DISSERTATION

THE TRANSFER PROBLEM: EXAMINING THE DIRECT AND INTERACTIVE EFFECTS OF SAFETY TRAINING TRANSFER CLIMATE AND WORK LOCUS OF CONTROL ON THE TRANSFER OF SAFETY TRAINING

Submitted by

Autumn D. Krauss

Department of Psychology

In partial fulfillment of the requirements

For the Degree of Doctor of Philosophy

Colorado State University

Fort Collins, Colorado

Fall 2005

COLORADO STATE UNIVERSITY

August 31, 2005

WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY AUTUMN D. KRAUSS ENTITLED THE TRANSFER PROBLEM: EXAMINING THE DIRECT AND INTERACTIVE EFFECTS OF SAFETY TRAINING TRANSFER CLIMATE AND WORK LOCUS OF CONTROL ON THE TRANSFER OF SAFETY TRAINING BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

Committee on Graduate Work

Evelinn A. Borrayo

Michelle M. Glantz

Eric Heggestad

Advisor Peter Chen

Department Head Ernest Chavez

ABSTRACT OF DISSERTATION

THE TRANSFER PROBLEM: EXAMINING THE DIRECT AND INTERACTIVE EFFECTS OF SAFETY TRAINING TRANSFER CLIMATE AND WORK LOCUS OF CONTROL ON THE TRANSFER OF SAFETY TRAINING

Occupational safety training is an integral part of those jobs in which workplace safety is a concern. Unfortunately, few studies have examined the predictors of whether the knowledge and skills learned in safety training are transferred back to the workplace. The purpose of the current study was to investigate whether person (i.e., work locus of control) and work environment (i.e., safety training transfer climate) variables predicted transfer of safety training.

It was hypothesized that work locus of control (with higher scores representing externality) would be negatively associated with transfer of safety training and safety training transfer climate defined at the organizational level would be positively associated with transfer of safety training. Furthermore, a cross-level interaction was hypothesized between safety training transfer climate and work locus of control to predict transfer of safety training such that the relationship between safety training transfer climate and transfer of safety training would be stronger for those with external locus of control when compared to those with internal locus of control

Union construction workers employed by nine different contractors provided information about the constructs of interest. The study's hypotheses were examined

using correlation and hierarchical linear modeling. While work locus of control did not possess a significant relationship with transfer of safety training, safety training transfer climate was positively associated with transfer of safety training when defined at both the individual and organizational levels. Furthermore, the interaction between safety training transfer climate and work locus of control was not significant, although the observed interaction pattern showed similarities with what was expected (e.g., stronger relationship between safety training transfer climate and transfer of safety training for those with external locus of control). Practical and theoretical implications such as how to foster high safety training transfer climate as well as suggestions for future research that strengthen the current study's limitations are discussed.

Autumn D. Krauss
Department of Psychology
Colorado State University
Fort Collins, CO 80523
Fall 2005

ACKNOWLEDGEMENTS

I offer my deepest thanks and appreciation to my advisor, Peter Chen, who served many roles (e.g., mentor, friend, karate instructor) throughout the course of the past five years. You have bestowed upon me the toolbox to be a competent professional and good person. I definitely owe you in the next life. I also thank my committee members, Eric Heggestad, Evelinn Borrayo, and Mica Glantz, for their professional insights and personal support. More thanks are given to the CPWR grant team, who is doing a fabulous job of carrying on the vision that began five years ago.

Thanks to my parents for offering unconditional support for my goals; my godparents for providing an endless supply of encouragement, generosity, and coffee; and the Greenbaums for facilitating my transition to the west coast with such kindness and enthusiasm. My sincerest thanks also to my great national support network with representatives in PA, NJ, MD, NY, CO, AZ, IL, OK, CA, and now OR. The fun we have had has made the last five years so much easier. Finally, thanks to Guy Greenbaum, who showed up for me at every opportunity and has decided to stick around for the next adventure.

DEDICATION

To my Dad:

Occupational safety has become a passion

for the CSU I/O program because of your work.

You are respected and appreciated.

TABLE OF CONTENTS

INTRODUCTION

Occupational safety research examines the roles of the work environment, the individual, and the interaction between these two to predict the engagement in safety behaviors and experience of workplace injuries (Smith, Karsh, Carayon, & Conway, 2003). The importance of occupational safety research becomes evident when one considers the current statistics regarding workplace injuries and occupational fatalities.

According to the most current data about workplace injuries and occupational fatalities (Bureau of Labor Statistics [BLS]), there were 5,559 fatal work injuries in the United States in 2003. Furthermore, 4,095,700 recordable workplace injuries occurred in private industry in 2003. A recordable injury is one that results in loss of consciousness, days away from work, restricted work activity or job transfer, medical treatment beyond first aid, or any significant diagnosis (e.g., fracture) by a medical professional. Of these 4,095,700 recordable workplace injuries, 2,301,900 required days away from work, job restriction, or job transfer. These figures indicate that 4.7 of every 100 full-time workers in private industry experienced a recordable workplace injury, and 2.6 of every 100 full-time private-industry workers experienced one that resulted in missed work, job restriction, or job transfer.

