at a particular point and time; in short, the most effective leaders "mobilize people to meet adaptive challenges" (p. 506).

Heifetz (2010) provided further description of the adaptive work concept, and the overall need for adoption of the operating principle, by identifying seven key descriptive elements or drivers that form the overall construct:

1. Many problems require solutions that reside beyond the scope of present operating parameters of the organization. Modern approaches to problem solving focus on gap analysis and gap closure that require flexible solutions many times exceeding the capabilities of traditional approaches.

2. An effective adaptive work environment must establish a focus on continuous learning. Developing an understanding that many issues existing within an organization are truly people problems provides an impetus for development of people skills to address such complexities.

3. Adaptive work requires a paradigm shift from the traditional authoritarian structure of top down responsibility to a more balanced or flat "stakeholder" focused model. Clearly identifying and effectively engaging the true stakeholders to address a specific problem provides an opportunity to achieve the most effective resolution.

4. To be effective, the concept of adaptive work mandates that the people involved consciously evaluate the components of an issue and separate the truly important elements from those that have limited impact. Developing the ability of individual stakeholders as well as working groups to distinguish elements of an issue based on relevance provides an improved problem-solving environment.

5. To achieve success, adaptive work environments must maintain a balance between efficiency of task and creativity. Particularly in a business environment, solving problems rapidly remains a stalwart principle based in part on the old adage "time is money." However, too much emphasis on speed of resolution may eliminate potentially innovative solutions that in the long run may prove more efficient than the proverbial quick fix.

6. Leaders must embrace the reality that adaptive work environments must operate in a different time frame than traditional focused structures. People require time to process the increased information flow that emerges within

adaptive work structures, and in turn must learn to react and respond in a positive collaborative manner. The added dimensions resulting from the interaction of stakeholders within the adaptive environment as opposed to traditional leader-follower structure, while potentially more complex, also provide a richer environment for innovation and problem solving.

7. Adaptive work, while relatively new as a formal organizational construct, fits with the normal human approach to identifying and resolving problems. Understanding first that a problem exists, then pursuing the gathering of facts and potential resolutions, and finally implementing the selected fix is logical based on human history and cultural norms. In addition, the presence of diversity of culture and values within most groups results in inevitable conflicts within an adaptive work environment. However, if managed effectively, these conflicts may yield more robust solutions to a variety of issues.

The concept of adaptive work and corresponding progressive work environments provides a more accurate portrayal of modern leadership challenges, in addition to leadership behaviors that transcend more traditional views related to styles and traits associated with leadership practice. Understanding the basis of these evolutionary changes in leadership theory is critical to the basis of this study relative to the influence of leaders on the safety of their subordinates. The variables presented by concepts such as adaptive leadership open many fronts for additional research beyond the topic at hand.

Summary

Based upon the elements of leadership theory identified in the review of the literature, the ability to establish a correlation between safety climate and actual injury rates among employees can serve as a predictive indicator of safety performance within a

given workgroup. Furthering this body of research in a non-manufacturing setting will provide additional validation of the versatility and accuracy of safety climate as indicators of safety performance.

The literature provides substantial empirical evidence of the critical role supervisors' play in implementing effective safety programs within their workgroups. The supervisor sets the tone of the workgroup regarding expectations for safety. While executive engagement and support remain a critical piece of the puzzle as well, absence of a safety-focused primary supervisor provides a working environment with a greater potential for occupational injuries.

The concept of safety climate emerges from the literature review as a key influence on the perspective that employees hold toward the relative safety of their workplace. The ability to measure safety climate and then correlate the findings to actual safety performance can provide a valuable predictive insight into the level of safety within a given workgroup. This study will build on the previous works mentioned by expanding the types of entities studied to date. The previous works focused on general manufacturing, steel processing, oil and gas exploration, and construction settings. By focusing on the university staff setting, the data collected within this study will broad applicability across a variety of non-manufacturing settings.

CHAPTER III - METHODOLOGY

Introduction

The primary focus of this research centers on determining whether a significant correlation exists between a supervisor's commitment to the safety of subordinates, as perceived by the subordinates, and the actual injury rates among those employees.

Data were collected to explore the possible relationship between leadership tendencies of the supervisors and their safety climate ratings as recorded by their employees, with evaluation of differentials related to demographic variables including gender, education level, skilled verses non-skilled positions, length of service to the university, or shift assignment.

Research Questions

Three primary research questions form the foundation of this research:

1. Does a significant correlation exist between employee perceptions of supervisor's commitment to the health and safety of workers and actual injury/illness rates within an organization?
2. Does a significant correlation exist between specific leadership practices of supervisors and their safety climate ratings as perceived by their employees?
3. Is there a significant difference in employee views on safety climate and leadership practices of their supervisor based on employee demographic variables including gender, education level, skilled versus non-skilled positions, time in position, or shift assignment?

Methodology

Primary data collection will come from employee responses to a survey consisting of three segments. The first includes seven employee demographic questions related to length of overall service to the organization, length of time in current job, assigned shift, gender, education level, functional work area, and experience level of immediate supervisor.

Segment two consists of 20 questions, including 9 related to safety climate and 11 related to general leadership practices. The safety climate questions originated from Zohar (1980) and received refinements in Zohar and Luria (2005) and Johnson (2007). Permission was secured from originator for the application in this research project. The balance of the 11 questions focused on measuring leadership tendencies originated in an employee supervisor survey developed and utilized by the Human Resources Department of Southern Union State Community College located in Wadley, Alabama.

Data Collection

The research design consists of a paper survey distributed and collected during regularly scheduled employee staff meetings. A member of the Environmental Health and Safety staff delivered the blank survey instrument, accompanied by a copy of the Institutional Review Board (IRB) approval form, to the participants. Upon completion, the participants inserted the forms into a sealed box to assure confidentiality.

Sample

During June 2013 employees of the Department of Facilities Management at a regional university were asked to complete the paper form survey instrument during regularly scheduled monthly group meetings. The facilities management organization at

this university had four primary functional areas of operations: maintenance, plant operations, building services, and grounds.

Description of Variables

Independent Variables

The primary independent variables for this study included length of service at university, length of time in job assignment, shift worked, gender, level of education completed, assigned work group, approximate experience level of supervisor in years, and the number and severity of work related injuries sustained by the employee within the previous 12 months.

