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Safety Climate Among Nontraditional Workers in Construction: Arguing for a Focus on Construed External Safety Image

Emily Stiehl[1] and Linda Forst[1]

Abstract

Safety climate, employees' perceptions of work-related safety,[1] has been promoted as a leading indicator of workplace safety in construction.[2,3] While research has primarily examined internal organizational sources (e.g., manager attitudes, formal organizational policies) on these perceptions, external sources of information might be more relevant to construction workers in nontraditional jobs who work for a limited time and/or have limited interaction with other employees. This paper argues for the future development of a *construed external safety image* scale to measure employees' perceptions about how external groups view their organization's safety.[4] The construed external safety image would capture the external sources that nontraditional workers use to assess safety climate and will allow public health researchers to identify and change dangerous workplaces while more effectively communicating information about safe workplaces to workers. The public health relevance of safety climate and construed external safety image for monitoring and communicating safety to nontraditional workers require examination.

Keywords

safety climate, residential construction, contingent workers, construction health and safety

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Introduction [AQ1]

Improving safety to reduce physical injury at work is an important focus for public health research and practice. *Safety climate*[a] represents workers' shared perceptions of the policies and practices around safety in their organizations[1] and has been acknowledged as a leading indicator of workplace safety.[2] In fact, a number of well-documented findings have linked it to subsequent safety behavior in organizations.[5–7] However, these studies have been primarily developed and tested in organizations with stable employment, where employees engage in shared sensemaking[8] to develop safety climate perceptions.[9] In this context, these shared perceptions are driven by internal organizational factors,[10,11] the two most significant of which are employee perceptions: (a) of the relevance of safety to their jobs and (b) of management's attitude toward safety.[6,12]

In the United States, the number of employees in isolated, temporary, or part-time occupations is large and growing.[13] They include workers in a range of occupations, such as construction, seasonal farm work, retail, and home care. These nontraditional workers are engaged in so-called precarious work. They often are employed for short or fixed durations, move between multiple sites or employers, and have less job security than full-time workers. Both a lack of job stability and a lack of familiarity among work teams can actually undermine safety outcomes in organizations. This is especially true in construction work, which will serve as the context of this paper. Residential construction workers are often employed to do a limited job on a single site for a fixed duration of time before moving to the next job, often at a new site with a different company or contractor. In the extreme, day laborers will wait on a street corner to be picked up for a job, where they are hired for the day and paid in cash, leaving little to no record of their employment.[14] This leaves little time for them to develop their own informed perception, much less a shared perception, of what their employer thinks about safety.

There are important questions about how well existing safety climate measures adequately capture nontraditional workers' perceptions of safety climate in an organization. For instance, are job tenure or interpersonal interactions necessary for the development of safety climate? In the workplace, research has begun to examine whether the sources of information used to develop safety climate perceptions are ubiquitous across all employees. The findings suggest that they are not. For instance, individual factors, including tenure[15] and work orientation (permanent vs. temporary employment[16]), seem to differentially impact safety climate. Employees with longer tenure in the organization have better perceptions of safety climate, on average.[15] Similarly, permanent employees are more likely to use organizational- and group-level indicators as referents for developing safety

perceptions (e.g., supervisory leadership, organizational training), while temporary employees are more likely to attend to individual themes (e.g., knowledge about safety and safety behaviors).[16] In both cases, long-term, permanent employees are likely to develop shared safety climate perceptions from internal organizational factors. In contrast, there are reasons to suspect that the use of internal safety climate measures, alone, may not be appropriate for nontraditional workers. First, different groups of employees are exposed to different risks, but safety climate measures the average assessment across employees, rather than at differences in the extremes (i.e., very hazardous vs. less hazardous workplaces, worksite, or work spaces). For instance, a laborer and a contractor may be exposed to very different job risks on the same job site, due to the different demands associated with their work roles. Second, nontraditional workers often have less interaction with other workers, sometimes working alone at a given site. This leaves less time to engage in shared sensemaking with other employees on the job or to develop perceptions of safety through internal interactions. Third, since nontraditional workers are more likely to be exposed to hazards as part of their job, these incidents may become normalized, leading workers to indicate that an organization is safe, even when objective measures would suggest otherwise.

