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Gretchen A. Mosher

*Iowa State University*, gamosher@iastate.edu

Nir Keren

*Iowa State University*, nir@iastate.edu

Steven A. Freeman

*Iowa State University*, sfreeman@iastate.edu

Charles R. Hurburgh Jr.

*Iowa State University*, tatry@iastate.edu

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# Measurement of Worker Perceptions of Trust and Safety Climate in Managers and Supervisors at Commercial Grain Elevators

## **Abstract**

The safety climate of an agricultural workplace may be affected by several things, including the level of trust that workers have in their work group supervisor and organizational management. Safety climate has been used by previous safety researchers as a measure of worker perceptions of the relative importance of safety as compared with other operational goals. Trust has been linked to several positive safety outcomes, particularly in hazardous work environments, but has not been examined relative to safety climate in the perennially hazardous work environment of a commercial grain elevator. In this study, 177 workers at three Midwest grain elevator companies completed online surveys measuring their perceptions of trust and safety at two administrative levels: organizational management and work group supervisors. Positive and significant relationships were noted between trust and safety climate perceptions for organizational managers and for work group supervisors. Results from this research suggest that worker trust in organizational management and work group supervisors has a positive influence on the employees' perceptions of safety climate at the organizational and work group levels in an agricultural workplace.

## **Keywords**

Elevators, Management, Safety, Working conditions

## **Disciplines**

Agriculture | Bioresource and Agricultural Engineering | Occupational Health and Industrial Hygiene

## **Comments**

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# Measurement of Worker Perceptions of Trust and Safety Climate in Managers and Supervisors at Commercial Grain Elevators

G. A. Mosher, N. Keren, S. A. Freeman, C. R. Hurburgh Jr.

**ABSTRACT.** *The safety climate of an agricultural workplace may be affected by several things, including the level of trust that workers have in their work group supervisor and organizational management. Safety climate has been used by previous safety researchers as a measure of worker perceptions of the relative importance of safety as compared with other operational goals. Trust has been linked to several positive safety outcomes, particularly in hazardous work environments, but has not been examined relative to safety climate in the perennially hazardous work environment of a commercial grain elevator. In this study, 177 workers at three Midwest grain elevator companies completed online surveys measuring their perceptions of trust and safety at two administrative levels: organizational management and work group supervisors. Positive and significant relationships were noted between trust and safety climate perceptions for organizational managers and for work group supervisors. Results from this research suggest that worker trust in organizational management and work group supervisors has a positive influence on the employees' perceptions of safety climate at the organizational and work group levels in an agricultural workplace.*

**Keywords.** *Elevators, Management, Safety, Working conditions.*

Human factors play an important, but often overlooked, role in the management of safety in the work environment. Workplace safety is one of several competing organizational demands. The relative priority of these demands is formed by perception, based in part on employee experiences and practices (Das et al., 2008; Zohar and Luria, 2005). One human factor that is believed to influence workers' perception of the climate of safety is trust. The following sections review the literature relevant to trust, agricultural safety, and safety climate, all factors associated with the proposed relationships between variables in this study.

## Trust

Trust has been shown by previous safety researchers to play an important role in safety-related outcomes in the workplace (Conchie and Burns, 2008; Cox et al., 2006).

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The authors are **Gretchen A. Mosher, ASABE Member**, PhD, Assistant Professor, **Nir Keren, PhD**, Associate Professor, **Steven A. Freeman, ASABE Member**, PhD, Professor, and **Charles R. Hurburgh Jr., ASABE Member**, PhD, Professor, Department of Agricultural and Biosystems Engineering, Iowa State University, Ames, Iowa, **Corresponding author:** Gretchen A. Mosher, 104 Industrial Education II, Iowa State University, Ames, IA 50011; phone: 515-294-6416; e-mail: gamosher@iastate.edu.