Dependent Variables

The dependent variables for this study included the supervisor's rating for safety climate (Questions 8, 10, 12, 14, 16, 18, 20, 22, and 24) and general leadership practices (Questions 9, 11, 13, 15, 17, 19, 21, 23, 25, 26, and 27) as rated by their subordinates.

Reliability and Validity

While many views exist regarding what accounts for validity in a research instrument, the common ground focuses on the ability of the participants to clearly understand the questions asked and interpret them in the intended context (Kimberlin & Winterstein, 2008).

Safety Climate Questions

The questions related to safety climate have evolved and received repeated validation over a span exceeding 30 years (Zohar, 1980; Zohar & Luria, 2005; Johnson, 2007). Zohar and Luria (2005) produced two 16-question instruments, one focused on the organization in totality and the second focused on a more micro or workgroup level within the organization.

The researchers mapped the survey questions to three dimensions that appeared similar to findings of Brown and Holmes (1986) utilizing a 10-item survey to identify the dimensions of risk perception, management concern, and management action.

Johnson (2007) utilized the 16 questions from Zohar and Luria (2005) as the basis for additional research regarding the predictive validity of safety climate. While the results validated three similar dimensions as reported by Brown and Holmes (1986), the Johnson study took a broader view and identified the dimensions in a more straightforward manner: caring, compliance, and coaching. In addition, the study also noted issues of cross loading within the 16-item instrument. Using exploratory factor analysis (Varimax Rotation), Johnson (2007) suggested the elimination of five questions (A\B\E\I, and P) that yielded a factor loading of less than 0.60, resulting in an 11-item safety climate survey.

The results reported by Johnson (2007) substantiated the previous works of Zohar (1980), Brown and Holmes (1986) and Zohar and Luria (2005) indicating that, while findings point to three distinct dimensions, a strong inner correlation exists between the constructs as demonstrated by a minimum score of 0.93 ($p < 0.05$). Based on this evidence, Johnson (2007) advocated the concept of a single global factor that best defines and provides an opportunity to measure safety climate. Based on the overall results of these previous studies, the safety climate questionnaire is deemed valid for the purposes of this research.

Leadership Practices Questions

The questions related to general leadership practices have received extensive usage by the developing institution over a five-year period as a method to measure

employee perceptions of their immediate supervisor. Prior to their inclusion in this research instrument, the questions received extensive review for clarity of meaning and applicability of application for this study. The questions displayed strong face validity, as described in Litwin (1995).

Based upon the prior use but limited evidence of formal validation, the internal consistency of the leadership practice questions was measured utilizing Cronbach's alpha. A standardized alpha score of 0.93 indicated very strong internal consistency across the nine leadership questions.

Study Limitations

The study will address one functional staff department at a single regional comprehensive university. The selection of a staff department as opposed to an academic college helped to make the findings of the study more applicable to other non-manufacturing settings with similar staff support functions.

The findings may have limits due to a potential lack of geographic, cultural, ethnic, and/or gender diversity that may exist within the organization sampled.

Summary

The norms of leadership relative to the safety of subordinates have evolved in the United States and around the world in developed countries over the last century. This study will help clarify the critical importance of the first-line supervisor actively leading safety initiatives as an essential element of efforts in reducing injuries in the workplace.

The ability to measure a supervisor's actual performance relative to demonstrated practices in leading safety, as viewed by subordinates, provides the most promise for establishing a correlation between the actions of a supervisor and actual injuries among subordinates.

The statistical results of this study, along with narrative, are found in Chapter IV. The potential implications and application of the findings appear in Chapter V.

Chapter IV: RESULTS

Introduction

This study focuses on determining whether a correlative relationship exists between the employee's perception of supervisors commitment to safety (safety climate) within an organization and the rate of occurrence of occupational injuries among the members of the organization. A secondary aim of the study includes an evaluation of the relationship between the safety climate of the organization and the employees' view of their supervisors' general leadership practices. The final purpose of the study looked at the potential impact of demographic variables including gender, education level, skilled versus non-skilled positions, time in position, and shift assignment on safety climate and /or general leadership practices.

The research project received approval from the WKU Office of Research Integrity prior to the commencement of the study. A copy of the instrument and accompanying "Informed Consent for Study Participants" is included in the appendices section. Detail regarding the validity and reliability of the survey instrument were provided in Chapter III.

The survey questions aimed at measuring safety climate and general leadership practices were structured using a 7-point Likert scale ranging from 1= never through 7 = always. Questions regarding length of service and number of injuries required participants to insert an appropriate numerical response. Questions aimed at other demographic elements including assigned work shift, gender, education level achieved, and departmental assignment were developed using a multiple choice format.

Population

Members of the university Department of Facilities Management were asked to voluntarily complete the survey during regularly scheduled group meetings. The participants represented four functional areas within the overall facilities organization: Maintenance, Plant Operations, Building Services Attendants, and Grounds Crew. A total of 252 employees completed the survey instrument. Based on a total population of 309 within the Department of Facilities Management, a study participation rate of 81% was achieved. All submitted surveys were included in the analysis.

Descriptive Statistics

As shown in Table 1, the variable of assigned work shift was divided into two categories, day shift and night shift. Day shift was defined as those employees beginning work at or after 6:00 a.m., while night shift included all employees beginning their work shifts after 3:00 p.m. Among the 252 respondents, 167 (66.2 %) indicated a day shift work assignment, 79 (31.4 %) indicated night shift, and six (2.4 %) provided no response to the question.

Details regarding the gender of participates are included in Table 2. Among the 252 total participants, 135 (53.5 %) were male, while females accounted for 104 (41.2%). Thirteen participants (5.3 %) did not indicate a gender classification on their surveys.

Table 1

Descriptive Statistics of Respondents Assigned Work Shift

Work Shift	*N*	Percent
Day	167	66.2
Night	79	31.4
No Response	6	2.4
Total	252	100.0

Table 2

Descriptive Statistics of Respondents- Gender

Gender	*N*	Percent
Male	135	53.5
Female	104	41.2
No Response	13	5.3
Total	252	100.0

The education level of the respondents is included in Table 3. Among the 252 employees completing the survey, 102 (40.4%) indicated they had graduated from high school or completed a General Education Development (GED) Examination. One hundred four of the employees (41.2%) reported completing some college or technical

school, while 34 (13.5%) indicated they were college graduates. Thirteen individuals did not provide a response to the question.

