Understanding Safety Climate in Small Automobile Collision Repair Shops

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Background *In the United States, approximately 236,000 people work in 37,600 auto collision-repair businesses. Workers in the collision-repair industry may be exposed to a wide range of physical and chemical hazards.*

Methods *This manuscript examines the relationship of safety climate as reported by collision repair shop workers and owners to: (1) an independent business safety assessment, and (2) employee self-reported work practices. The study was conducted in the Twin Cities metropolitan area.*

Results *A total of 199 workers from 49 collision shops completed a survey of self-reported work practices and safety climate. Surveys were completed by an owner or manager in all but three shops. In general, self-reported work practices were poor. Workers' scores on safety climate were uniformly lower than those of owners. For workers, there was no correlation between how well the business scored on an independent audit of business safety practices and the safety climate measures they reported. For owners, however, there was a positive correlation between safety climate scores and the business safety assessment. For workers, safety rules and procedures were associated with improved work practices for those engaged in both painting-related and body technician-related activities.*

Conclusions *The enforcement of safety rules and procedures emerged as a strong factor positively affecting self-reported work practices. These findings identify a simple, cost effective path to reducing hazards in small workplaces.* Am. J. Ind. Med. 57:78–86, 2014. *© 2013 Wiley Periodicals, Inc.*

***KEY WORDS:* small business; work practices; safety climate; auto collision repair**

INTRODUCTION

In the United States, approximately 236,000 people work in 37,600 auto collision-repair businesses (NAICS code 811121). According to the US Census Bureau [2012], over half (55%) of businesses have four or fewer employees and 23% have 10 or more employees. Collision-repair workers may be exposed to a wide range of physical and chemical hazards, including ungrounded electrical wiring, blocked exits, noise, and isocyanates [Whittaker and Reeb-Whitaker, 2009; Bejan et al., 2011]. The rate of work-related asthma for spray painters was ninefold greater (20.3 vs. 2.2 per 100,000) than for workers in other industries based on workers' compensation data from Washington State [Whittaker and Reeb-Whitaker, 2009]. Thus, auto collision repair can be considered a high-hazard industry consisting almost entirely of very small enterprises.

As business size decreases, small enterprises become increasingly less likely to have a wide range of employment policies and programs, such as performance appraisal, employee assistance, and sexual harassment. Owners frequently manage human resource issues without

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administrative assistance. Only 10% of firms with fewer than 50 employees have formal human resource programs, compared with 28% of firms with 50–99 workers [Hornsby and Kuratko, 1990; Wager, 1998; Hornsby and Kuratko, 2003]. Studies of small firms have found that accounting, finance, production, and marketing take precedence over personnel-related issues [Hornsby and Kuratko, 2003]. Focus groups conducted with the owners of collision-repair shops have shown similar priorities [Parker et al., 2012].

Many studies discuss the importance of safety climate in improving and maintaining workplace safety [e.g., Coyle et al., 1995; Shannon et al., 1996; Carder and Ragan, 2003; Prussia et al., 2003; DeJoy et al., 2004]. Safety climate has been defined as the shared perceptions of safety policies, procedures, and practices as well as the overall importance attributed to safety within an organization [Prussia et al., 2003; Cavazza and Serpe, 2009]. Factors influencing safety climate may include management's commitment to safety, return-to-work policies, post-injury administration, and safety training.

Ideally, organizational characteristics of a business should support safety through empowerment of its employees as individuals as well as collectively (e.g., through safety committees and safety leadership). Data are needed to better describe the nature of safety practices within small enterprises and how they are reflected in the knowledge and beliefs of both employees and owners [NIOSH, 2002]. Data from large corporations indicate that better worker perceptions of health and safety have been predictive of lower injury rates [Hoivik et al., 2007]. Our previous work showed that small businesses with safety committees performed better on an independent assessment of hazard control on a wide range of metal fabrication machines. We also demonstrated that minimal input into the organization of safety facilitated the improvement of machine-related hazards [Parker et al., 2009]. Although most of the business establishments in our prior study were small (range: 5–120), they were significantly larger than the shops in the Collision Auto Repair Safety Study (CARSS).