While these numbers have significantly decreased over the past twenty-five years (the average recordable workplace injury rate in private industry was 9.2 per 100 full-time workers in 1978), the current figures are still alarming when considering all of the

factors that these statistics do not address. Specifically, the following aspects of occupational safety are of equal importance and not taken into consideration with the statistics described above: the number of workplace accidents that do not result in injury, the number of workplace injuries that do not result in consequences worthy to deem it "recordable," the number of workplace injuries that go uncounted because the injured individual does not report it, and the number of cumulative traumas (e.g., back pain) or chronic illnesses (e.g., asthma) that do not have a clear etiology.

An initial explanation for why employees experience injuries at work is that the physical aspects of their jobs (e.g., equipment in improper working order, work environment marred by hazardous substances) create dangerous work circumstances that make being safe impossible. While these physical characteristics are undoubtedly a cause of workplace accidents and injuries, the organization conceptualized as an open system with both physical- and human-related components (Fahlbruch & Wilpert, 1999) suggests that human-related factors (e.g., unsafe behavior) are also playing a role. Previous research by the National Safety Council supports this assertion by showing that approximately 40% of workplace accidents are the result of unsafe behavior (National Safety Council, 1996).

Given that occupational safety training is a standard component of virtually every job involving activities even minimally dangerous (Chhokar & Wallin, 1984; Cohen & Jensen, 1984; Reber & Wallin, 1984; Reber, Wallin, & Chhokar, 1990), it does not appear that the majority of workers engage in unsafe behaviors because they are lacking the necessary training to develop the knowledge and skills needed to work safely. Alternatively, it is likely that while workers are provided with safety training to acquire

the needed knowledge and skills, they do not apply the learned safety behaviors to the job when they return from training. The action of applying what one learns during training to the actual work environment is called transfer of training, and it is formally defined as the "(1) generalization of material learned in training to the job context and (2) maintenance of the learned material over a period of time on the job" (Baldwin & Ford, 1988, p. 64).

Statistics show that only about 10% of training content is actually transferred back to the job (Georgenson, 1982). Furthermore, a meta-analytic path analysis of training research showed that when transfer of training was regressed on knowledge attainment and skill acquisition, the relationship with knowledge attainment was nonsignificant and only 35% of the variance in transfer of training was explained by skill acquisition (Colquitt, LePine, & Noe, 2000). These results suggest that additional predictors beyond learning outcomes likely explain whether someone transfers the training content back to the job. Based on these findings, similar conclusions about safety training can be made. In particular, it can be concluded that factors other than acquiring the knowledge and skills taught in safety training are related to whether workers use the trained safety behaviors on the job.

Insights can be drawn from the general training literature to identify these predictors beyond knowledge and skills likely to be associated with transfer of safety training. For instance, in the study described above, Colquitt et al. (2000) also demonstrated that their model possessed the best fit to the meta-analytic data when personal (e.g., personality) and work environment (e.g., climate) characteristics were directly related to training outcomes such as transfer of training, rather than being fully mediated by learning outcomes (i.e. knowledge and skills). The purpose of the

proposed study is to examine the direct and interactive effects of a trainee's personal characteristics and the work environment to predict transfer of safety training. Specifically, the roles of work locus of control, safety training transfer climate, and the interaction between these two variables to predict transfer of safety training will be investigated. First, the importance of the trainee's personal characteristics and work environment for the transfer of training will be described below. Second, an overview of the roles of work locus of control and safety training transfer climate for predicting transfer of training along with research about these constructs in the occupational safety context will be presented. Third, the transfer of safety training outcome will be discussed. Finally, the research hypotheses for the present study will be specified.

Transfer of Training Predictors

Considerable research has been conducted to investigate the predictors of whether individuals apply the knowledge and skills learned in training when completing their job tasks (e.g., Baldwin & Ford, 1988; Holladay & Quinones, 2003; Salas & Cannon-Bowers, 2001). In 1988, Baldwin and Ford reviewed the research that had focused on transfer of training and created a model depicting its predictors. In their model, they suggested that along with the learning that occurs during the training program, a trainee's personal characteristics and work environment would affect whether the trainee applies the trained material in the workplace.

The importance of personal characteristics during training (e.g., affecting trainee motivation, learning during training, transfer after training) has been widely acknowledged (Fleishman & Mumford, 1989; Noe, 1986). In particular, the following trainee characteristics have shown to possess positive relationships with important

training outcomes: locus of control (Baumgartel, Reynolds, & Pathan, 1984), need for achievement (Baumgartel et al., 1984), conscientiousness (Colquitt & Simmering, 1998), goal orientation (Ford, Smith, Weissbein, Gully, & Salas, 1998), and self-efficacy (Quinones, 1995).