Table 4 provides information regarding the distribution of respondents by work-group within the university's Department of Facilities Management. Fifty-one employees (20.2%) indicated they were assigned to the Maintenance Group. Plant Operations Group accounted for 25 employees (9.9%) while 144 (57.1%) of the participants indicated assignments in Building Services. Twenty-nine employees reported being members of the Grounds Crew, and three respondents failed to provide a response to the question.

Table 3

Descriptive Statistics of Respondents
Level of Education Completed

Education Level	*N*	Percent
HS or GED	102	40.4
Some College or Tech	104	41.2
College Graduate	34	13.5
No Response	12	4.9
Total	252	100.0

Table 4

Descriptive Statistics of Respondents Assigned Work Groups

Work Group	*N*	Percent
Maintenance	51	20.2
Plant Operations	25	9.9
Building Services	144	57.1
Grounds	29	11.5
No Response	3	1.3
Total	252	100.0

The final demographic question included in the survey results related to the employee's length of service to the university, as shown in Table 5. Seventy-seven individuals indicated a length of service between zero and two years, accounting for 30.5% of the total responses. Employees having served the university from three to seven years accounted for 81 persons (32.1%) while 93 individuals (36.9%) indicated an overall length of service of eight or more years. Only one participant failed to provide data for the question.

Table 5

Descriptive Statistics of Respondents
Length of Career at University

Years	*N*	Percent
1-2	77	30.5
3-7	81	32.1
8- Above	93	36.9
No Response	1	00.5
Total	252	100.0

Analysis

This research study sought to answer three primary questions:

1. Does a significant correlation exist between employee perceptions of supervisor's commitment to the health and safety of workers and actual injury/illness rates within an organization?
2. Does a significant correlation exist between specific leadership practices of supervisors and their safety climate ratings as perceived by their employees?
3. Is there a significant difference in employee views on safety climate and leadership practices of their supervisor based on employee demographic variables including gender, education level, skilled versus non-skilled positions, time in position, or shift assignment?

The analysis of the data will be provided aligned with the individual research questions.

Analysis Research Question One

The first question of this study asked, "Does a significant correlation exist between employee perceptions of supervisor's commitment to the health and safety of workers and actual injury/illness rates within an organization?"

Initial statistical analysis indicated strong consistency, based on a lack of variance in mean scores between groups, relative to their responses to the safety climate questions. The results also indicated a strong positive mean score for all respondents of 5.21 for the same safety climate questions. The results of the analysis are displayed in Table 6.

A Pearson Product-Moment Correlation Coefficient was computed to assess the relationship between the Safety Climate Score and the number of occupational injuries, based on three injury severity classifications, within each workgroup. No significant correlations were found, with the exception of one data point for the Plant Operations Group, injuries requiring medical attention, which resulted in a weak, yet significant correlation based on $p < .05$ ($r = 0.43$, $n = 25$, $p = 0.03$). Results for all groups are displayed in Table 7.

Based on the findings as presented, the null hypotheses relative to Research Question One is not rejected. The survey data does not indicate a substantial correlation between the safety climate and injury experience within these workgroups.

Table 6

Safety Climate Score and Employee Injuries by Workgroup

	Safety Climate Score			Minor Injuries			Injuries Requiring Medical Treatment			Injuries with Lost Work Days		
Workgroup	*N*	$\overline{X}$	*SD*	*N*	$\overline{X}$	*SD*	*N*	$\overline{X}$	*SD*	*N*	$\overline{X}$	*SD*
Maintenance	51	5.39	0.94	48	0.41	1.56	48	0.06	0.24	48	0.06	0.24
Plant Operations	25	5.37	1.09	25	0.20	0.50	25	0.04	0.20	25	0.00	0.00
Building Services	144	5.19	1.33	136	0.27	0.68	136	0.09	0.35	136	0.09	0.34
Grounds	29	5.00	1.28	29	0.68	2.03	29	0.13	0.35	29	0.06	0.25
No Response	3			14			14			14		
Total	252			238			238			238		

Table 7

Correlation Between Safety Climate Score and Employee Injuries by Work Group

		Minor Injuries	Injuries Requiring Medical Treatment	Injuries with Lost Work Days
Workgroup	*N*	*r*	*r*	*r*
Maintenance	48	0.23	0.19	0.19
Plant Operations	25	0.19	0.43 *	0.00
Building Services	136	0.01	0.00	0.00
Grounds	29	0.00	0.12	0.16
No Response	14			
Total	252			

*Significant $p < .05$

In addition to the survey data collected specifically for this study, relevant data exists for the university as a whole regarding both injuries requiring medical treatment (Total Recordable Cases) and injuries resulting in days away from work (Lost Workday Cases). The collection of this data is a legal requirement under the provisions of the Occupational Safety and Health Act. The methods for collecting and reporting the data are established by the United States Bureau of Labor Statistics.

A comparison of annual rates of significant injuries between the university being studied and rates for universities as reported by the Bureau of labor Statistics was performed. The rates for the university were calculated using a formula adopted by the Bureau of Labor Statistics for normalizing injury rate reporting:

Number of injuries and illnesses X 200,000 / Employee hours worked = Incidence rate

The 200,000 hours in the formula represents the equivalent of 100 employees working 40 hours per week, 50 weeks per year, and provides a standard approach for the incidence rates (U.S. Department of Labor, 2012).

The injury rates for the university being studied were for calendar year 2012. The employees at the university reported a total of 47 occupational injuries that met the criteria for inclusion on the U.S. Department of Labor Summary of Work-Related Injuries and Illnesses, also referred to as Recordable Cases. Included in the 47 total cases were 13 that resulted in employees missing at least one day of work, otherwise referred to as Lost Workday Cases (U.S. Department of Labor, 2012).

Utilizing the prescribed formula, the 2012 annual recordable case rate for the university being studied was calculated at 1.7 cases per 100,000 hours worked:

47 cases x200,000 = 9,400,000 /5,434,010 hours worked=1.72 Total Recordable Rate.