This manuscript examines the relationship of safety climate as reported by workers and owners, an independent business safety assessment, and employee self-reported work practices in auto collision repair shops in MN. Data were obtained as part of the CARS study, a NIOSH-sponsored R01 grant initiative. CARSS is a randomized intervention developed to improve worksite health and safety management practices and lower health and safety risks in small automobile collision-repair shops.

METHODS

The human subjects review boards of the Park Nicollet Institute and the University of Minnesota approved all study procedures. Informed consent was obtained from all business owners prior to entry into their shop. Both institutional review boards exempted the work practices survey from signed consent because identifying information was not obtained. However, participants were provided an information sheet advising of the right to decline participation.

Business Eligibility and Recruitment

To be eligible to participate in CARSS, a collision shop had to: (1) have at least 75% of business revenue generated by collision repair activities; (2) be in business for at least 1 year prior to recruitment; (3) be independently owned and operated or, if a franchise, have no corporate-mandated safety program; (4) have at least one employee and carry workers' compensation insurance; (5) have a paint booth; and (6) not be receiving consultative services from the health and safety group assisting CARSS.

Using the Dunn and Bradstreet database and the Alliance of Automotive Service Providers (AASP-MN) membership directory, a dataset was created consisting of 273 auto collision repair businesses within a 50 mile radius of Minneapolis/St. Paul. Initially, 50 businesses were randomly selected from the list of 273. All were sent letters and phoned. Of these, 15 did not meet eligibility criteria, no contact could be made with 2, 7 declined participation, and 26 of the remaining 33 (79%) agreed to participate. The two primary reasons given for not participating were "not interested" and "don't have time." The remainder were recruited from four sources: focus groups participants (3), AASP-MN (7), referral from a business owner (8) and suppliers (9). Participation rates were 3/4 (75%) for focus group participants, 7/7 (100%) for AASP-MN members, 7/9 (78%) for owner referrals, and 8/9 (89%) for suppliers. Of those recruited, two subsequently declined to participate, leaving a total sample of 49 shops.

Self-Reported Work Practices and Safety Climate

Every employee was asked to complete a three-part written survey evaluating work practices, safety climate, and demographics. Surveys were completed at the time of the first business safety assessment conducted by a CARSS industrial hygienist and before any significant interaction with the owner or the implementation of new programs within the business. Owners completed an identical survey without the work practices questions.

Work practices included safety-related behaviors relevant to autobody technicians (11 questions, Table II) or painters (10 questions, Table III). Combination workers who were engaged in body technician work and painting completed a survey with 21 work practice questions. Workers were asked about the use of personal protective equipment (e.g., protective eye wear, respirators, knee pads), hand cleaning (e.g., use of solvents, soap), as well as specific work practices (e.g., standing to the side when using high-tension chains, changing paint booth filters).

Safety climate was measured using an abbreviated version of a survey developed by Cheyne et al. [1999] addressing seven constructs with two questions for each construct (14 questions total; Table I). Questions were answered on a scale of 1 (strongly disagree) to 5 (strongly agree). Demographic data included age, gender, education, language preference, and primary job activities (e.g., painter, body technician, or combination worker).

Business Safety Assessment

Businesses were evaluated by a staff industrial hygienist using a business safety assessment survey consisting of 92 items addressing eight topic areas: right-to-know training, emergency planning, storage and use of compressed gases, paint booth and paint mixing area hazards, ergonomics, electrical safety, personal protective equipment (eyes, hearing, skin), and respiratory protection. Inter-rater reliability was evaluated on an ongoing basis in 10% of randomly selected establishments.

Data Analysis

Owner and worker surveys and business safety assessments were reviewed and entered into a Microsoft Excel file. Data were analyzed using SAS (SAS Institute, Cary, NC, 2011). The reliability of the safety climate constructs was evaluated by computing Cronbach's alpha. A score for each of the seven safety climate constructs was determined by adding responses for both questions within that construct. Because of the small size of most businesses, scores were summed within shops and then averaged for the number of respondents. Each pair of questions had a minimum score of 2 and a maximum score of 10. Analysis was conducted for all employees participating in the baseline study. The lowest possible shop-level score was 14 (i.e., $7 \times 2 = 14$), and the maximum possible score was 70 (i.e., 70/70).