The goal of this paper is to argue for a new measure to capture the relative importance of external forces, in addition to internal ones, for measuring safety climate among nontraditional workers. We draw on the idea of construed external image—i.e., employees' beliefs about how outsiders view their organization[4,17]—to describe three potential external sources of information about an organization's safety climate that could moderate the relationship between the organizational context and the employees' safety climate responses. We call this new measure as construed external safety image (CESI). Our purpose in this paper is to make the case for creating a CESI measure and to propose three external forces that should be considered for the measure's development. If indeed nontraditional workers use external sources of information for assessing safety, public health professionals could use this information to better identify and target unsafe workplaces, using shared external information to reduce nontraditional workers' exposure to occupational injury hazards. We discuss CESI in the context of the construction industry to ground our argument for nontraditional workers' safety climate.

Model of Safety Climate and Construed External Image

Figure 1 incorporates the idea of construed external image[4] to show our proposed model of CESI, moderating the relationship between the organizational context and safety climate. Dutton et al.[4] identify two sources of information

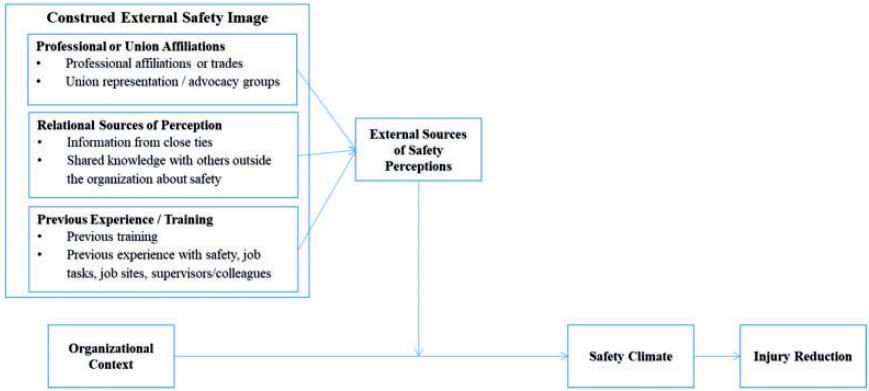

Figure 1. Model of safety climate and construed external safety image in residential construction.

that employees use to develop perceptions of their organizations. One is internal to the organization, including employees' perceptions of the organizations' distinctive, central, and enduring characteristics.[18] Traditional measures of safety climate have similarly focused primarily on these internal organizational factors to measure an employee's perception of safety climate. The other source incorporates external information—what employees believe outsiders think about their organization.[4] To clarify, this construed external image does not necessarily measure what outsiders actually think. Instead, these employee assessments of external information reflect their beliefs about how others perceive the organization and can inform their perceptions of the organization, as well. It is clear that within organizations, variation exists between the perceptions of permanent and temporary workers[19] as well as in the objective safety levels across organizational groups or departments. It seems reasonable that employees with longer organizational tenure would be more likely to evaluate their organization's safety climate using internal interactions, policies, and practices, while less stable employees would be more likely to incorporate and heavily weight information from external sources or experiences. CESI, then, reflects the employees' interpretations of outsiders' perceptions of their organization's safety. They can use this information, especially in the absence of much internal information, to engage in sensemaking about their organization's safety climate. In the next sections, we define safety climate and highlight three external sources of CESI that should be considered when creating its measure: trade groups or union affiliations, relational sources of information, and previous work experience and training. Next, we use the construction context as one example of nontraditional work to make a case for the importance of CESI. We use this context mainly because it represents a range of workers, including nontraditional

workers, who typically work on various sites and/or for various contractors for a limited period of time. Finally, we discuss the implications of CESI to public health practice.

Safety Climate

Safety climate has emerged as a leading indicator of safety because of its association with several tangible outcomes, including improved physical health, improved mental health, and reduced injury among organizational employees.[2,20] Indeed, safety climate has been shown to shape behaviors, including participation in organizational safety and safety compliance.[5,21] The two key dimensions of employees' shared safety climate perceptions are the perceived relevance of safety to the employee's job and the employee's perception of management's attitude toward safety.[12] Permanent employees collectively construct these safety climate perceptions through a shared sensemaking process, developing their perceptions over time.[16] Supervisors communicate their expectations by directing employee behavior and, over time, these interactions serve to define and enforce safe behaviors, or to promote or ignore unsafe ones. The organization similarly influences safety expectations through its policies and practices.

While our goal is not to delineate all of the possible factors that could impact safety climate, we note that most of the work proposing possible inputs to safety climate have focused on internal factors controlled by the organization. This is evident from the list of associated factors that were developed at a conference on safety climate[2]: employee involvement/empowerment; management commitment; organizational policies that value safety and align it with production; owner/client involvement; site safety leadership; and accountability at all levels.