Using the same formula, the lost workday case rate was calculated:

13 cases x 200,000 = 2,600,000 / 5,434,010 hours worked = 0.47 Lost Workday Rate

The comparative numbers originated from the Bureau of Labor Statistics report, Incident Rates of Non-Fatal Occupational Injuries and Illnesses by Industry and Case Types- 2011. The 2011 calendar year data is the most current comparative data available at the time of this study. The BLS reported corresponding injury rate data for the education and health services sectors in general at 4.7 total recordable cases per 100,000 hours worked, and 1.3 lost workday cases per 100,000 hours worked. The BLS further reported rates specifically for colleges, universities, and professional schools at 2.1 total recordable case rate and .6 lost workday case rate.

The findings displayed in Table 8 provide evidence that supports the concept outlined in Research Question One. The annual total recordable injury rates for the university studied were 19% lower than the national average for a similar period of time. The lost workday case rate for the same periods of comparison were 21.6 % lower. The safety climate score for the representative sample of employees collected during the study is 5.27. Based on the 7-point Likert scale used in the study, the median score for safety climate is 3.50. Therefore, the safety climate for the university studied should be viewed as substantially positive.

The individual group data collected as part of the survey process did not yield any substantial correlations between the group safety climate scores and their injury experience. However, applying the university-wide normalized data to a validated national database focused on colleges and universities yielded findings supportive of the concept that a positive safety climate will yield fewer injuries among the employees.

Table 8

Subject University Injury Rates Compared with Bureau of Labor Statistics Injury Data For U.S. Universities

	Subject University *	BLS Data**	Differential
Total Recordable Case Rate	1.7	2.1	19.0 %
Lost Workday Case Rate	0.47	0.60	21.6 %

**Subject University Data for Calendar Year 2012*
*** Bureau of Labor Statistics (BLS) Injury Data for Calendar Year 2011*

Analysis Research Question Two

The second research question asked, "Does a significant correlation exist between specific leadership practices of supervisors and their safety climate ratings as perceived by their employees?"

Initial statistical analysis indicated strong consistency between groups based on the lack of variance in mean scores by group relative to their responses to the leadership practice questions. The results also indicated a strong positive mean score for all respondents of 5.62 for the same leadership questions. The results of the analysis are displayed in Table 9.

A Pearson Product-Moment Correlation Coefficient was computed to assess the relationship between the Safety Climate Score and the results of Leadership Practices Questions, by workgroup. The results ranged from 0.81 for the Grounds Group to 0.85 for the Plant Operations Group, indicating a strong positive correlation. The results for all groups are included in Table 10.

Table 9

Leadership Practice Scores by Workgroup

Department	*N*	$\overline{X}$	*SD*
Maintenance	51	5.74	0.92
Plant Operations	25	5.84	1.04
Building Services	144	5.56	1.32
Grounds	29	5.62	0.98
No Response	3		
Total	252		

Table 10

Safety Climate Scores Compared with Leadership Practice Scores by Workgroup

	Safety Climate			Leadership Practices			
Work Group	*N*	$\overline{X}$	*SD*	*N*	$\overline{X}$	*SD*	Correlation
Maintenance	51	5.29	0.94	51	5.74	0.92	0.84*
Plant Operations	25	5.37	1.09	25	5.84	1.04	0.85*
Building Services	144	5.19	1.33	144	5.56	1.32	0.84*
Grounds	29	5.00	1.28	29	5.62	0.98	0.81*
No Response	3			3			
Total	252			252			

*Significant $p < .05$

Based on the findings of as presented, the null hypotheses relative to Research Question Two is rejected. The survey data indicates a strong correlation between the Safety Climate Scores and the results of the Leadership Practices questions across all four groups.

Analysis Research Question Three

The third research question asked, “Is there a significant difference in employee views on safety climate and leadership practices of their supervisor based on employee demographic variables including gender, education level, skilled versus non-skilled positions, time in position, or shift assignment?”

An analysis of variance (ANOVA) was performed to compare each of the demographic variables of gender, education level, skilled versus non-skilled positions, time in position, and shift assignment with both the safety climate and leadership practices scores.

Relative to gender, males accounted for 135 (54%) of the participants while 104 (41%) reported as female. Thirteen participants or (5%) failed to indicate gender on their surveys. The results of the ANOVA indicated no significant variance between the two genders when compared to either the safety climate or leadership practice scores. The results did not indicate any instances at the $p < .05$ level. Based upon the findings, the null hypothesis for the gender element of Research Question Three cannot be rejected. The data related to the gender variable is displayed in Table 11.

Table 11

Safety Climate and Leadership Practice Scores by Gender

	Safety Climate			Leadership Practices		
Gender	*N*	$\overline{X}$	*SD*	*N*	$\overline{X}$	*SD*
Male	135	5.27	1.10	135	5.66	1.10
Female	104	5.04	1.32	104	5.48	1.28
No Response	13			13		
Total	252			252		

Data concerning the level of education of participants indicated that 102 (40%) of the participants reported being high school graduates or having successfully completed the General Education Development Test (GED), 104 (41%) reported having completed some amount of college or technical school training, 34 (13%) reported being college graduates, and 12 failed to indicate a level of education completed on their surveys.

The results of the ANOVA indicated no significant variance in the responses of participants in each of the levels of education. The results did not indicate any instances at the $p < .05$ level. Based upon the findings, the null hypothesis for the education level element of research question three cannot be rejected. The data related to the education level variable is displayed in Table 12.

Table 12

Safety Climate and Leadership Practices Scores by Level of Education

	Safety Climate			Leadership Practices		
Education Level	*N*	$\overline{X}$	*SD*	*N*	$\overline{X}$	*SD*
HS or GED	102	5.42	1.10	102	5.72	1.16
Some College or Tech	104	5.16	1.18	104	5.59	1.20
College Graduate	34	4.91	1.44	34	5.54	1.26
No Response	12			12		
Total	252			252		

To analyze the potential impacts of the positions held by participants on their view of their supervisors' performance, data were assembled based on the workgroup assignments. Participants within the Maintenance and Plant Operations groups were classified as having skilled positions; these individuals have technical training and/or professional certifications in a recognized craft or trade such as electricians or Heating, Ventilation and Air Conditioning Technicians (HVAC). The participants in the Building Services and Grounds groups were considered to have non-skilled positions. The normal assignments for these groups include general cleaning, lawn care, etc. Participants occupying skilled positions accounted for 76 (30%) of the respondents, while 173 (69%) were aligned to non-skilled. Three participants (1%) failed to indicate a workgroup assignment.