Several positive organizational outcomes have been linked with positive employee trust perceptions, including high-quality communication, higher performance levels, constructive citizenship behaviors, increased problem solving, and employee cooperation (Whitener et al., 1998). Furthermore, the effect of supervisors and management on the safety perceptions of workers has been discussed by many researchers and practitioners (White and Eiser, 2006; Zohar and Luria, 2005), but none have specifically studied the relationship between trust and safety climate. Although trust has been suggested as a contributing factor in the enhancement of safety climate in previous studies (Conchie and Donald, 2008; Mullen, 2004; Seo et al., 2004), little research has measured the strength of the relationship between organizational and work group level trust and safety climate (Thompson et al., 1998) in an agricultural work environment.

Although few studies have tested the impact of trust on safety climate, low trust levels have been linked to several negative safety and organizational outcomes. First, a lack of trust in administrators may divert workers' attention from their assigned tasks (Mayer and Gavin, 2005). Moreover, workers who are concerned or worried about the behavior of their boss may not be focusing on improving their own work or concentrating on their personal safety. Davis et al. (2000) noted that other outcomes of low-trust work environments may include increased attempts to break management rules or setting inappropriate goals that contradict organizational objectives. Kath et al. (2010) and Prussia et al. (2003) suggested that a stronger agreement on safety concerns is present in settings where positive relationships between managers and workers are evident, and this agreement is more likely to predict positive organizational safety outcomes.

Trust has been shown to be particularly important in high-reliability organizations. High-reliability organizations have been defined as those where safety is a critical component of operations (Cox et al., 2006). Failure in safety systems within these operations could lead to high-level damage, injury, or loss of life. Examples in the literature include aviation, biotechnology, offshore drilling, nuclear power, and rail operations (Cox et al., 2006).

Levin (1999) identified two primary constructs of trust: consistency and credibility. Consistency has been identified by several other researchers as a principal component of trust. Dependable and consistent behavior is grounded in correspondence between the actions and the words of management and supervisory personnel over a period of time (Clark and Payne, 1997) and plays an important role in cultivating and sustaining workplace trust. Even so, consistency alone does not constitute trust, as low-trust actions may also be predictable to workers. Credibility provides the second construct of trust as defined by Levin (1999). From an employee perspective, credibility is characterized not only by consistency between words and deeds, but by an alignment between the values of the trustor and the trustee (Mayer et al., 1995). For this reason, both constructs are important components of the definition of two-level trust in a workplace setting.

## **Agricultural Safety**

Agriculture is not included on the list of high-reliability organizations (Cox et al., 2006) even though work environments within the commercial grain-handling industry have no shortage of safety hazards. Production agriculture has long been considered a hazardous profession based on the number of safety incidents recorded annually (Chapman and Husberg, 2008; BLS, 2012). Management and supervisory personnel at commercial grain-handling facilities deal with a wide variety of safety hazards (OSHA,

2004). Other challenges of agricultural worksites include the combination of large numbers of seasonal and temporary laborers and the intense pressure for high productivity during the busy spring and fall seasons (Walker, 2010).

On any given day, multiple hazards are presented to workers in the agricultural commodity-handling industry. The risks are well known by workers (Walker, 2010), yet fatality rates in the industry are perennially higher than those in other industries (BLS, 2012). One factor playing a major role in safety outcomes is employee behavior (Neal et al., 2000).

## **Safety Climate**

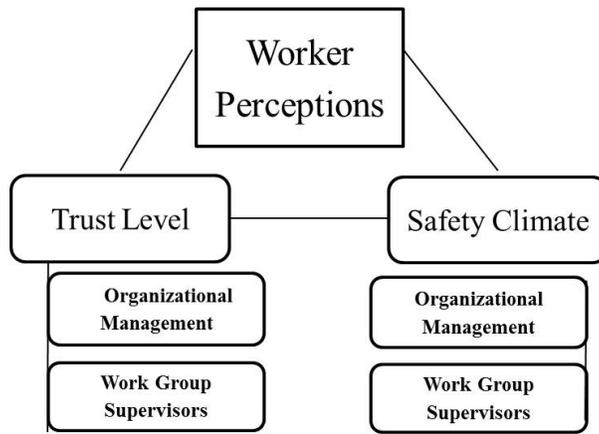
One measurement that has been suggested as a frame of reference for employee behavior is safety climate (Cooper and Phillips, 2004). Safety climate was introduced by Zohar (1980) as a measurement of shared employee perceptions concerning the relative importance of safety as compared with other organizational goals. Several researchers have defined and discussed factors that predict safety climate (Cooper and Phillips, 2004; Griffin and Neal, 2000), but disagreement remains on the constructs and dimensions that predict or describe an organization's safety climate.