In contrast, nontraditional workers have less time inside organizations to interact with organizational members and to learn the organization's policies and practices. They tend to work alone or in small groups and are subject to firing and rehiring, sometimes on a daily basis. As a result, they are less likely to develop the same shared safety climate perceptions as permanent workers.[16,22] When asked, "is this workplace safe?" nontraditional employees have less information with which to form their opinion. As a result, they may be more likely to incorporate external information into their response.

Construed External Image Among Nontraditional Employees

While safety climate measures have been shown to exhibit high internal consistency among stable employees and to relate to safety behaviors, it is unclear whether they apply in the same way among nontraditional employees. There are several reasons to expect they may not.

First, safety climate measures the average shared perception of safety in an organization,[1] but it does not account for variation arising from temporary, continually changing, or noncircumscribed employment arrangements. Previous research has shown that employees access different sources of information when considering safety. For instance, temporary workers attend to individual themes (e.g., perceived to be in their control), rather than organizational or group policies influencing safety.[16] Similarly, truck drivers share perceptions of organization-level safety climate but tend to differ in their group-level safety climate perceptions.[22] This is especially relevant in construction, where workers from different trades,[23] have their own set of safety considerations, formalized training, and certifications that can influence their perceptions. Small construction jobs often require a single tradesman for a given job (e.g., a single plumber), and no one else may be on-site to influence, or could even tell, whether the employee is following expected safety procedures. Representation by strong unions and advocacy organizations in construction relative to other sectors, as well as different languages, literacy, and cultural norms due to disproportionately high immigrant representation among day laborers (NAHB, 2013) also influence how employees interpret whether their organizations are safe. [AQ2]

Second, and related, previous models of safety climate were primarily developed using employees embedded in organizations, who could build relationships with peers and engage in shared sensemaking through organizational socialization. Even previous studies of safety climate in construction tended to be done with workers in commercial construction organizations which have longer employment contracts, are rehired by the same employer repeatedly over time, and are comparable to the organizations that are often studied in the safety climate literature.[24] Nontraditional workers, including construction workers, do not have such consistent relationships. On any given day, they could be working in an entirely different job, on a different site, with a different supervisor or subcontractor and different coworkers. So, when they are asked to respond to safety climate questions around supervisor support or coworker support, it is unclear how they would answer. Would they base their responses on their actual experiences that they have during their brief employment in a particular setting; on their relative experiences in this setting compared to other settings in which they have worked; or on general perceptions of safety that they have built over time? These employees work in small and dispersed work teams[25] and often have inadequate worksite training.[26] In a study of lone truck drivers, Huang et al.[22] found little evidence of shared work group-level safety climate, although they still found a relationship between organization-level safety climate and safe behavior, especially when the organization had a strong safety climate.

Finally, previous research on safety climate examined organizations that were at least partially responsible for the health and safety of their workforce through payment of health insurance and/or workers' compensation. Nontraditional

employees are less likely to have such guaranteed protection and may even find it more difficult to withstand the loss of revenue associated with lost days of work.[27] Additionally, they are often poorly compensated, leaving few resources (e.g., financial, social support, social status, legal status) to advocate for, or influence, safety in their organizations. For example, the compensation of commercial versus residential construction workers varies greatly (see Table 1), with commercial construction workers earning salaries 51 percent higher, across the sector, and 35 percent higher among specialty trades.[28] Since construction laborers tend to rotate among various small businesses and/or independent contractors, working a minimal amount of time for each one, no one organization is responsible for providing for the employee's future beyond paying their hourly wage. Without workers' compensation or health insurance provided through their organization, safety can seem much more individualized.[16] In many ways, these employment relationships take on a transactional, arms-length quality, where the employee is viewed as an independent worker, paid to do a specific job, rather than a hired member of the organization. Low wages and few benefits can also signal that their position is not valuable to the organization or that getting a job done quickly is more important than doing it safely.

In summary, previous explanatory models, developed to elucidate relationships between aspects of safety climate and either risk behavior or injury, have largely set out to characterize contributing/influential factors in stable or long-term employment relationships with single employers. Extrapolation of these models to residential construction workers, which include temporary or transitory workers and immigrant workers, are simplistic, considering the irregularities described above. The perception or experience of an average permanent employee could be very different from that of a nontraditional employee.

The Construction Context

While nontraditional workers exist in a variety of industries and occupations (e.g., construction, farming, retail, healthcare), we focus here on the construction context in order to practically illustrate CESI as a contributor to safety climate in this segment of the workforce.