Business safety scores were computed for each participating shop. Business safety scores are expressed as the *percent* of business safety assessment survey items that were been present at the time of the evaluation (e.g., 79/79 or $91/91 = 100\%$). The number of items evaluated ranged from 77 to 91 out of the 92 total items assessed (i.e., at least one item was not applicable in any shop). Each business was evaluated on a range of items depending on the nature and type of work conducted. For example, if painters used supplied-air respirators with loose-fitting hoods, respirator fit testing was not needed and fit test records were not evaluated. Scores were based on the presence of items on the business safety assessment form. Business safety scores were subsequently used as an overall measure of how well each business complied with best practices.

Work activities were divided into two general classifications: painting-related and body technician-related. Combination workers (i.e., employees performing technician and painting jobs) were included in, and answered question for both groups. For most questions, workers who reported using best practices at least 75% of the time (e.g., used eye protection at least 75% of the time when required) were compared with workers who reported using best practices <75% of the time. For several questions (e.g., working under cars), any worker who reported a poor work practice, such as using wood blocks to support the vehicle, was construed as doing so all of the time. Work practices were analyzed individually and grouped together to create a combined score based on the 10 painting-and 11 bodywork-related questions. Scores were standardized to100% in order account for activities that were done by some workers but not by others.

TABLE I. Cronbach's Alpha for Seven Safety-Climate Constructs All Respondents

Safety climate construct	Definition of construct[a]	Cronbach's alpha overall	Cronbach's alpha workers	Cronbach's alpha owners
Management commitment	Perceptions of management's commitment to addressing health and safety issues	0.86	0.85	0.73
Communication	Perception about how well safety information is communicated within a business	0.78	0.81	0.63
Priority of safety	The importance of health and safety issues within the business	0.89	0.87	0.90
Safety rules and procedures	Views on the efficacy and necessity of rules and procedures	0.52	0.54	0.50
Supportive environment	The nature of the social environment at work, and the support derived from it	0.73	0.73	0.27
Involvement	The extent to which safety is a focus for everyone and all are involved	0.77	0.78	0.64
Work environment	Perceptions of the nature of the physical environment	0.70	0.70	0.68

[a] Cox and Cheyne [2000].

TABLE II. Selected Work Practices and Overall Safety Climate Scores for Those Engaged in Body Work

Safety practice	N	Yes, best practice (%)	Safety climate score for group with best practices (SD)	Safety climate score for group poor work practices (SD)	*P*-value
Safety glasses with grinding	152	63	52.0 (11.8)	50.0 (10.5)	0.18
Safety glasses when working under cars	151	23	52.9 (11.4)	50.6 (11.4)	0.30
Safety glasses when using compressed air	152	20	51.3 (11.6)	51.1 (11.4)	0.91
Hearing protection with pneumatic tools and grinders	155	55	54.2 (10.1)	47.7 (11.9)	0.001
Pad or mat with kneeling	150	61	53.6 (9.8)	47.1 (12.5)	0.001
Safe practices when straightening a frame	141	78	51.5 (11.5)	48.3 (11.8)	0.15
Never clean hands with solvents	150	59	52.8 (10.5)	48.2 (12.2)	0.03
Use the proper aids with overhead lifting	150	73	51.3 (11.4)	50.0 (11.5)	0.55
Good work practices when under cars	149	58	53.2 (10.7)	47.9 (11.8)	0.006
Safely support cars when working underneath	149	91	50.8 (11.8)	52.6 (6.0)	0.57
Regularly check the condition of high tension chains and slings	135	38	47.1 (10.4)	54.7 (10.0)	<0.0001

Analysis included the computation of means, standard deviations, *t*-tests, and Chi-squares. Simple logistic regression was used to evaluate the relationship between business safety assessment questions and overall employee or owner safety climate construct scores. The odds of "yes" versus "no" for each item on the business assessment form was the dependent variable, and the overall employee or owner construct scores were treated as independent variables at the shop level. For each item in the business assessment form, a positive response (i.e., the expected item was present) was reflected in an increased odds ratio.

Work practices and safety climate were examined using generalized linear models with the shop as a random effect. The relationship between shop safety score and safety climate score was examined using logistic regression with shop characteristics as covariates and safety climate scores aggregated at the shop level.