The results of the ANOVA indicated no significant variance in the responses of participants between those assigned to skilled or non-skilled positions. The results did not

indicate any instances at the $p < .05$ level. Based upon the findings, the null hypothesis for position skill level element of Research Question Three cannot be rejected. The data related to the position skill level variable is displayed in Table 13.

Table 13

Safety Climate and Leadership Practice Scores by Workers in Skilled vs. Non-Skilled Positions

Department	*N*	$\overline{X}$	*SD*
Maintenance *	51	5.29	0.94
Plant Operations *	25	5.37	1.09
Building Services **	144	5.19	1.33
Grounds **	29	5.00	1.28
No Response	3		
Total	252		

* Skilled Positions
** Non-Skilled Positions

Data related to the years of service of participants at the university indicated that 77 (30%) of the participants reported a length of service between zero and two years, 81 (32%) reported having between three and seven years, and 93 (37%) reported having eight or more years of service. Only one participant failed to respond to the length of service question.

The results of the ANOVA indicated no significant variance in the responses of participants based upon their length of service to the university. The results did not indicate any instances at the $p < .05$ level. Based upon the findings, the null hypothesis

for length of service element of Research Question Three cannot be rejected. The data related to the length of service variable is displayed in Table 14.

Table 14

Safety Climate and Leadership Practices Scores by Years of Service

	Safety Climate			Leadership Practices		
Years of Service	*N*	$\overline{X}$	*SD*	*N*	$\overline{X}$	*SD*
1-2	77	5.62	1.20	77	5.27	1.15
3-7	81	5.53	1.09	81	5.15	1.19
8- Above	93	5.71	1.26	93	5.22	1.32
No Response	1			1		
Total	252			252		

Data were collected to assess the influence of assigned work shift on employees' views of their supervisor related to safety climate and leadership practices. Responses from participants indicated that 167 (67%) reported a day shift assignment, while 79 (31%) reported assignments on night shift. Two participants failed to respond to the shift assignment question.

The results of the ANOVA indicated no significant variance in the responses of participants based upon their assigned work shift. The results did not indicate any instances at the $p < .05$ level. Based upon the findings, the null hypothesis for the shift assignment element of Research Question Three cannot be rejected. The data related to the shift assignment variable is displayed in Table 15.

Table 15

Safety Climate and Leadership Practice Scores by Assigned Work Shift

	Safety Climate			Leadership Practices		
Shift	*N*	$\overline{X}$	*SD*	*N*	$\overline{X}$	*SD*
Day	167	5.29	1.15	167	5.72	1.12
Night	79	5.05	1.27	79	5.43	1.19
No Response	6			6		
Total	252			252		

Summary

A comprehensive review of literature regarding the potential impact of leaders on the safety of their subordinates yielded a variety of research spanning well over 30 years. Beginning with Zohar (1980), the concept of safety climate emerged and has served as a focal point of a number of key studies. The studies to date have focused on general manufacturing, oil exploration, and heavy industry settings. The need to understand the potential for transferability of findings to non-manufacturing settings, such as a university, served as the primary driver for this research.

The study focused on maintenance and housekeeping personnel at a regional comprehensive university during the summer of 2013. A potential participant pool of 300 employees was identified, and ultimately 252 (84%) completed surveys for the study. A combination of analysis tools, including Pearson's Product-Moment Correlation Coefficient and Analysis of Variance (ANOVA), was used to assess the data surrounding the proposed research questions. The results were presented in this chapter. Chapter V

will provide additional perspective regarding the findings, along with potential applications and possibilities for future research.

CHAPTER V : DISCUSSION AND CONCLUSIONS

Introduction

Occupational injuries have dramatic impacts, both direct and indirect, on not only the worker that sustains the injury, but also the worker's family, co-workers, supervisors, and many others dependent upon the particular circumstances of the causal event. With the creation of the National Safety Council and other organizations focused on the study of injuries and method of injury prevention, countless studies have yielded a litany of theories regarding the causes of these injuries and methods to protect human beings from them.

Debates have continued throughout the history of the industrialized world regarding who holds the responsibility for the safety of a worker. Early practice focused squarely and solely on the injured worker and/or a co-worker who may have contributed to the event. With the growth of trade unions and collective bargaining, followed by the passage of the OSHA Act, employers became the primary holder of responsibility for the safety of their workers. Requirements to identify and control common risks, provide personal protective equipment, and train employees regarding the potential hazards they face in performing their assigned tasks have resulted in a higher level of overall worker safety in all sectors.

Despite the overall improvements in knowledge, processes, technology, and training, workers still suffer injuries, including over 4600 fatal injuries in the U.S. in 2011 (U.S. Department of Labor, 2012). The review of literature discussed several of the current initiatives aimed at positively influencing behaviors by engaging workers and supervisors more actively in injury prevention. All of the behavior related concepts appear to have one common theme, the need for strong "safety focused" leadership. The

most successful corporate-wide safety transformations studied, including Alcoa, DuPont, and General Motors, all began with a strong focus on developing safety savvy leaders at all levels.

The concept of measuring safety climate, first reported by Zohar (1980) is based on worker responses to a series of questions aimed at gauging how workers feel their supervisor responds to certain situations that potentially impact their safety. In the years since, the original safety climate survey process received refinements based upon statistical evaluations made following studies in a variety of settings across the globe.

The primary focus of this study centered on determining whether the safety climate score of a workgroup correlates to the number of injuries and illnesses sustained by the employees within the workgroup. A number of previous studies have established relationships between the stated variables to varying degrees, and across a variety of settings including oil and gas exploration, construction, and general manufacturing. The construct of the study follows the basic path of the previous endeavors; however the application in a university setting appears seminal.

This research strived to add to the body of knowledge regarding organizational leadership influence on employee safety. In order to develop effective interventional strategies for injury reduction, a greater understanding of the dynamics between employees and supervisors relative to matters of safety is essential. This research aids in understanding the potential impact of demographic variables such as gender, education level, skilled versus non-skilled positions, time in position, and shift assignment on employee views regarding safety climate within their workgroup.