Despite differences among researchers, dominant themes have emerged. One theme that has been revealed repeatedly is the commitment that management and supervisors have toward safety (Cavazza and Serpe, 2009; Conchie and Donald, 2008; Neal et al., 2000). Cooper and Phillips (2004) characterized the relationship between management and supervisory commitment and safety climate as complex, with changes in climate level and strength not always resulting in a more positive safety performance. Flin et al. (2000) suggested that safety climate components and themes vary greatly according to differences in industry, company, and work practices. A second theme emphasized by safety researchers is the importance of work group attitudes toward safety (Pousette et al., 2008; Zohar and Luria, 2005). Seo et al. (2004) suggested that management commitment to safety was an influencing factor on supervisory commitment to safety, suggesting a relationship between safety attitudes at the organizational level and the group level. This research aligns with that of DeJoy et al. (2004), who found that a positive safety climate was greatly influenced by company policies and practices. DeJoy's earlier work (1996) viewed safety climate as a primary factor in both supporting and self-protective safety actions.

In testing their multi-level model of safety climate, Zohar and Luria (2005) found that organizational (management) climate predicts work group (supervisory) climate, which in turn predicts worker behavior.

Furthermore, Das et al. (2008) noted that safety climate has a significant perceptual component. This means that workers may recognize and construe information or episodes quite differently than expected, and management and supervisors may have little control over these perceptions. Clark (1999) noted that a lack of understanding and incorrect perceptions was common among work groups. Negative or incorrect perceptions may incorrectly influence group beliefs about other work expectations. Because perceptions are not necessarily based on fact, but rather the workers' interpretation of facts, having correct information about group safety perceptions is important for managers and supervisors (Clark and Payne, 1997).

For this reason, understanding the influence of factors such as trust on perceptual-based measures such as safety climate provides managers and supervisors a good idea of



**Figure 1. Relationship of worker trust and perceptions of safety climate at organizational and work group levels.**

how their workers might act in a safety-sensitive situation. This is especially true in work environments that have multiple hazards or high time pressure (Cox et al., 2006; McLain and Jarrell, 2007). Agricultural work environments have both of these components, yet little research has examined the influence of trust in management and supervisory personnel at a grain-handling facility.

This research seeks to better understand the relationship between employee perceptions of trust and safety climate at two levels of administration: organization (management) and group (supervisory). This research is the first examination of the relationship between trust and safety climate at two levels in a grain elevator work environment, an environment that has been characterized multiple times as one of the most dangerous occupational sectors (BLS, 2012; Chapman and Husberg, 2008). Thus, this study aimed to answer the following research questions:

- Q1. Does organizational trust predict the level of organizational safety climate?
- Q2. Do employee perceptions of organizational consistency and credibility predict the organizational safety climate?
- Q3. Does work group trust predict the level of group safety climate?
- Q4. Do employee perceptions of work group consistency and credibility predict the group level safety climate?
- Q5. Do organizational trust, consistency, and credibility predict group trust, consistency, and credibility?
- Q6. Does organizational safety climate predict group safety climate?

A graphical model of the relationship between workers' trust and perceptions of safety climate at the organizational (management) and work group (supervisory) levels is shown in figure 1.