Two Domains of Construction Work

Construction industries around the world are made up of many small companies and relatively few large companies, divided into two broad domains: residential and commercial. The employment structure in the commercial segment closely resembles the employment structure in traditional organizations studied in the safety climate literature. Commercial construction workers generally work for a single, large contracting organization, which has commercial contracts at

Table 1. Comparison of Occupational Factors Among Different Construction Worker Trades.

	Construction managers	Electricians	Carpenters	Laborers	Helpers/roofers
Number in United States (USBLS)	485,000	583,500	901,200	128,000	N/A
Training	Bachelor degree; moderate-term on-the-job training	High school diploma; apprenticeship	High school; apprenticeship	<High school	<High school
Median pay	$82,790/year $39.80/h	$49,840/year $23.96/h	$39,940/year $19.20/h	$24,500/year $11.78/h	$24,320/year $11.69/h
Hazards	Few, office work, walk-around inspections	Electrical shock, burn, falls	Cuts, amputations, falls, strains/sprains	Cuts, bruises, sprains/strains, chemical/dust inhalation	Fall, sprain/strains, chemical inhalation

Note. USBLS = U.S. Bureau of Labor Statistics.

multiple sites. Even if they are laid-off, they are often rehired to the same company or the same few companies.

In contrast, 81 percent of U.S. construction companies employ fewer than ten workers.[29] These small employers regularly go into and out of business with changes in the economy. As such, worksites in the residential domain are smaller (e.g., private residences), and jobs are shorter in duration. Nontraditional workers, including residential construction workers, are often employed by these small construction companies, independent contractors, or subcontractors to work for a fixed period of time on a given project, with little continuity from one project to the next in terms of supervisors, coworkers, or organizational safety standards. Workers in residential construction additionally contend with job insecurity,[30] resulting from short-term and irregular employment arrangements. They are often hired by contractors to do a small job on a single site for a fixed duration of time, and then must move on to find the next job, sometimes with a different company or contractor. In the extreme, day laborers will wait on a street corner to be picked up for a job, where they are hired for the day and paid in cash, leaving little to no record of their employment.[14] In a study of 2660 day laborers at 264 hiring sites in 139 cities and twenty states, 43 percent were hired by construction contractors, with the top five occupations including construction laborer, gardener and landscaper, painter, roofer, and drywall installer.[14] These construction workers tend to experience high rates of physical injury.[2] In many cases, their only source of control over safety involves avoiding organizations with poor safety practices/records, although the need for employment may cause them to ignore it.

Safety in Construction Work

As a result of the physically demanding and potentially dangerous nature of the work, safety is an important consideration in the construction industry. This industry still has a disproportionately high rate of injury among its workers. The number of deaths in 2015 (937; 10.1 per 100,000 FTEs) was higher than in any other industry.[31] The primary causes were falls (359; 39.9 percent of all construction deaths in 2014); being "struck by object" ($N = 73$; 8.1 percent); electrocutions ($N = 74$; 8.2 percent); and being "caught in between" objects ($N = 39$; 4.3 percent).[31] The rate of musculoskeletal injury in construction was the highest among goods-producing sectors (41.9 per 100,000 full-time workers),[32] largely due to the heavy lifting, awkward postures, and hand tools associated with the job. Noise-induced hearing loss, acute and chronic respiratory effects from chemical and dust exposures, traumatic injuries to the hands and eyes due to flying and sharp objects, and lead toxicity are also common.[29] Fatal and nonfatal injury is even greater among laborers—low-skill, frontline construction workers, sometimes called "helpers"—who must additionally cope with job insecurity and low wages, making it difficult for them to protect

their health. Among construction laborers, the fatal injury rate was nearly twice as high as for construction in general (17.7 per 100,000 full-time equivalent workers [FTEs]),[31] and the incidence rate for nonfatal occupational injury and illness was 301.7 per 10,000 FTEs.[32] When asked about their jobs, Latino construction workers describe several factors that could increase their risk of injury at work, including supervisors' emphasis on speed over safety, economic incentives to work quickly, and a lack of sufficient training or equipment.[33] However, Occupational Safety and Health Act (OSHA) training requirements in construction are vague and provide only general guidance to employers about when to train their workers.[34]

Construction work represents a range of occupational categories, each with its own training requirements. Differences between five of these categories, including laborers, are described in Table 1. Practically speaking, residential construction workers are often not entitled to workers' compensation insurance, since in many states, there is no requirement for coverage for those employed for short durations. Laborers are seen as easily replaceable, and their informal and temporary employment often means that wages do not meet prevailing wage standards. Coupled with the fact that many nontraditional construction workers are immigrants and unauthorized workers who are unapprised of, or unable to realize, their rights and entitlements, protection from injury is low.