Three primary research questions form the foundation of this study:

1. Does a significant correlation exist between employee perceptions of supervisor's commitment to the health and safety of workers and actual injury/illness rates within an organization?
2. Does a significant correlation exist between specific leadership practices of supervisors and their safety climate ratings as perceived by their employees?
3. Is there a significant difference in employee views on safety climate and leadership practices of their supervisor based on employee demographic variables including gender, education level, skilled versus non-skilled positions, time in position, or shift assignment?

Discussion of Research Findings

Findings for the specific research questions along with additional findings and observations related to the study are included in this section.

Research Question One

Research Question One asked, "Does a significant correlation exist between employee perceptions of his supervisor's commitment to the health and safety of workers and actual injury/illness rates within an organization?" A Pearson Product-Moment Correlation Coefficient was conducted to assess the statistical relationship between the safety climate score of participants drawn from survey Questions 8, 10, 12, 14, 16, 18, 20, 22, and 24 and the number of injuries that participants suffered within the last 12-month period.

With the exception of one workgroup, Plant Operations, no significant correlations emerged relative to research question one. In addition, the correlation found

in the Plant Operations Group data while meeting the threshold for significance ($p < .05$) appeared weak with a level of ($p = 0.03$). The overall lack of statistical significance may be a function of sample size as divided within the four workgroups. A larger sample size may be required to yield a statistically significant finding.

While the null hypothesis for Research Question One was rejected based upon the survey data, a comparison of secondary data gathered across the subject university as a whole, with national injury data (U.S. Department of Labor, 2012), revealed a positive relationship between a positive safety climate score for all respondents of 5.21 based on a 7- point Likert scale. The university data for all employees for the calendar year 2012 indicated a Total OSHA Recordable Case Rate of 1.7 cases per 100,000 hours worked compared to a national average for universities of 2.1 reflected in the most recent data available by the Bureau of Labor Statistics Data for calendar year 2011. The comparison revealed that the subject university rate was 19.0% lower than the national average. The data indicated a similar story for Lost Workday Case Rates, with the subject university displaying an annual rate of 0.47 cases per 100,000 hours worked versus a national average of 0.60, a 21.6% lower rate of injuries.

The individual group data collected as part of the survey process did not yield any substantial correlations between the group safety climate scores and their injury experience. However, applying the university-wide normalized data to a validated national database focused on colleges and universities yielded findings supportive of the concept that a positive safety climate will yield fewer injuries among the employees.

Research Question Two

Research Question Two asked, "Does a significant correlation exist between specific leadership practices of supervisors and their safety climate ratings as perceived by their employees?" Initial statistical analysis indicated strong consistency between groups based on the lack of variance in mean scores by group relative to their responses to the leadership practice questions. The results also indicated a strong positive mean score for all respondents of 5.62 for the same leadership questions. A Pearson Product-Moment Correlation Coefficient was computed to assess the relationship between the Safety Climate Score and the results of Leadership Practices Questions by workgroup. The results ranged from 0.81 for the Grounds Group to 0.85 for the Plant Operations Group, indicating a strong positive correlation.

The purpose in including this question was to validate the premise that leader actions transcend the operational climate of the workgroup. The findings indicate that, among the groups included in this study, the leaders displayed a consistency of actions both in areas of general leadership practices and more specifically actions that potentially impacted the safety of their subordinates.

Research Question Three

Research Question Three asked, "Is there a significant difference in employee views on safety climate and leadership practices of their supervisor based on employee demographic variables including gender, education level, skilled versus non-skilled positions, time in position, or shift assignment?" An analysis of variance (ANOVA) was performed to compare each of the demographic variables. The findings across the five demographic variables failed to yield any instances where the value of $p < .05$, therefore

no significant differences existed relative to gender, education level, skilled versus non-skilled positions, time in position, or shift assignment.

This lack of variance between demographic groups should serve as a positive indicator of a consistency of leadership among the supervisors of the participants within this research.

Additional Findings

While not specifically germane to the prescribed research questions, an interesting variance emerged regarding responses to two of the safety climate questions. The median rating for all survey questions by all respondents was 5.40 on a 7- point Likert scale. The two questions referenced numbers 14 and 27 were the only questions with ratings below 5.0. Question 14 -- “Refuses to ignore safety rules when work falls behind schedule” had a median rating of 4.33 while question 27 -- “Frequently talks about safety issues throughout the work week” -- had a median score of 4.87. The ultimate meaning of the rating divergence specifically regarding these questions lies beyond the realm of this study. The presence of this anomaly within the data may provide a window for a more focused future inquiry.

Study Limitations

The study addressed a relatively small sample of employees from one functional staff department at a single regional comprehensive university. The findings may have limits due to a potential lack of geographic, cultural, and ethnic diversity that may exist within the organization sampled. Additional studies should be considered to provide a broader view of the subject in other similar settings.

Suggestions for Future Research

The pursuit of knowledge that may prevent someone from suffering an occupational injury is a valuable endeavor. Developing a deeper understanding of the dynamics of leadership, as it relates to fostering a positive safety climate at the workgroup level, may ultimately lead to opportunities for enhancements in leadership selection and development processes. Additional studies could be conducted among similar populations at other universities, healthcare facilities, and non-profit organizations that would continue to build on the overall body of safety climate research.

Additional inquiry may be warranted within the target population of this study to explore the divergent data related to survey questions 14 and 27. A more granular exploration into the subtopics included in these questions may lead to development of strategies for improvement of local leadership practices.

Leading safety in the workplace is a pivotal topic that warrants additional inquiry. There exist several levels of focus on the topic beyond the first-line supervisor; these include actions of mid-level and senior leaders, in addition to enablers and catalysts including education and training for leaders at all levels. Establishing “need to know” attitudes towards safety related topics within organizations must start at the top. The organizational importance of specific initiatives and practices begins with the tone and direction set by leaders. Instilling a sense of importance regarding the safety of workers, into the psyche of leaders remains a dilemma. Exploring the current state of leadership development may provide valuable insight on where to begin.

Dunlap (2009) discussed the lack of safety content in leader education, specifically in Masters of Business Administration (MBA) programs. A review of MBA

curriculums, coupled with interviews of MBA candidates, provided evidence that formal course content focused on safety leadership is non-existent. During interviews with leaders in business settings that had recently completed an MBA, Dunlap found that while all participants viewed safety as important, and a key responsibility for them as leaders, none indicated that they had received formal training on the subject area.