## **Methodology**

Two survey instruments were used to measure trust and safety climate. The Management Behavior Climate Assessment (Levin, 1999) was used to evaluate employee trust levels in their management and their work group supervisor as well as provide demographic data such as age, gender, and educational background. The 40-item

instrument (20 items measuring perceptions of management, and 20 items measuring perceptions of supervisors) was developed and validated by Levin (1999) as a behavioral measurement of trust in two levels of administration. She validated the survey instrument by administering it to 601 individuals from seven diverse organizations, including manufacturing, academic, military, and government settings.

Variables were measured on a five-point scale (1 = almost or almost always, 2 = usually, 3 = occasionally, 4 = seldom, and 5 = rarely or never). Examples of items used included “Top management tells the same story to each person they speak to” and “My supervisor does what he or she says they will do.” Levin (1999) identified two factors to explain the concept of trust: consistency and credibility. Confirmatory factor analysis performed on data gathered for this project yielded similar results. Therefore, the aggregated means of employee responses regarding trust, consistency, and credibility are included in the models presented as the dependent variable.

To measure employee perceptions of safety climate, the Organization and Group Level Safety Climate instrument (Zohar and Luria, 2005) was used. To validate the instrument, it was administered to 3,952 employees from 36 manufacturing plants in several industries. Johnson (2007) further validated the instrument with an additional 292 employees at three heavy manufacturing locations. The instrument consisted of 32 items and surveyed employees on two levels: organizational (management) and work group (supervisory). Items were scored on a five-point scale (1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, and 5 = strongly disagree). Examples of items used include “Top management react quickly to solve problems when told about safety hazards” and “My supervisor emphasizes safety procedures when we are working under pressure.”

Factor analysis yielded one universal safety climate factor for management (organizational) and one for supervisors (group); therefore, aggregated scores for employee perceptions of organizational and work group safety climate are used in analysis. Although the scale originally used a three-factor climate structure, the one-factor climate structure has been suggested by the researchers as adequate (Johnson, 2007; Zohar and Luria, 2005). Thus, one factor was used to represent safety climate at each administrative level, resulting in an organizational safety climate value and a work group safety climate value.

Instruments were administered to workers in a web-based platform. The data collection process began with a letter of consent, followed by the trust and safety questionnaires. Questionnaires were presented in random order, and questionnaire items were also randomized. To connect data between instruments, workers were assigned random identification numbers. No personal identifiers were linked with the identification numbers to eliminate the possibility of tracking participants' responses and to promote candid responses from the participants.

## Results

Participants were employees of three grain-handling facilities located in the upper Midwest region of the U.S. Workers who would be subject to safety-related decisions in their daily job were offered the opportunity to participate in the project. Of the 410 invitations, 197 responded. Of these 197 respondents, 177 provided usable data, for a response rate of 43%.

Scale reliabilities were calculated with Cronbach's alpha. The reliability of the organizational and work group trust scales were 0.96 and 0.97, respectively, while the

**Table 1. Demographic characteristics of participants at each grain elevator.**

		Company 1 (n = 33; 19%)	Company 2 (n = 19; 11%)	Company 3 (n = 125; 70%)	Total (n = 177)
Gender	Male	28 (85%)	16 (84%)	98 (78%)	142 (80%)
	Female	5 (15%)	3 (16%)	27 (22%)	35 (20%)
Age	Under 30	5 (15%)	4 (21%)	27 (22%)	36 (20%)
	31 to 40	7 (21%)	3 (16%)	19 (15%)	29 (16%)
	41 to 50	10 (30%)	7 (37%)	39 (31%)	56 (32%)
	51 to 60	9 (27%)	3 (16%)	35 (28%)	47 (27%)
	Over 61	2 (6%)	2 (10%)	5 (4%)	9 (5%)
Education	Below HS	1 (3%)	0 (0%)	3 (2%)	4 (2%)
	High school	16 (48%)	4 (21%)	40 (32%)	60 (34%)
	2 years or less	14 (42%)	10 (53%)	58 (46%)	82 (46%)
	4 years or more	2 (6%)	5 (26%)	24 (19%)	31 (18%)

organizational and group safety climate scales showed reliability scores of 0.95 and 0.97, respectively. All of these scores were above the standard guideline of 0.80 and therefore are considered to demonstrate adequate reliability (Bryman and Cramer, 2009).