Safety Climate and CESI

When developing perceptions of safety, especially with tenure in the job, it makes sense to draw from what you have heard or seen before, whether inside or outside the organization. Three external factors comprise CESI and could moderate the relationship between the organizational context and safety climate perceptions: (a) trade groups or union affiliations, (b) relational sources of perception, and (c) previous work experience or training. In this section, we describe each of these components and propose sample measures to assess them (see Table 2).

Trade Groups or Union Affiliations

Trade groups and union affiliations serve as referents of safety perceptions because they establish and convey safety standards to their members, including nontraditional workers. These standards transcend any single site or organization and dictate occupational norms and regulations that influence safe behavior. For instance, in construction, each trade has its own set of safety standards that guide behavior. Electricians learn practices for avoiding electrical shock, as well as standards and codes for installing electrical wires in residential settings. When employees develop strong trade identities, they tend to use them as the primary source of information about appropriate behavior, even preferring

Table 2. Possible Questions for Learning About External Sources of Safety Climate.

External domain	Questions
Trade groups or union affiliations	Consider all of the other people who have the same occupation that you have. How safe do you think they would consider your current worksite? Are you a member of a union? How safe would your union think your worksite is? Are you a member of a worker center? How safe would the worker center think that your worksite is? When deciding whether to take a job: a. How often do you consider whether other people in your occupation would think the job is safe? b. How often do you consider whether workers in your union would think the job is safe? c. How often do you consider whether people in your worker center would think that the worksite is safe?
Relational sources	How safe do your family members consider your worksite to be? How safe do your friends consider your worksite to be? How safe do your friends, who also work in the same occupation as you, think your worksite is? When deciding whether to take a job: a. How often do you consider whether your family would think the job is safe? b. How often do you consider whether your friends would think the job is safe? c. How often do you consider whether your friends, who also work in the same occupation as you, would think that the worksite is safe?
Previous work experience and job-related training	Think about any training around safety you have received from the Occupational Safety and Health Act (OSHA). Have you ever heard of OSHA? How safe do you think your current worksite is relative to what you learned in the training? Think about any other training you have received for your occupation. Based on that training, how safe do you think your current worksite is? Based on your previous worksites, how safe is your current worksite (where you are working today)? When deciding whether to take a job: a. How often do you consider the OSHA training you received when thinking about whether your worksite is safe? b. How often do you consider other training when thinking about whether your current worksite is safe? c. How often do you think about previous worksites when considering whether your worksite is safe?

(continued)

Table 2. Continued

External domain	Questions
	Do you know regulations (safe practices) around: • fall protection: ladder safety, scaffolding, use of harness; • being struck by heavy objects; • safe material handling, housekeeping; • machine use: electricity hazards, machine guarding, power tool use; • trench and excavation safety; cranes and rigging; • personal protective equipment

them to their organizational identities.[35] Union membership also influences nontraditional employee perceptions through the development and dissemination of standards and norms, and also through collective bargaining around safety in the workplace. When comparing union and nonunion workers who had experienced an injury in the past, Gillen et al.[36] found that union members were more likely to perceive that their supervisors cared about their safety and that risk-taking was not a part of their job than nonunion members. Union members also said that they were made aware of dangerous work practices and received safety instructions when hired. Workers in unions or trade groups can use professional standards or norms to interpret the safety climate of their organization. Unions can also directly alter policies or behaviors in the workplace to make them safer for employees. If an employee's union were fighting for better safety policies in his/her organization, the employee's perceptions of safety might be lower than they would be otherwise. These affiliations provide workers with information they use to demand or apply safety interventions in a given organization. The twenty-first century rise of workers' centers—community-based worker advocacy organizations that focus on underserved working populations—may fill this role, as well.[37] We expect that nontraditional workers who are members of a trade group, union, or worker center will have more knowledge about how to evaluate safety in the workplace and will receive tangible support for changing their organization's safety climate.