In addition to the noted individual characteristics, reviews of training research (e.g., Baldwin & Ford, 1988; Salas & Cannon-Bowers, 2001) identified peer and supervisory support (Facteau, Dobbins, Russell, Ladd, & Kudisch, 1995; Huczynski & Lewis, 1980) as well as training transfer climate (Baumgartel & Jean-pierre, 1972; Tracey, Tannenbaum, & Kavanagh, 1995) as the key work environment variables predictive of transfer of training.

After reviewing the transfer of training literature, Baldwin and Ford (1988) also provided some suggestions for future research when investigating these trainee and work environment characteristics. First, they suggested that the work environment characteristics such as training transfer climate be more clearly defined and their components be described with more specificity. Second, they advocated that training transfer climate be more aligned with the original conceptualization of climate (Schneider, 1983), so that the differences in climate across workgroups or organizations and its relationship with transfer of training could be assessed. Finally, they suggested that research investigate the interaction between the trainee's personal characteristics and work environment to explain transfer of training. This specific suggestion was echoed by Salas and Cannon-Bowers (2001) in their review of training research. In the current study, these recommendations are all addressed by safety training transfer climate being clearly defined and examined at the contractor level as well as the interaction between

work locus of control and safety training transfer climate being a focus of the study. Now that a general review of transfer of training's predictors has been presented, the trainee characteristic and work environment constructs of particular interest in this study will be discussed.

Work Locus of Control

Locus of control is defined as an individual's predisposition to view the consequences of his behaviors as controlled by himself (i.e., internal locus of control) versus the environment and others (i.e., external locus of control) (Rotter, 1966). The dimensions of external and internal locus of control are viewed as poles of the locus of control continuum, allowing an individual to fall somewhere within the range of extreme internal locus of control to extreme external locus of control. While those with internal locus of control are more likely to believe that a strong contingency exists between their behavior and important outcomes (e.g., promotion, workplace injury), individuals with external locus of control possess the propensity to think that their receipt of outcomes is unrelated to their behavior.

Given these descriptions of individuals with internal and external locus of control, locus of control should be an important predictor of work attitudes and work behaviors. For instance, a person who believes that he controls whether he receives important outcomes (internal locus of control) should most likely feel positive about his job and perform his job well in order to receive the outcomes. Likewise, an employee who feels that the power over outcomes is beyond his control (external locus of control) will likely perform his job at a lower standard since he believes that the receipt of outcomes is not dependent upon his performance. Though the difference in work attitudes and work

behaviors as a function of locus of control will be lessened if positive outcomes are not available in the work environment, those with internal locus of control are still likely to demonstrate greater job performance because they perceive the act of controlling work behavior in itself as rewarding (Spector, 1982).

Indeed, in his review, Spector (1982) identified locus of control as one of the most examined personality characteristics in the organizational context, and in their meta-analysis, Judge and Bono (2001) reported average corrected correlations of internal locus of control with job performance and job satisfaction of .22 and .32, respectively. When investigating the effects of locus of control on work outcomes, it has been examined both as a general construct (Rotter, 1966) and a construct embedded in the work context. Spector (1988) labeled the latter construct "work locus of control," and it represents an individual's beliefs about his control over experiences and outcomes at work. Along with greater job satisfaction and better job performance, internal work locus of control has been associated with greater employee well-being in the forms of better psychological and physical health (Spector, 1988; Spector & O'Connell, 1994). Similar findings for work locus of control have been obtained with samples from many different countries (Spector, Cooper, Sanchez et al., 2002).

As mentioned above, some evidence does exist that locus of control plays a role in training (Baumgartel et al., 1984). When describing his model depicting the effects of trainee attributes and attitudes on training, Noe (1986) indicated that when compared to those with external locus of control, those with internal locus of control should be more engaged and motivated to learn in the training program, since they believe that their effort in the training program will lead to the acquisition of new knowledge and skills.

More importantly for transfer of training, those with internal locus of control should be more likely to transfer their new knowledge and skills to the workplace, since they believe that they can control the receipt of valuable rewards by utilizing the training content. Specifically, individuals with internal locus of control will transfer the training because they believe that using the learned knowledge, skills, and behaviors will result in important outcomes such as better job performance, praise by supervisors, and reduction in injury experiences.

Though this theory coupled with initial research suggests that locus of control should be related to transfer of training, Baldwin and Ford's (1988) review of the transfer of training literature showed mixed results. For instance, while Baumgartel et al. (1984) found internal locus of control to be associated with intended effort to apply the training content when returning to the workplace, Noe and Schmitt (1986) reported non-significant results between locus of control and motivation to transfer immediately following the training as well as actual behavior as rated by subordinates three months after the training program.