Workers were drawn from grain elevator operators that volunteered their workers for the study. The service area of the participating grain elevators covers approximately 60% of the state surveyed, and the grain-handling capacity of the participating grain elevators is approximately 20% of the state's grain-handling capacity in an average year (Ag Classroom, 2010). Demographic characteristics of the sample are shown in table 1.

Analysis was conducted with SPSS (v. 19.0, IBM Corp.). Bivariate linear regression techniques were used to determine whether organizational and group safety climate responses could explain a significant amount of variance in the dependent variables of organizational and group trust, organizational and group consistency, and organizational and group credibility. To calculate the proportion of variance explained by the safety climate responses, standardized regression coefficients (r) were used along with F-tests. The F-score was used to determine if the amount of variance explained was statistically significant. The standard error of the regression coefficient was used to measure the extent to which the regression coefficient could differ from sample to sample (Bryman and Cramer, 2009). A summary of the models generated from both administrative levels (organizational and work group) is shown in table 2.

A positive and significant relationship was noted between organizational trust and organizational safety climate. A high level of variance (approx. 28%) in the dependent

**Table 2. Bivariate regression models of trust, consistency, credibility, and safety climate.<sup>[a]</sup>**

Variable Tested	Standardized Regression Coefficient (r)	Standard Error of Regression Coefficient	F-Value
Organizational trust and organizational safety climate	0.526**	0.074	51.92**
Organizational consistency and organizational safety climate	0.248**	0.072	11.93**
Organizational credibility and organizational safety climate	0.163*	0.069	5.54*
Work group trust and work group safety climate	0.421**	0.068	42.06**
Work group consistency and work group safety climate	0.118	0.067	2.48
Work group credibility and work group safety climate	0.113	0.061	2.29

<sup>[a]</sup> Asterisk (\*) indicates significance at  $p < 0.05$ ; \*\* indicates significance at  $p < 0.01$ ;  $n = 177$ .

**Table 3. Relationships of worker perceptions of manager and supervisor trust, consistency, credibility, and safety climate.<sup>[a]</sup>**

Variable Tested	Standardized Regression Coefficient (r)	Standard Error of Regression Coefficient	F-Value
Organizational trust and work group trust	0.837**	0.039	456.72**
Organizational consistency and work group consistency	0.846**	0.034	492.80**
Organizational credibility and work group credibility	0.681**	0.054	151.99**
Organizational safety climate and work group safety climate	0.735**	0.051	206.37**

<sup>[a]</sup> Asterisk (\*) indicates significance at  $p < 0.05$ ; \*\* indicates significance at  $p < 0.01$ ;  $n = 177$ .

variable trust was explained by the workers' perceptions of organizational safety climate. Organizational consistency and credibility, while significant, did not explain the same level of variance (approx. 6% and 2%, respectively).

The same statistical tools were used to measure the relationships between trust, consistency, and credibility at the two administrative levels as well as the relationship between the two levels of safety climate. The results are shown in table 3. Positive and significant relationships were observed between the safety climate factors at the organizational and work group levels. All bivariate regression models were significant at  $p < 0.01$ . Additionally, the amount of variance explained in each model was significant.

## Discussion

Positive and significant relationships were noted between organizational trust, consistency, and credibility and organizational safety climate, suggesting that high levels of trust and its factors predict a more positive organizational safety climate. The strength of the relationships between the trust variables and safety climate at the organizational level are noteworthy, indicating that more positive perceptions of organizational trust, consistency, and credibility predicted a more positive opinion concerning organizational safety climate. This finding provides an empirical basis for a relationship that many researchers (Clark, 1999; Mayer and Gavin, 2005; McLain and Jarrell, 2007) have implied and supports similar findings by Kath et al. (2010). Based on these data, the perception of consistent and credible behaviors by management predicts a high level of organizational safety climate, but the composite score of trust perceptions explains a higher degree of variance in the model. This observation indicates that, although consistency and credibility are important factors of employee trust, as individual predictors of safety climate they are not as strong as they are together, as the two factors together form trust. This finding aligns with previous research on trust (DeJoy, 1996; Levin, 1999; Whitener et al., 1998; Clark and Payne, 1997).