RESULTS

For the business safety assessment, the kappa statistic ranged from 0.82 to 0.98 between the two staff industrial hygienists (six joint visits, all survey items) and ranged from 0.76 to 0.96 between each staff industrial hygienist and an external auditor familiar with the collision repair industry (three visits per staff member). Cronbach's alpha was $\geq$0.7 for most safety climate constructs, and was lowest for safety rules and procedures (Table I).

Between November 2009 and May 2011, 49 establishments were enrolled in the study. The average time in

TABLE III. Selected Work Practices and Overall Safety Climate Scores for Those Engaged in Painting-Related Activities

Safety practice	N	Yes, best practice (%)	Safety climate score for group with best practices (SD)	Safety climate score for group poor work practices (SD)	*P*-value
Always use a respirator in the paint booth	137	78	54.7 (9.6)	49.3 (12.6)	0.08
Always use a respirator when painting outside the booth	118	43	57.9 (8.5)	50.1 (11.1)	0.0002
Clean shaven when using a respirator	122	36	54.1 (10.7)	52.9 (9.9)	0.54
Never clean hands with solvents	137	55	54.6 (9.6)	51.8 (11.4)	0.13
Change paint booth filters regularly	58[a]	43	55.4 (10.6)	52.7 (9.6)	0.22
Use gloves when mixing paints	128	90	53.4 (10.4)	49.5 (12.7)	0.24
Use gloves when spray painting	129	85	53.5 (10.3)	50.7 (12.2)	0.30
Use gloves when priming	136	83	53.6 (10.2)	51.6 (12.2)	0.41
Use gloves when cleaning paint guns	136	90	53.4 (10.4)	51.3 (12.1)	0.52
Use gloves when cleaning spills	136	95	53.7 (10.3)	44.7 (12.2)	0.02

[a] This reflects the number of painters who believe they are primarily responsible for changing paint-booth filters.

business was 32 years (SD = 13 years; range = 1.5–60; median = 31 years), and businesses had an average of 7 employees (SD = 6, range = 1–29, median = 6). Businesses had been owned or managed by the same person for an average of 14 years (SD = 11, range = 1–39), and business owners or managers had been in the collision industry for an average of 27 years (SD = 12, range = 1–50). Overall, 13 out of 49 business owners (27%) were currently working with or had worked with a safety consultant, and 33 (67%) were AASP-MN members.

Surveys were completed by over 99% of employees present on the day of the initial business safety assessment, for a total of 199 employees (93 combination workers, 62 body technicians and 44 painters). All workers were male, four were Hispanic, one was black, and five were Asian. For all employees, 95 (49%), 45 (23%), and 54 (28%) had graduated, attended but did not graduate, and did not attend technical school, respectively. Data were missing for five workers. Sixteen (9%) workers did not graduate from high school, 132 (70%) were high school graduates, and 41 (22%) had attended or graduated from college. Data were missing for 10 individuals.

In each shop, a survey was completed by the owner (n = 34) if he or she was present, the manager (n = 3), or person who did not indicate their status as an owner or manager (n = 9). Owner data were missing for three shops. For the owner group, 27%, 40%, and 32% had not attended, attended some, and graduated technical school, respectively and 25%, 32%, 53% had attended high school, graduated from high school, and attended at least some college, respectively. All but one owner/manager was white, non-Hispanic and their means age was 48.5 (SD = 8, range = 31–65). Owners had been in business an average of 27 years (SD = 13).

In general, employee work practices were substandard, with few best work practices rising above 75% (Tables II and III). Although use of respirators in paint booths was high, only 63% of painters reported they were clean-shaven when using their respirator. Use of eye protection varied considerably between tasks. Self-reported work practices were not associated with business size (<11, 11+ employees) or workers' technical education.

Tables II and III also show overall measures of safety climate for workers engaged in unsafe work practices in comparison with those engaged in best work practices. Those engaged in best work practices had overall safety climate scores that were almost always higher than those who did not engage in best work practices. For body technicians, use of hearing protection when using pneumatic tools and grinders (6.5% difference, $P = 0.001$) and using adequate protection when kneeling (6.5% difference, $P = 0.001$) were associated with a significant increase in safety climate scores, as we were good work practices when working under cars and not using solvents as a hand cleaner. For painting-related activities, use of respirators outside of the paint booth (6.8% difference, $P = 0.0002$), and using glove to clean chemical spills (9.0% difference, $P = 0.02$) produced higher safety climate scores.