Since Baldwin and Ford's review in 1988, research has continued to examine how locus of control is related to training outcomes. In two studies, Tziner and his colleagues obtained no main effect for locus of control on transfer of training as rated by the trainees or their supervisors (Tziner & Falbe, 1993; Tziner, Haccoun, & Kadish, 1991). Though not the focus of their study, Smith-Jentsch, Salas, and Brannick (2001) observed trends in their results showing internal locus of control to be associated with greater (1) display of trained behaviors in a simulation subsequent to training and (2) transfer of training one year after the program, however the correlations were nonsignificant. Finally, in a meta-

analytic path analysis of training motivation, Colquitt et al. (2000) found that while locus of control was negatively associated (lower values indicating greater internality) with motivation to learn and posttraining self-efficacy, it was positively related to transfer of training.

Research conducted by Blau (1993) may provide insight into the nonsignificant relationships observed between locus of control and transfer of training. Blau (1993) showed that while work locus of control (Spector, 1988) possessed significant relationships with job performance criteria, general locus of control (Rotter, 1966) did not. Based on the literature showing relationships to be stronger when the predictor and criteria are within the same context (e.g., work; Fisher, 1980), Blau contended that Spector's work locus of control measure should be the preferred measure when examining locus of control's relationships with work criteria. An investigation of the measures used in the training research, which obtained null findings between locus of control and transfer of training, showed that the general locus of control measure developed by Rotter or a subset of Rotter's items were used. With respect to the finding from the Colquitt et al. (2000) meta-analysis, the result was based on only two studies, which are reviewed above, and the confidence interval for the meta-analytic correlation (r = .19) was almost inclusive of zero (CI = .02, .36). In an attempt to provide a consistent work context for the study's measures and maximize the potential for finding a relationship between locus of control and transfer of training, locus of control was assessed by using Spector's work locus of control measure.

Along with the studies described above in the general work and training contexts, locus of control has been the subject of occupational safety research on only two

occasions. First, Janicak (1996) found that workers with internal locus of control were less likely to be injured than workers with external locus of control. Second, Kuo and Tsaur (2004) reported a positive relationship between external locus of control and unsafe behavior in a large-scale study of construction workers in Taiwan. In addition to these studies that focused on locus of control, research has been conducted by Jones and Wuebker to develop and examine the construct of safety locus of control. Consistent with Rotter's (1966) conceptualization, safety locus of control refers to stable beliefs about one's ability to influence whether he/she experiences accidents and injuries (Wuebker, 1986). When compared to participants with external safety locus of control, those with internal safety locus of control have experienced fewer and less severe occupational accidents (Jones & Wuebker, 1993).

Taken together, it appears that several reasons exist why work locus of control should play an important role in transfer of safety training. First, the positive relationship between internal locus of control and general work outcomes is well documented. Second, though the results for locus of control and transfer of training are mixed, the focus on work-specific locus of control makes it more likely that internal locus of control will be positively associated with transfer of safety training. Third, those studies in the occupational safety area including locus of control or a corollary (i.e., safety locus of control) did find promising results for internal locus of control and safety outcomes. Given these reasons, it is expected that greater transfer of safety training will be observed for those individuals with greater internal locus of control.

Safety Training Transfer Climate

Training transfer climate has been shown to be a work environment factor that plays an integral role in training (Baldwin & Ford, 1988; Salas & Cannon-Bowers, 2001). The construct "training transfer climate" stems from the seminal research about organizational climate by Schneider and his colleague (Schneider, 1983; Schneider & Reichers, 1983). Organizational climate is defined as employees' shared perceptions about an organization's values and priorities, and it develops when individuals make similar inferences about these values and priorities by noting organizational policies and observing managerial actions (Schneider, 1990). To be consistent with the definition of organizational climate, it is important to assess training transfer climate by targeting employees' shared perceptions at a level greater than the individual (for an example, see Tracey et al., 1995), though some studies have elected to define and correspondingly measure training transfer climate as individual perceptions (labeled *perceived* training transfer climate and for an example, see Smith-Jentsch et al., 2001).

The original research regarding training transfer climate was conducted by Rouiller and Goldstein (1993), who defined the construct as "shared perceptions about those situations and consequences which either inhibit or help to facilitate the transfer of what has been learned in training into the job situation" (p. 379). They found that training transfer climate at the level of the work site positively predicted individual-level transfer of training after accounting for individual-level learning during training. A subsequent study by Tracey et al. (1995) provided additional evidence that high training transfer climate is associated with greater transfer of training. Their research showed that training transfer climate targeted at the workgroup level was positively related to

individual-level transfer of training after controlling for individual-level work behavior before training and knowledge attainment during training.