Behm, Veltri, Fonooni, and Haynes (2008) surveyed the Deans of 50 business school across the United States to determine if their programs included environmental health and safety (EH&S) content as either required or elective courses. They further asked the deans to provide personal insight into their perspectives regarding the importance of EH&S knowledge for business leaders. With regard to curriculum, no health and safety related courses were included as either required or elective in any of the programs, while five schools listed elective courses in environmental related topics.

The study by Behm et al. (2008) also solicited feedback from the business school deans regarding their personal views on the importance of EH&S to today's business leaders. Of the deans that provided comments:

> Most thought that safety was an operational issue while environmental management was more strategic, and thus more important for their students to understand. Respondents also referred to the importance of green issues and sustainability, and the fact that environmental issues are public whereas safety is an internal issue, suggesting that public issues are more important than internal issues to the workforce.

Based upon the findings of Dunlap (2009) and Behm et al. (2008), there appears to be a need for inclusion of EH&S related topics, focused on key leadership practices, in

established avenues of leader development such as general management degree and/or MBA programs. Establishing a strong case for the inclusion of core safety courses within the curriculum of existing business degree programs may provide a platform for changing the paradigm of leaders with regard to their role in protecting workers.

Additional research should be considered to assist in strengthening the case for inclusion of EH&S within business curriculums. A comparative survey that solicited the view of individual leaders relative to their focus and involvement in leading safety initiatives within their organizations may provide a valuable base on which to build a compelling case for change. Establishing a correlation between the active support of safety initiatives among leaders, and reduced injury rates within their organizations would provide an opportunity to assign an estimated dollar savings associated with the positive leadership practices. While some may view the attribution of monetary implications to the topic of employee injuries as abhorrent, the exercise may provide a common rally point for the divergent philosophies that span the world of business academics.

Enlisting key faculty from leading business schools to jointly participate in safety leadership research may also hold promise for escalating interest in the topic area. The potential leverage that accompanies the endorsement of theories and practices by established academics' within renowned universities can greatly accelerate the recognition and acceptance of concepts such as active safety leadership across the world of business.

Establishing practical correlations between the implementation of positive safety initiatives with established business practices such as quality, waste reduction, and

sustainability may provide yet another avenue. Taubitz (2010) discussed avenues that safety professionals can and should utilize to become "part of the discussion" around lean and sustainable initiatives. Taubitz illustrates that "natural" partnership opportunities exist to inject EH&S principles into the "fabric" of sustainable initiatives.

La Duke (2011) makes a case for the application of Deming's principles of elimination of waste and adoption of new operating philosophies around safety within organizations. Injuries and the resulting direct and indirect effects on daily activities within an organization constitute waste. Preventing injuries constitutes a proactive form of waste elimination, a practice core to Deming's principles. The principle of adopting new operating philosophies supports the premises espoused by La Duke (2011) and Taubitz (2010). Leaders must be motivated to think not only "outside the box" but also in terms of actively championing EH&S practices in their daily operational practices.

Establishing partnerships between business leaders, academia, and safety professionals to collectively undertake a series of research initiatives aimed at establishing a substantive body of data to support the need for leadership engagement in safety, appears to hold the most promise for gaining acceptance of safety leadership concepts.

Conclusions

The documented research into the specific topic of safety climate appears to have begun with a seminal study by Zohar (1980) that sought to link the potential impact of organizational leaders actions on the overall view and actions of their employees toward safety. While the initial study did not yield findings that supported a significant correlation between supervisor's actions and the relative safety of employees, it provided

clear indicators that the concept of safety climate was both real and warranted further study.

Following Zohar's initial research in 1980 through 2003, some 29 studies were undertaken around the globe focused on exploring the concept of safety culture and/or climate in a broad array of industrial settings. While the structure and findings of the studies presented considerable variability, commonality was found in on the fact that leaders' actions provided the greatest impact either positive or negative on the overall operational climate of the workgroups and, specifically, on the area of safety (Yule, 2003).

The findings of this study, while in several instances not yielding statistically significant data, support several key assertions that appear to have relevancy in the study and practice of the critical importance of leadership in providing a safe workplace. The overall responses of the study participants in both safety climate and general leadership actions indicated strong consistency, and also substantially positive overall scores. These positive survey scores coupled with the subject university data that indicates an injury experience some 20 % less than the average for U.S. universities, provides a persuasive argument for the overall construct of the study.

It stands to reason that the immediate supervisor would have the greatest influence on their employees due to the high level of daily contact and the basic nature of the leader-employee relationship. Flin (2003) supported the notion that while all levels of leadership within an organization have influence on policies and actions that, directly impact the safety of employees, generally speaking the lower level employees face the

greatest risk for injury. Therefore, their immediate supervisors have the greatest potential for influence within their span of control.

Going forward, much additional research is needed on this subject of safety climate. A compelling case exists based upon the number of occupational fatalities and serious injuries that occur each day in this country. The opportunities to better understand the relationship and dynamics that exist between supervisors and the employees they manage, particularly in the area of safety climate, appear abundant. While complex, the concepts of organizational culture and climate become a bit clearer with each additional piece of research completed.

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APPENDIX A: INSTITUTIONAL REVIEW BOARD APPROVED DOCUMENTS

A LEADING AMERICAN UNIVERSITY WITH INTERNATIONAL REACH
OFFICE OF COMPLIANCE

DATE:	April 26, 2013
TO:	David Oliver, BS,MS
FROM:	Western Kentucky University (WKU) IRB
PROJECT TITLE:	[456000-1] A Comparative Analysis of the Relationship Between Employee Perceptions of Their Supervisor's Commitment to Safety and Actual Injury Rates in a University Setting
REFERENCE #:	IRB 13-369
SUBMISSION TYPE:	New Project
ACTION:	APPROVED APPROVAL
DATE:	April 26, 2013
REVIEW TYPE:	Exempt from Full Board Review

Thank you for your submission of New Project materials for this project. The Western Kentucky University (WKU) IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Exempt from Full Board Review based on the applicable federal regulation. Please

remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by an *implied* consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

This project has been determined to be a Minimal Risk project.

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Paul Mooney at (270) 745-2129 or irb@wku.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Western Kentucky University (WKU) IRB's records.