Relational Sources Influencing Perception

Second, employees can use their network of relationships as a set of referents for developing or interpreting safety climate. The homophily effect[38] suggests that people prefer to interact with those who share similar characteristics with them. Nontraditional workers use so-called close ties[39] to provide them with realistic information about job opportunities and specific aspects of the work itself.[40] These ties are especially prevalent in residential construction, where many

workers learn about job opportunities through personal relationships, including friends and family members, or by word of mouth.[41] For nontraditional workers, perceptions of safety can arise through interactions with close ties outside of the organization, through a socialization process. As they engage in sensemaking with their peers, some of whom work in similar occupations and/or organizations, they will begin to develop expectations about safety and assess whether a particular organization is safe. Some research lends validity to the idea that peers can influence perceptions of safety. For instance, Lingard et al.[42] found that among road construction workgroups, there was large within-group agreement about safety climate measures but less agreement across groups about the actual safety behaviors of their coworkers. The movement of nontraditional workers between multiple sites makes it more difficult for a consistent set of workgroup colleagues to socially influence safety climate perceptions. However, the use of close social ties outside of the organization (including family, friends, and acquaintances from previous worksites) to learn about work can generate consistent perceptions about certain organizations. These close ties provide information to employees about safe working techniques[43] but could also provide feedback about which employers they believe are safe. Again, workers' centers may provide a large role, particularly for new immigrant workers. We expect that nontraditional workers, who are connected to many close ties familiar with their work, will socialize with those close ties to receive relevant information about various employers and safety on the job.

Previous Work Experience and Training

The third external source of information about safety comes from the training and previous work experience received outside of the current organization. The OSHA of 1970 does not delineate the responsibility of employers to provide health and safety training to workers, although more than one hundred of the act's current standards contain training requirements. As a result of severe, traumatic injuries and fatalities, states and municipalities have legislated construction health and safety practices that go beyond OSHA legislation. They include scaffolding rules, mandatory health and safety training, and other measures. In fact, OSHA suggests a thirty-hour and a ten-hour health and safety curriculum for construction workers and offers a certification for completing it; however, OSHA does not require this course. Only seven states have legislation requiring that workers obtain this OSHA ten-hour certification. Other states will not fund or issue permits for commercial building, and some insurance companies will not insure employers without evidence of training for contracted employees. Despite the fact that about 22 percent of the sector employs Hispanic workers, there are few OSHA ten-hour courses and no thirty-hour courses in Spanish. However, OSHA and others are beginning to put resources into health and safety training for low-literacy Spanish speakers.[44]

As in other industries, employees receive different levels of training depending on their job title. In general, construction managers must have a bachelor's degree, and they receive fairly extensive on-the-job training; those in special trades—e.g., plumbers, painters, carpenters, electricians, bricklayers—generally undergo formal training in apprenticeship programs after which they are awarded a journeyman's card for special trades, but nontraditional workers, including general laborers, tend to receive less formal training and are often less skilled.

Finally, previous employment experiences can serve as a source of information for developing perceptions of safety. Employees use these previous experiences to compare the relative safety of their current worksite, given previous experiences in other worksites. Nontraditional employees, who frequently transition between jobsites, can recall previous experience on similar job tasks, or working with similar coworkers or supervisors to construct a relative perception of safety. When evaluating safety climate, they incorporate previous experiences to shape their understanding of how others would evaluate safety on their current site. We expect that nontraditional workers with extensive previous training and/or experience will have better information about safety and can compare their previous experiences with the current ones.

Safety Climate Research With Nontraditional Workers

From a research perspective, it can be difficult to recruit nontraditional workers for studies about perceptions. For example, many day laborers are not formally documented through employment contracts, W-2s, or other legal documents typically tying employees to organizations. They may also have limited time to participate in research due to multiple jobs or work–life demands. So, how could we advance research on nontraditional workers' safety by using CESI? In this section, we describe four strategies for practitioners to use CESI.

Strategies for Implementation

Safety climate scales. Focus groups and surveys can be used to understand the external sources nontraditional employees use to generate perceptions of safety across organizations. Table 2 lists a set of possible questions. While safety climate scales developed in traditional settings have been validated for understanding the average emphasis on safety in a given organization, these measures do not account for perceptions arising from outside of the organization. This is potentially problematic in studies that examine safety climate among nontraditional workers, like migrant farm workers[45] and construction workers,[46,47] who use standard measures of safety climate to assess safety. What does safety climate mean in these nontraditional settings? Would an employee be able to assess management's commitment to safety after a few days on the

job? Perhaps. But, it is also possible that nontraditional employees in residential construction would get only glimpses of these items while working on the job. One notable study that begins to address this issue developed a safety climate scale for truck drivers.22 This study found that safety climate perceptions tended to vary across individuals in the same work group but that strong organizational safety climate could influence workers' safety behaviors.22 More research should examine how employees perceive safety climate variations between worksites and how they perceive overarching occupational policies or standards when considering safety climate. For example, Jorgensen et al.48 and Marin et al.49 develop measures for assessing construction safety climate among Hispanic workers, the latter including items about training and nonretaliation for voicing problems. While the scale items they develop do not to ask about any specific organization (which raises questions about the meaning of safety climate), the studies propose new measures to explore how nontraditional workers develop perceptions of safety. Identifying the components that comprise "safety climate" would allow for stratification of populations and a more accurate picture of the role of safety climate as a leading indicator for injury reduction in nontraditional versus conventional working populations.