Work practices and safety climate were subsequently examined using generalized linear models (no table). We evaluated each of the seven safety climate constructs to determine how they were related to an overall measure of safety using a single score for work practices. For body technician-related activities (11 items), the mean score was 64% (SD = 19%) and for painting-related activities (10 items), the mean score was 78% (SD = 20%). For every 1% increase in the work practice score, the safety rules and procedures construct improved by 0.24% ($P = 0.008$) and 0.42% ($P = 0.0001$) for painting-related and body technician-related activities, respectively. Other safety climate constructs and overall safety climate score were not related to the overall safe work practices score. The associations between safety climate and work practices were not affected by a worker's job position, years of experience, or level of technical education.

As seen in Table IV, the average safety climate score for workers was lower than that of owners for all constructs ($P < 0.05$). Neither owners nor workers felt an emphasis was placed on safety rules and procedures, and this measure fared least well in both groups. Owner perceptions of safety climate did not vary with their level of education or the number of years the business had been operational. Safety climate scores for workers were better in smaller (<11 employees, n = 40) compared with larger (≥11 employee, n = 9) establishments (Table V). These differences were statistically significant for all measures except safety rules and procedures ($P = 0.21$), involvement in safety activities ($P = 0.13$) and workers' feeling their environment was supportive of safety work practices ($P = 0.07$, considered at borderline level for statistical significance).

Safety climate was also examined by how well each establishment fared during its business safety assessment (Table VI). Owners in which the overall business safety evaluation score was in the top 50% rated their safety climate better than owners in the bottom 50%. However, neither group of owners placed an emphasis on safety rules and procedures. This was true despite the fact that owners in higher-scoring shops gave safety a higher priority to safety and placed a greater emphasis on management commitment to safety.

As seen in Table VII, for owners, every 1-point increase in business safety assessment score resulted in an overall 2% increase in the overall safety climate construct score for owners (*last column*). The increase in safety climate construct scores was as high as 14% for three constructs: priority of safety, environment, and involvement. The only business-level variable that had a consistent impact on owners' safety climate measures was the current or prior engagement of an independent safety consultant. The adjusted odds ratio

TABLE IV. Safety Climate Scores for Workers, Owners, and All Respondents

Safety climate construct	Worker mean (SD) N = 199	Owner mean (SD) N = 63	All respondents N = 262	Comparison of worker and owner groups P-value
Management commitment	7.4 (2.3)[a]	9.1 (1.1)	7.8 (2.2)	<0.0001
Communication	7.3 (2.2)	8.3 (1.4)	7.6 (2.1)	0.008
Priority of safety	7.5 (2.1)	9.1 (1.3)	7.9 (2.1)	<0.0001
Safety rules and procedures	6.2 (2.0)	6.9 (2.0)	6.4 (2.0)	0.01
Supportive environment	7.9 (1.9)	9.3 (0.9)	8.2 (1.8)	<0.0001
Involvement	7.8 (1.9)	8.9 (1.3)	8.1 (1.8)	<0.0001
Work environment	7.7 (2.0)	9.3 (1.2)	8.1 (1.9)	<0.0001
All scores combined	51.8 (11.1)[b]	60.8 (7.3)	54.0 (11.0)	<0.0001

[a]Individual construct scores are out of 10 (e.g., 7.4/10).
[b]All scores combined are based on a total possible score of 70 (i.e., 7 scores × 10 points each). The mean may be affected by a small amount of variability in the number of questions answered by all workers.

showed a twofold increase in safety climate scores when a safety consultant had been working with the shop when compared with businesses which had not engaged a safety consultant (data not shown).