WESTERN KENTUCKY UNIVERSITY

Institutional Review Board
Continuing Review Report

Name of Project: A Comparative Analysis of the Relationship Between Employee Perceptions of Their Supervisor's Commitment to Safety and Actual Injury Rates in a University Setting
Name of Researcher: David E. Oliver MS, CSP, CEM
Department: WKU Ed Leadership doctoral Program

How many total subjects have participated in the study since its inception? # 0

How many subjects have participated in the project since the last review? # 0

Is your data collection with human subjects complete? ☐ **Yes** ■ **No**

1. Has there been any change in the level of risks to human subjects? (If "Yes", please explain changes on a separate sheet). ☐ Yes ■ No

2. Have informed consent procedures changed so as to put subjects above minimal risk? (If "Yes", please describe on a separate sheet). ☐ Yes ■ No

3. Have any subjects withdrawn from the research due to adverse events or any unanticipated risks/problems? (If "Yes", please describe on a separate sheet). ☐ Yes ■ No

4. Have there been any changes to the source(s) of subjects and the Selection criteria? (If "Yes", please describe on a separate sheet). ☐ Yes ■ No

5. Have there been any changes to your research design that were not specified in your application, including the frequency, duration and location of each procedure. (If "Yes", please describe on a separate sheet). Survey Instrument Attached with Highlighted Changes ■ Yes ☐ No

6. Has there been any change to the way in which confidentiality of the Data is maintained? (If "Yes", please describe on a separate sheet). ☐ Yes ■ No

7. Is there desire to extend the time line of the project? ☐ Yes ■ No

On what date do you anticipate data collection with human subjects to be completed? _____

INFORMED CONSENT FOR STUDY PARTICIPANTS

Project Title: Department of Facilities Management - Employee Safety Perception Study

Investigator: David E. Oliver CSP, CEM, 270-745-4181

You are being asked to participate in a project conducted through Western Kentucky University. The University requires that you acknowledge your agreement to participate in this project. The investigator or his delegate will explain to you in detail the purpose of the project, the procedures to be used, and the potential benefits and possible risks of participation. You may ask him/her any questions you have to help you understand the project. A basic explanation of the project is written below. Please read this explanation and discuss with the researcher or his delegate any questions you may have.

1. **Nature and Purpose of the Project:** Doctoral dissertation research to determine if employee's perception of their supervisor's commitment to safety is reflected in the actual number of injuries that occur on in the workplace.

2. **Explanation of Procedures:** By completing this survey, the information you provide will be analyzed and compared to the number of injuries that have occurred within the group over the last twelve months. The findings will provide critical information regarding a possible correlation between safety climate and the frequency of injuries.

3. **Discomfort and Risks:** There are no known discomforts or risks that are likely to result from this research.

4. **Benefits:** The University may derive benefits from a better understanding of how the actions of supervisors can impact the relative safety of the workplace. This information may lead to improved safety procedures and training for all levels of the university.

5. **Confidentiality:** At no point will participants be asked to include their name or other identifying information as part of this project. Upon completing the survey you will be asked to place it in a sealed box, that will only be opened when all surveys have been completed. Survey forms will be retained in a secure location on campus for the required time period of three years, after that period all related materials will be disposed of in accordance with university policy for disposal of confidential materials.

6. **Refusal/Withdrawal:** Participation in this research project is entirely voluntary. There are no penalties for choosing not to participate, and anyone who agrees to participate in this study is free to withdraw from the study at any time with no penalty.

After reviewing the elements of the project, if you then decide to participate, your completion of this survey will serve as verification of your implied consent as a voluntary participant.

You understand also that it is not possible to identify all potential risks in an experimental procedure, and you believe that reasonable safeguards have been taken to minimize both the known and potential but unknown risks.

THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY
THE WESTERN KENTUCKY UNIVERSITY INSTITUTIONAL REVIEW BOARD
Paul Mooney, Human Protections Administrator
TELEPHONE: (270) 745-2129

APPENDIX B: SURVEY INSTRUMENT

Safety Climate Survey

1) I have worked at WKU _____ Years 2) I have been in my current job _____ Years

3) I normally work _____ Days _____ Nights 4) Gender : _____ Male _____ Female

5) My level of education is _____ High School/GED _____ Some College or Technical School _____ College Graduate

6) I am assigned to (Select One):

_____ Maintenance _____ Plant Operations _____ Building Services Attendants _____ Grounds Crew

7) Approximately how long has your primary supervisor been a supervisor?

_____ Less than 6 Months _____ One Year _____ 3-5 Years _____ Over 5 Years _____ I do not know

Below are some questions about your primary supervisor. Please rate your supervisor on his/her performance for each of the questions below, using the following scale rating 1 to 7

1 = Never 2 = Very Rarely 3 = Rarely 4 = Occasionally 5 = Frequently 6 = Very Frequently 7 = Always

Item	Question	Rating
8	Discusses how to improve safety with us	
9	Understands my job and what I do well enough to help me with problems	
10	Uses explanations (not just compliance) to get us to act safely	
11	Possesses the knowledge, skills, and/or experience necessary to perform job	
12	Frequently tells us about the hazards in our work	
13	Is available when needed	
14	Refuses to ignore safety rules when work falls behind schedule	
15	Has a positive attitude and encourages an enjoyable work environment	
16	Is strict about working safely when we are tired or stressed	
17	Practices good customer service	
18	Makes sure we follow all the safety rules (not just the important ones)	
19	Resolves employee conflicts in an appropriate manner	
20	Insists that we obey safety rules when fixing equipment or machines	
21	Effectively holds me accountable for the way I do my work	
22	Says a "good word" to workers who pay special attention to safety	
23	Communicates clearly and concisely expectations, assignments, and/or instructions	
24	Is strict about safety at the end of the shift, when we want to go home	
25	Regularly solicits and/or is open to my input about how to improve our department	
26	Spends time helping us learn to see problems before they arise	
27	Frequently talks about safety issues throughout the work week	

Please also answer the follow questions about yourself:

28) In the past twelve months I have had _____ injuries that required only minor first aid (Band Aid, etc)

29) In the past twelve months I have had _____ injuries that required medical attention (Doctor, ER, Urgent Care, etc)

30) In the past twelve months I have had _____ injuries that caused me to miss one or more days of work