An emerging set of methods has been developed to help employees describe how their perceptions are built over time, or over employers. One innovative method involves asking participants to construct their work history by filling in a calendar with significant events and then assembling the work history around that.[50] Using this approach, it would be possible to ask employees at multiple stages of their lives to describe their work history and then to see how safety climate is "built" over time.

Understanding safety among nontraditional employees. Safety climate has a strong connection to reduced injury and safe behaviors.[51] But, in nontraditional settings, where employees have fewer opportunities to interact over time, less is known about how employees develop perceptions of safety. And, even if the organization is generally safe for the average worker, how do nontraditional workers assess the average level of safety for other workers like them? The findings about tenure[15] and permanent versus temporary[16] employment above suggest that there is likely an organizational socialization aspect to learning about safety on the job. Future research could use the scales proposed above to examine how temporary workers who have worked on and off for the same contractor or organization over time develop perceptions about that contractor's level of safety versus a worker who is employed on a more permanent basis. Another consideration could be the process of identifying formation within the organization. Employees who are embedded in the organization will likely have a stronger connection to the organization and to other embedded individuals, influencing how they interpret and perceive safety. They are also more likely to tie the distinguishing features of their organization to their own self-concept,

making it more difficult for them to distance themselves from association. Luria and Yagil[16] mention that psychological contracts could influence where employees go for information about safety. Embedded employees have developed broad relationships with an organization and might be more likely to use organizational and/or group-level information to learn about safety.[16] Finally, the considerations of safety might be very different among permanent and nontraditional (e.g., laborers) workers. Future work is needed to examine how these different groups acquire information to develop their perceptions and whether nontraditional workers are provided the same safety considerations as more permanent employees. Some of this could be done through interviews, asking employees to explain their process for determining whether a job site is safe or unsafe and how safe they feel in their current organization. The CESI could provide insight into where nontraditional workers receive information about the safety of their organizations and use that to inform community efforts.

Focus on communities. In the community, it is important that researchers, workers' centers, unions, public health departments, religious institutions, and others interested in protecting the health of workers connect directly with nontraditional workers to shape an understanding of safety at work. It could occur through a consolidation of information about unsafe environments or safety practices, and/or social networking to enhance the sharing of relevant safety information among peers. First, one method for enhancing safety is to partner with workers' centers and/or unions to build and distribute information, on behalf of nontraditional workers, to policy makers or regulators about dangerous employers and unsafe work practices. For instance, using the CESI, these organizations could better understand where its members are getting their information and the general perceptions that nontraditional workers have of certain employers. Second, this information could also be conveyed to nontraditional workers to improve their ability to identify unsafe workplaces and avoid injury. Forst et al.[43] developed a training program for nontraditional employees that developed the workers' knowledge about workplace safety and built their self-efficacy to speak out when something seemed unsafe.[43] While we do not wish to place the burden of improving an employer's safety climate onto employees, the CESI could inform policy makers about where employees are receiving information about safety, what that information is, and how best to intervene on the employees' behalf.

Another method for using the CESI is to leverage its findings to enhance existing relationships and surveillance efforts in the community. In the same way that traditional employees develop safety climate perceptions through an internal sensemaking process, it is possible for these community organizations to facilitate a shared sensemaking process outside of the organization. Residential construction workers tend to have strong networks of "close ties" from whom they learn about jobs and work requirements. As these community members

discuss their work, they could collect information about worksites or contractors that are safe and distribute that information through the informal network of peers. In this way, public health groups could provide better information to nontraditional workers about which organizations are unsafe while working to make them safer. Many nontraditional employees are unable to turn down employment, but community interventions could be designed to examine the specific safety trade-offs that nontraditional employees make when deciding whether to take or refuse a job. They could also provide support to nontraditional employees who want to avoid or change unsafe environments but may be less able to do so (e.g., due to financial needs).