High training transfer climate has also been associated with greater self-reported efforts to apply the training on the job (Baumgartel et al., 1984) and transfer of training as observed by trained raters (Smith-Jentsch et al., 2001). When transfer of training was regressed on training transfer climate in their meta-analytic path analysis, Colquitt et al. (2000) reported a beta coefficient for training transfer climate of .12, which was significant ($p < .05$). In fact, training transfer climate also positively predicted motivation to learn ($\beta = .24, p < .05$) and posttraining self-efficacy ($\beta = .91, p < .05$), demonstrating its relationships with other important training outcomes (Colquitt et al., 2000).

Given the minimal training research that has focused on safety training, it is not surprising that only two studies have investigated the role of training transfer climate for safety training. First, some recent research found that training transfer climate was not related to workplace injury rates obtained from workers' compensation claims, which were conceptualized as the transfer of safety training criteria (Sinclair, Smith, Colligan, Prince, Nguyen, & Stayner, 2003). Since Sinclair et al. also obtained null findings for other work environment and individual characteristic predictors, they speculated a problem with using injury outcomes as the transfer of safety training criteria, given their low base rate and contamination from myriad extraneous variables. Instead, the authors suggested that the measurement of safety behaviors would be a better operationalization of transfer of training.

The other study that investigated the role of training transfer climate in the safety context was conducted by Smith-Crowe, Burke, and Landis (2003), who developed the construct of "safety training transfer climate" and defined it as the extent to which employees perceive that their organization and its management value and prioritize the transfer of safety training. Upon reviewing the training transfer climate and safety climate literatures along with conducting a qualitative review of comments provided by participants about their experiences with safety training, Smith-Crowe et al. proposed ten dimensions of safety training transfer climate, extracting eight from the literature and developing two from the qualitative comments.

The dimensions and their respective definitions are as follows: (1) **social and goal cues**-encouragement provided by supervisors and co-workers to use what one learned during training on the job and specific goals set with respect to the implementation of trainees' knowledge, (2) **task cues**-prompts to transfer training that are inherent in one's job (e.g., clear opportunity to use training), (3) **no-feedback consequences**-supervisors' indifference to one's transfer of training, (4) **punishment consequences**-overt discouragement of the transfer of training, (5) **extrinsic reinforcement consequences**-receipt of external rewards (e.g., monetary incentives) upon the on-the-job display of behaviors learned during training, (6) **intrinsic reinforcement consequences**-receipt of internal rewards (e.g., appreciation by others) upon the on-the-job display of behaviors learned during training, (7) **perceived importance of safety training programs**-degree to which individuals think that safety training is valued within their organizations, (8) **perception of management attitudes toward safety**-degree to which individuals think that management values safety within their organizations, (9) **perceived effects of**

required work pace on safety- extent to which required work pace is perceived to be more important than safety performance, and (10) **perceived appropriateness of safety training**-extent to which safety training is perceived to be appropriate in terms of content, presentation, and facilities.

Although Smith-Crowe et al. (2003) did provide an initial foundation for the development of safety training transfer climate, it seems that the construct could benefit from some additional work to clarify the dimensions. For instance, two of the dimensions created by Smith-Crowe et al., *perceived effects of required work pace on safety* and *perceived appropriateness of safety training*, were not identified from the literature but instead the result of a post-hoc analysis of the qualitative data. Furthermore, Smith-Crowe et al. dropped three of the a priori dimensions (i.e., no-feedback consequences, extrinsic reinforcement consequences, perceived importance of safety training programs) because they were not supported in the qualitative comments. Finally, some of the dimensions, particularly *management attitudes toward safety* and *perceived effects of required work pace on safety*, and their corresponding definitions do not specifically focus on the transfer of safety training. As an attempt to strengthen the safety training transfer climate construct, some initial pilot work was conducted in the current study. Specifically, when developing the self-report measure of safety training transfer climate, all of the ten dimensions were considered for inclusion on the scale, and the scale's items were written to focus specifically on transfer of safety training while still preserving the dimensions' original definitions as much as possible.

By utilizing samples from two organizations that possessed different safety training transfer climates (i.e., one significantly higher than the other), Smith-Crowe et al.

(2003) found that safety training transfer climate moderated the relationship between participants' knowledge from training and safety performance. Specifically, for those individuals employed at the organization with the higher safety training transfer climate, the relationship between safety knowledge and safety performance was stronger than for those working for the company with the lower safety training transfer climate. Though only this initial work has begun to examine the safety training transfer climate construct, it is a reasonable assertion that safety training transfer climate should be positively associated with transfer of safety training. This contention is largely based on the generally positive results within the training literature that have shown training transfer climate to be related to transfer of training.

Interaction between Work Locus of Control and Safety Training Transfer Climate

As stated above, the interaction between trainee characteristics and the work environment during training has been cited as a topic in need of further research (Baldwin & Ford, 1988; Salas & Cannon-Bowers, 2001). In the current study, the moderating role of work locus of control on the relationship between safety training transfer climate and transfer of safety training is of particular interest.