The same observation on the influence of trust on safety climate, as opposed to consistency and credibility alone, is seen at the work group level. Although work group trust levels predicted the level of group safety climate responses, a perception of consistent and credible behavior within the work group did not significantly predict a higher level of safety climate. This finding aligns partially with the findings of Zohar and Luria (2005) on two-level safety climate, with a significant relationship between trust in the work group supervisor and perception of positive safety climate. However, a stronger effect was noted at the organizational level in this study, contradicting Zohar and Luria's

(2005) finding that work group climate has a stronger impact than organizational climate on employee perceptions.

The positive and significant relationship between trust factors and safety climate responses at both levels was not unexpected. Both Thompson et al. (1998) and Zohar (2008) observed a stable relationship between safety goals at the organizational and work group levels. Both researchers noted that the roles each play may be different, with organizational management creating policy and procedure, and work group supervisors implementing the resulting policies on a daily basis. An alternative interpretation comes from Thompson et al. (1998), who concluded that managers and supervisors play different roles in the “politics” of an organization. From a safety perspective, harmful politics from the organizational management can result in inappropriate priorities, unrealistic production schedules, and unhealthy incentives, all of which are detrimental to workplace safety. Because work group supervisors are often sensitive to these organizational-level politics and may serve as a liaison between management and the workers (Thompson et al., 1998), it is not unexpected to find a strong and significant relationship between trust factors and safety climate.

### **Limitations and Future Work**

The study results suggest an important relationship between safety climate and workers’ perceptions of trust in organizational managers and workplace supervisors. The research builds on previous work, which proposed that worker perceptions play a role in safety climate (McLain and Jarrell, 2007; Zohar and Luria, 2005) and that trust plays a role in determining those perceptions (Kath et al., 2010). The research of DeJoy et al. (2004) suggested that safety-related policies and strong organizational communication about safety expectations can also directly influence workplace safety outcomes. The findings of this study suggest that the role of management and supervisors in workers’ safety climate perceptions should not be discounted. However, perceptions of trust and safety may vary at different levels of administration. For example, low trust in management may have different effects than low trust in supervisors. Furthermore, these results strongly suggest that trust should be considered an important element of safety culture in the agricultural work environment, with an emphasis on encouraging managers and supervisors to focus on consistent and credible actions to enhance safety outcomes for their workers.

As with most research, many questions concerning trust and safety climate in agricultural workplaces remain. Further research is needed to better understand the differing dynamics of low trust at multiple levels within the company, as well as factors that influence the priority workers give to safety. Modeling two-level trust with additional educational or training interventions and their impact on both the safety visibility and the safety performance within an organization would also add to the body of knowledge on agricultural safety.

Several limitations constrain the generalizability of this research. First, a small sample size and potential measurement error both have the potential to affect the results of the study. Additionally, the data were collected using cross-sectional collection techniques from research subjects whose organizations volunteered for the study, introducing the potential for selection bias. The scope of this study did not include family grain operations, where the work climate may be driven by a different set of factors than were examined here. Furthermore, even in a commercial grain-handling facility, factors other than trust could impact how workers feel about safety climate. Gender, ethnicity, career

choice, and risk perceptions are just a few factors that could also play a role in how workers perceive safety climate (Henning et al., 2009). Future research could address some of these potential factors. Testing the findings on a wider population with more diversity in gender, occupation, and workplace hazards would also add to the existing body of knowledge in this area.

The prevention of safety incidents in the agricultural workplace has many factors. The perceptions of workers may be one of the more difficult factors to manage and control because of the strong perceptual component (Das et al., 2008), but this research suggests that consistent and credible behavior by managers and supervisors could play a positive role in encouraging enhanced perceptions of workplace safety by workers.

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