Emphasis on federal and state regulators. Finally, the CESI scale could be used to influence legislation or national policy. Unions are well positioned to do this. They can generate national conversations about the risks that employees should be exposed to and can work to change employers' perceptions of acceptable workplace risks. There is a Cochrane working group on Occupational Health and Safety that systematically evaluates intervention studies to prevent workplace illnesses and injuries. The thirteen intervention studies with designs to prevent construction injuries that met inclusion criteria failed to provide evidence for the benefits of technical, human, and organizational interventions that are often recommended by standard texts of safety, consultants, and safety courses. Regulations and regionally oriented safety campaigns, training, inspections, and the introduction of occupational health services were not shown to be effective at reducing nonfatal injuries. There is limited evidence that targeting company-level efforts to reduce injuries is effective.[52] A surveillance study of fall injuries in construction demonstrated that fall prevention legislation in Illinois led to a reduction in fall injuries.[53] So, future policy interventions for this group of workers should be developed to promote external standards of safety. They could include national occupational standards about what constitutes safe work practice for journeymen and laborers or mandatory continuing education around safety. At the moment, there is no national standard requiring OSHA ten-hour training in construction. Other OSHA regulations are also relatively limited in residential construction. At the same time, these policies could be strengthened to affect construction workers' health and well-being. Construction workers suffer high rates of severe physical injury and even mortality as a result of accidents on the job. A lack of safety policies, due to the unique nature of the industry, can have catastrophic effects on employees' lives and livelihoods.

Conclusion

Although safety climate is an important leading indicator of safety, research is lacking to provide an understanding of how nontraditional employees, who

regularly change jobs, develop their perceptions of workplace safety. As a result, the current measures of safety climate that look at the shared perceptions of employees, using data about the organization, may not accurately reflect the safety climate of nontraditional employees. Indeed, the safety climate literature shows variation between permanent and transitory employees. Since nontraditional employees have less time to develop perceptions of safety through shared interactions within the organization, it is important to understand where their perceptions are formed. This is useful to practitioners in a few ways. First, nontraditional workers, including residential construction workers, are more often exposed to hazardous conditions at work and less likely to receive extensive training about how to protect themselves. Understanding how they develop perceptions of their worksite's safety priorities could improve public health practitioners' approaches for improving the employees' ability to recognize unsafe work practices. Second, better measures of worksites' CESI would allow public health practitioners to identify sites where nontraditional workers work, even though they consider it unsafe or think that others might perceive it to be unsafe. Understanding how to account for those differences will allow public health practitioners to better identify unsafe worksites and work with them to improve safety, or warn employees to avoid them. It would also allow unions and other worker-protection groups to understand their role in educating nontraditional workers to identify and avoid unsafe worksites.

Another interesting question with this group of nontraditional workers is whether economic conditions could perpetuate unsafe working environments. For individuals who are struggling to find work, how can we provide options for refusing to work in unsafe conditions? We highlight the role of external sources of information, or CESI, to frame the referents that nontraditional workers might use when evaluating safety and choosing how to act. This is not to say that permanent employees would not also be influenced by external sources of information but that they may be less likely to attend to them if (a) their organizational membership is already supplying a carefully constructed message about safety and (b) the internal and external messages are relatively consistent. More work is needed to understand how nontraditional workers develop safety climate perceptions and then to evaluate whether those perceptions relate to safety behaviors in the same way as traditional workers do. Although OSHA mandates provision of a safe working environment by the employer, nontraditional employment arrangements demand an increased degree of self-efficacy among these workers because of their extreme vulnerability. This is not to put the burden of safety on employees but instead to leverage these workers' first-hand experiences and expertise to understand what defines safe workplaces and to identify the best places to intervene on nontraditional workers' behalf to improve safety. More work is also needed to understand how public health professionals can manage nontraditional workers' safety perceptions and how

to use this information to improve the safety of organizations that employ such workers.

Since nontraditional workers are employed for short periods of time, sometimes working alone, it may be important to raise awareness about what people think of the worksites where they work. At the same time, improving the workers' understanding of safe or unsafe work, alone, does not fix the unsafe environment. The second point is to leverage these external perceptions to better identify employers whom workers perceive to be unsafe, even if they continue working for them. Here, we can build political power to understand which organizations are unsafe and to create awareness so that they can be targeted and improved.

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Note

a. We refer to safety climate as the shared perceptions of safety among employees in the organization. We use the term safety climate in this document to refer to average safety climate perceptions. We argue that the source of safety climate is likely different for different groups of employees. Permanent employees tend to develop perceptions from internal factors—interactions with colleagues, supervisors, and organizational policies. Temporary employees may be more heavily influenced by factors outside of the organization.

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