In the general organizational context, locus of control has been shown to moderate the relationships between performance feedback and organizational commitment (Tang, Baldwin, & Frost, 1997), shiftwork and fatigue (Smith, Tanigawa, Takahashi, Mutou, Tachibana, Kage, & Iso, 2005), work demands and job strains (Naswall, Sverke, & Hellgren, 2005; Parkes, 1991), and various job characteristics and job attitudes (Knoop, 1981). Additionally, studies have obtained significant results demonstrating that locus of control interacts with constructs at the organizational level

(e.g., organizational frustration: Storms & Spector, 1987) and constructs that are climate-oriented (e.g., psychological climate: Witt, 1989) to predict individual-level behavior.

For each study noted above, the relationship between the variables was stronger for individuals with external locus of control than those with internal locus of control. Those with external locus of control are sensitive to the work environment and depend on outside factors to guide their job attitudes and work behaviors (Blau, 1993; Spector, 1982). Furthermore, those with external locus of control do not attempt to exert control over the work environment; as a result, they are passively affected by stressors and experience greater strains (Naswall et al., 2005). Conversely, individuals with internal locus of control look to themselves for direction and are less influenced by the work environment (Blau, 1993; Spector, 1982).

Within the training context, few studies have examined the moderating role of locus of control. Tziner et al. (1991) found that those with internal locus of control engaged in greater transfer of training than trainees with external locus of control. When explaining this finding, the authors cited a lack of support for the training program in the work environment and suggested that those with external locus of control were less likely to transfer the training due to their heightened sensitivity to this lack of support. Furthermore, Smith-Jentsch et al. (2001) found that locus of control moderated the relationship between perceived training transfer climate and transfer of training (i.e., frequency of trained behaviors observed by others during a simulation) for an assertiveness training program. The pattern of the interaction was consistent with the results of the above studies such that the relationship was stronger for those with external locus of control compared to internal locus of control.

It is reasonable to assume that similar moderating effects will be observed for work locus of control when investigating the relationship between safety training transfer climate and transfer of safety training. While the relationship is expected to be positive for both those with internal and external locus of control, it is hypothesized to be stronger for individuals with external locus of control. Individuals with internal locus of control are less likely to use the work environment as an indicator of their behavior, instead believing that their personal effort will dictate their use of the trained safety behaviors on the job. Conversely, safety training transfer climate will be more likely to determine the behavior of those with external locus of control, due to their acute sensitivity and responsiveness to the work environment (Blau, 1993; Spector, 1982)

Transfer of Safety Training

When examining the effectiveness of a training program, it is important to consider a variety of criteria. Kirkpatrick's four-level model (1959a, 1959b, 1960a, 1960b) of training outcomes is the most common evaluative framework used to assess a training program (Salas & Cannon-Bowers, 2001). Specifically, Kirkpatrick proposed that training effectiveness be determined by examining the trainees' **reactions** (e.g., affective responses toward the training), trainees' **learning** (e.g., knowledge resulting from the training), trainees' **behavior** (e.g., use of the training in the workplace), and organization's **results** (e.g., effects of the training on organization-level outcomes). In 1997, Alliger, Tannenbaum, Bennett, Traver, and Shotland revised Kirkpatrick's model in several ways, which included dividing the reactions component into affective (e.g., satisfaction with the training program) and utility (e.g., usefulness of the training content

on the job) reactions and labeling the "behavior" component of Kirkpatrick's model "transfer."

Although it is widely acknowledged that all of the outcomes are important when evaluating training programs, trainees' behaviors (i.e., transfer) and organizational results are by far the least investigated outcomes due to limited accessibility to the trainees following the completion of the training program (Salas & Cannon-Bowers, 2001). Even when reviewing the transfer of training literature, Baldwin and Ford (1988) included studies that assessed transfer with attitudinal measures because of the limited research that actually used a behavioral measure. The constructs assessed on these attitudinal measures included the trainee's intended effort to apply the learned material on his job (Baumgartel & Jean-pierre, 1972), perceived appropriateness of the training material (Hicks & Klimoski, 1987), attempts to transfer the material back to the workplace (Huczynski & Lewis, 1980), and anticipated job performance change resulting from the training program (Miles, 1965). Based on Alliger et al.'s (1997) work, these measures would actually be included within the level one training outcome "utility reactions." While a meta-analysis of the relationships between the training outcomes showed that utility reactions did possess positive relationships with transfer (Alliger et al., 1997), the authors asserted that utility reactions cannot serve as a substitute for behavioral measures when assessing transfer.

The lack of focus on transfer and behavioral assessments is also a common occurrence in safety training research. Safety training programs have been implemented to teach safety behaviors focusing on the reduction of back and neck injuries (Linton, 1991), the compliance with safety standards (Wells, Stokols, McMahan, & Clitheroe,

1997), the management of dangerous work assignments (Hickman & Geller, 2003), and the recognition of safety hazards (Kowalski-Trakofler & Barrett, 2003). For these programs, training effectiveness was measured either by a knowledge or skill assessment at the end of training (learning outcome) or an analysis of changes in organizational injury incidence (results outcome) following the implementation of the program.