DISCUSSION

There has been a long-standing interest in finding ways to assist small enterprises in improving health and safety [e.g., NIOSH, 2012; Kazutaka, 2012]. However, owners of many small establishments have little access to good health and safety information, and are frequently unaware of the scope of regulations to which they must comply [Fonteyn et al., 1997; Bradshaw et al., 2001; Hornsby and Kuratko, 2003; Kotey and Slade, 2005]. These problems are compounded in the collision repair industry because owners tend to seek information from easily accessible channels such as suppliers who may lack training and whose financial interests may or may not be served by providing the best available information [Hartman et al., 1994; Parker et al., 2012]. In reference to the auto collision-repair industry, Ceballos et al. [2011] point out that, "Training, risk perception, beliefs in susceptibility to disease and behaviors can affect personal exposure."

In order to find better ways to access and assist small establishments, it is important to understand organizational factors affecting workplace safety and health. While a substantial body of literature exists on the management of small enterprises (e.g., *Journal of Small Business Management*), information on health and safety management is scant, and little has been published on the determinants of a safe work environment within small enterprises.

Huang et al. [2012], in the only other study we found of safety climate in small enterprises, noted the importance of management commitment to safety as a key indicator of safety climate with fewer than 5% of small establishments having an employee with expertise in health and safety

TABLE V. Worker Safety Climate Scores by Shop Size

	Small (<11) N = 40			Large (≥11) N = 9			
Safety climate construct	N	Mean[a]	SD	N	Mean	SD	P-value
Management commitment	130	7.7	2.2	65	6.8	2.3	0.01
Communication	131	7.5	2.1	65	6.9	2.4	0.08
Priority of safety	130	7.7	2.0	65	7.0	2.2	0.03
Safety rules and procedures	131	6.1	2.0	65	6.4	1.8	0.21
Supportive environment	130	8.1	1.7	65	7.5	2.1	0.07
Involvement	127	8.0	1.7	64	7.4	2.2	0.13
Work environment	126	8.0	1.9	65	7.2	2.0	0.005
All scores combined	123	53.1	10.5	64	49.2	12.0	0.06

[a]See note at the bottom of Table V.

TABLE VI. Owner Safety Climate Scores by Overall Business Safety Score

	Bottom 50%		Top 50%		
Safety climate construct	**Mean**	**SD**	**Mean**	**SD**	***P*-value**
Management commitment	8.6	0.9	9.5	0.6	0.0006
Communication	7.8	1.3	8.7	1.2	0.02
Priority of safety	8.3	1.3	9.6	0.9	0.0002
Safety rules and procedures	6.5	1.8	7.3	2.0	0.18
Supportive environment	8.9	0.8	9.7	0.5	0.0009
Involvement	8.1	1.2	9.4	0.9	0.0002
Work environment	8.8	1.2	9.7	0.7	0.0029
All scores combined	57.0	6.3[a]	63.8	4.9	0.0006

[a]See note at the bottom of Table V.

[Furuki et al., 2006]. In a study of safety programs in mid-size manufacturing worksites, few establishments had ongoing employee participation in safety, and only 11 out of 25 had set safety goals [Barbeau et al., 2004]. Although the median company size was much greater than in our study, two overlapping themes that emerge between our findings and the latter study: (1) there is an ongoing need for management commitment to safety; and (2) employee engagement in safety programs is often insufficient. CARSS safety climate data indicated that employees perceived of owners as only modest in both their commitment to, and communication about safety.

For several safety climate constructs, higher scores were reported by employees engaged in best work practices compared to those who were not (Tables II and III). Worker safety climate survey responses improved when workers reporting good work practices were compared with those who did not report good work practices. This effect was greater for those engaged in body technician work than for painting-related activities. It may be that that the painters perceive isocyanate-containing paints as the most significant potential exposure hazard and do not think of other work processes as potentially hazardous.

When work practices were combined into a single measure and evaluated using generalized linear models, only safety rules and procedures was statistically significant; other safety climate constructs and the overall safety climate score were not related to the overall safe work practices score. Work practice measures were not impacted by years of experience or technical school education.

It was surprising to find no connection between safe work practices and technical school training. We hypothesized that workers who had a technical education would have been more aware of hazards and how to control them than workers without formal technical training. We subsequently investigated safety and health training in a major collision-repair technical education program and found no formalized training in 16 courses. This lack of training represents a missed opportunity to improve worker health in the United States [Schulte et al., 2005].