One recent study that has utilized a behavioral measure was conducted by Smith-Crowe et al. (2003) to examine how knowledge from safety training and safety training transfer climate is associated with safety performance. In their study, they used the General Safety Performance Scale (GSS; Burke, Sarpy, Tesluk, & Smith-Crowe, 2002) as the safety training outcome. Burke et al. (2002) developed the GSS as a measure of safety task behaviors thought to be applicable and required for all jobs in which safety is a concern. It includes the following four dimensions: (1) using personal protective equipment, (2) engaging in work practices to reduce risk, (3) communicating health and safety information, and (4) exercising employee rights and responsibilities.

A limitation associated with the use of this measure as the study's outcome is worthy of attention. The outcome of the Smith-Crowe et al. (2003) study would have been better aligned with the predictors (i.e., safety knowledge as the number of safety training courses passed, safety training transfer climate) if the behaviors on the safety performance measure had been shown to be the focus of safety training. In the current study, this limitation was reconciled by some preliminary research being conducted to ensure that the behaviors representing transfer of safety training are actually the focus of safety training. Specifically, transfer of safety training was assessed by the trainees' self-reported engagement in the behaviors that are the focus of safety training programs

attended by the trainees. While it is acknowledged that the use of the self-report method to assess transfer of training is a limitation of the current study (labeled elsewhere as "perceived training transfer," Facteau et al., 1995), the method has been utilized in previous training studies (e.g., Smith-Jentsch et al., 2001) and recognized as common by two training reviews (Baldwin & Ford, 1988; Salas & Cannon-Bowers, 2001). Furthermore, safety behaviors are also often self-reported in occupational safety research (e.g., Hofmann & Stetzer, 1996).

This study builds on the work by Smith-Crowe et al. (2003) by continuing to use behaviors from the GSS as part of the transfer of safety training measure. Besides the GSS, another safety behavior measure was recently developed by Hofmann, Morgeson, and Gerras (2003). They created a safety citizenship behavior (SCB) scale by adapting existing organizational citizenship behavior measures. The SCB includes six dimensions, listed here each with an exemplar: (1) **helping**-volunteering for safety committees, (2) **voice**-raising safety concerns during planning sessions, (3) **stewardship**-protecting fellow crew members from safety hazards, (4) **whistleblowing**-reporting crew members that violate safety procedures, (5) **civic virtue**-attending safety meetings, and (6) **initiating safety related change**-trying to improve safety procedures.

Little work has been conducted to ensure that the safety behaviors included on the SCB are indeed outside the scope of one's required job tasks, with the exception of Hofmann et al's (2003) participants rating them as such when compared to six items from the GSS. Additionally, Hofmann et al. showed that when subordinates viewed their supervisors' leadership positively, they were more likely to perceive the SCB items as part of their job, suggesting that under some circumstances the items may be viewed as

required safety behaviors. Finally, no research has examined whether the GSS and SCB items are the subject of occupational safety training. Given these reasons and to ensure a comprehensive transfer of training outcome, both the GSS and SCB's items were considered for inclusion as part of the transfer of safety training measure. Now that all of the study's components have been elaborated upon (i.e., work locus of control, safety training transfer climate, interaction between work locus of control and safety training transfer climate, transfer of safety training), the study's hypotheses will be specified.

Specification of Hypotheses

As outlined above, work locus of control represented the trainee's personal characteristic and safety training transfer climate represented the work environment construct. Additionally, transfer of safety training was represented by some of the safety behaviors from the GSS (Burke et al., 2002) and the SCB (Hofmann et al., 2003), which is described in detail below. Furthermore, safety training transfer climate was assessed at the contractor level while work locus of control and transfer of safety training were assessed at the individual level. The levels of analysis for the current study are also explained in detail below. Based on the review of the research presented above, the following three hypotheses were derived:

H_1: A positive relationship will exist between safety training transfer climate and transfer of safety training such that an increase in safety training transfer climate will be associated with an increase in transfer of safety training.

H_2: A negative relationship will exist between work locus of control (where greater scores refer to more externality) and transfer of safety training

such that those characterized as possessing greater external work locus of control will report engaging in less transfer of safety training.

H_3: Work locus of control will moderate the relationship between safety training transfer climate and transfer of safety training. Specifically, the relationship between safety training transfer climate and transfer of safety training will be stronger for those individuals with more external work locus of control than those with more internal work locus of control.

In an attempt to further clarify the current study's expected relationships between safety training transfer climate, work locus of control, and transfer of safety training, Figure 1 is presented below. The y-axis refers to transfer of safety training, the x-axis represents safety training transfer climate, and the lines within the figure refer to internal and external work locus of control. The values are hypothetical to allow for the illustration prior to data analysis.