CARSS safety climate scores portray a complex picture in which owners see themselves as providing a safe workplace even in the absence of clear guidance in the form of safety rules and procedures. Owner scores were $\geq$9 out of 10 for 4 out of 7 safety climate constructs (Table IV). The scores were not tempered by years of ownership, business size, or level of education. These data complement findings from focus groups we conducted with the same group of workers and owners. Focus groups showed a substantial gap between the perceptions of owners and workers with regard to health and safety and a reluctance on the part of owners to develop and enforce safety rules—a critical component of safety culture [DeJoy et al., 2004; Cavazza and Serpe, 2009; Parker et al., 2012].

In small enterprises, the social dimensions of safety climate are likely more interlinked with the social climate of the worksite than in larger establishments. The most consistent relationship found in this study was that owners always rated safety climate in their business more favorably than employees. The discrepancy between owner and worker perceptions should be considered in developing safety programs for very small enterprises. Owners frequently see

TABLE VII. Unadjusted Odds Ratio of Safety Climate Score Increasing With Improving Overall Shop Safety Scores for Workers and Owners

	Safety climate construct							
Group	**Management commitment**	**Communication**	**Priority of safety**	**Safety rules**	**Supportive environment**	**Involvement**	**Work environment**	**Overall safety climate**
Owners	1.12 (1.04–1.20)[b]	1.07 (1.02–1.13)	1.14 (1.08–1.19)	1.06 (1.03–1.10)	1.14 (1.05–1.24)	1.14 (1.08–1.20)	1.11 (1.04–1.18)	1.02 (1.01–1.04)
Workers	NS[a]	NS	NS	1.06 (1.01–1.12)	NS	NS	NS	NS

[a]NS = not significant.
b = 95% confidence interval.

employees as members of their extended families; however, this view is not usually shared by employees [Parker et al., 2012]. Employees with seemingly similar working conditions may respond quite differently from each other to the same sets of questions based on the social relationships within the establishments. Furthermore, employees are apt to dismiss health-related problems as inherent to the nature of the work in which they are engaged but this perception may vary based on their relationship to the business owner or manager [Eakin and MacEachen, 1998; Eakin et al., 2009].

One limitation of this study was the need to combine a random sample of businesses with a purposeful sample. It is exceptionally hard to recruit a completely random sample of 50 very small business establishments. Regardless, the number of owners that do or do not agree to participate always limits a random sample. Overall, participation in this study was high, with 79% of randomly selected businesses agreeing to participate.

The second limitation was our not being able to find a safety climate survey developed for use in small businesses. We used the safety climate survey developed by the British Health and Safety Executive [Davies et al., 1999] because its development and use are comprehensively described [e.g., Cox and Cheyne, 2000] and publically available [Davies et al., 1999; Cox and Cheyne, 2000]. In CARSS, Cronbach's alpha was good (i.e., $\geq$0.7) for all constructs except safety rules and procedures.

Third, safety climate represents an overall organizational-level perspective on a business (i.e., shared perception) [DeJoy et al., 2004; Beus et al., 2010]. However, in the CARS study, the distinction between individual and group-level perceptions is blurred because of the number of very small businesses. The average business had 7 employees, 9 shops had 3 or fewer employees, and 23 shops, nearly half of our sample, had 5 or fewer. The small size of many establishments blurs the distinction between shop-and individual-level measures of safety climate.

Lastly, our sample size was limited in some aspects of the analysis. For example, the examination of work practices led to 10 or fewer workers in some cells (e.g., see Table III). Similarly, for owners, we were constrained by only having a total of 49 individuals. Hence, stratification limited our ability to examine difference between groups and pursue sub-group analysis (e.g., see Table V).

CONCLUSIONS

A clear gap exists between owner perceptions of performance as measured by safety climate and actual performance in an audit of their facility. Simultaneously, there are substantial gaps in best work practices implemented by workers. The development and enforcement of simple shop policies (e.g., safety rules and procedures) might lead to significant improvements in workplace safety for both owners and workers. This should be combined with easy to use guidelines related to regulatory compliance (e.g., respirator programs) and low cost programs (e.g., right-to-know training). Because many small workplaces have both economic constraints and lack expertise in risk assessment and hazard control, it is important to develop commonly applicable simple procedures programs that emphasize primary prevention Kazutaka [2012].

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