In the figure, the main effects of both safety training transfer climate and work locus of control are displayed. Additionally, work locus of control serves as a moderator such that the slope of the regression line representing external work locus of control is steeper than the one representing internal work locus of control. This suggests that the relationship between safety training transfer climate and transfer of safety training is stronger for externals compared to internals.

It should be noted that the pattern of the interaction observed by analyzing the study's actual data might look different than the example presented here but would still support the hypotheses if (1) safety training transfer climate is positively associated with transfer of safety training, (2) work locus of control is negatively associated with transfer

of safety training, and (3) the line representing external work locus of control is steeper than the line representing internal work locus of control.

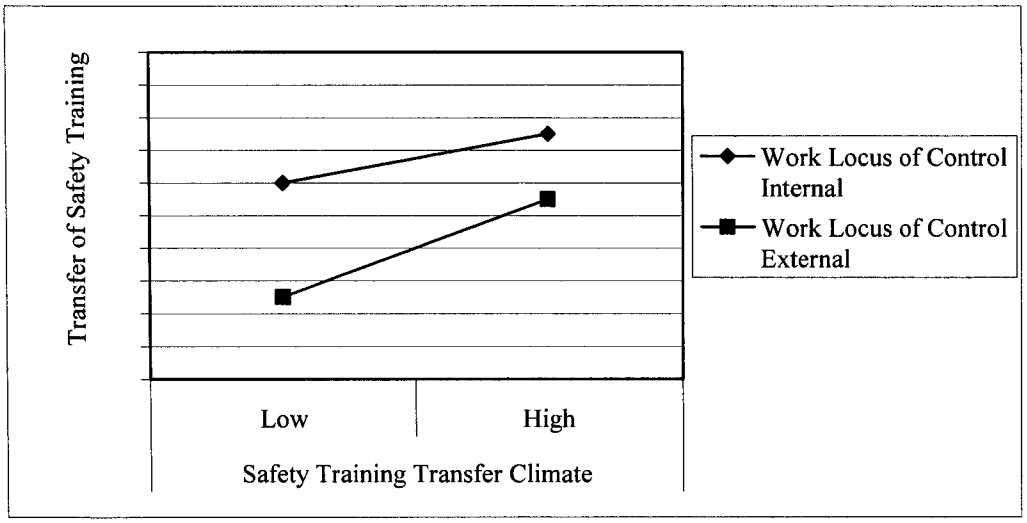

Figure 1.
Hypothesis Three Depicted with Safety Training Transfer Climate as the X-Axis and Transfer of Safety Training as the Y-Axis.

Levels of Analysis

Safety training transfer climate is based upon the original conceptualization of organizational climate (Schneider, 1990) and the work on training transfer climate conducted by Rouiller and Goldstein (1993). Since an important characteristic of the definition is "shared perceptions," the targeted level of analysis for safety training transfer climate is higher than the individual. In the current study, the level of analysis was the contractor, which is consistent with the organizational level. The organization has served as the level of analysis for other climate constructs (Schneider & Reichers, 1983) including those in the safety context (safety climate; Zohar, 2003). With respect to specific studies examining training transfer climate, Tracey et al. (1995) showed that training transfer climate could be reliably measured at a level higher than the individual

(workgroup), and Smith-Crowe et al. (2003) distinguished between two organizations based on their safety training transfer climate.

Given that variables included in this study were both at the organizational level (safety training transfer climate) and at the individual level (work locus of control, transfer of safety training), a cross-level model was specified. In the current study, two cross-level hypotheses were investigated: (1) a cross-level main effect where organizational-level safety training transfer climate was hypothesized to predict individual-level transfer of safety training and (2) a cross-level interaction where organizational-level safety training transfer climate and individual-level work locus of control were hypothesized to interact in predicting individual-level transfer of safety training.

METHOD

Participants

Participants for this study were 128 pipefitters (34%), plumbers (38%), and steamfitters (28%) working in the construction industry in a northwestern state. These participants all belonged to a Local of an international trade union and were active (not retired) full-status (journeymen, not apprentices) members. The Local negotiates an employment contract with a group of construction contractors that employ the Local members on a project basis. Two weeks before the survey administration, an analysis was completed to ascertain the number of Local members currently working for each of the 188 contractors represented in the employment contract. The number of Local members employed by a specific contractor ranged from one to 284. To ensure that a sufficient number of responses (i.e., at least three; Hofmann et al., 2003) from Local members would be obtained to measure safety training transfer climate for each contractor, the Local members currently working for ten contractors that were employing 25 to 232 members were targeted for participation. The total number of Local members targeted for participation by working at these ten contractors was 615. The Training Coordinator for the Local confirmed that all members asked to participate in the study had completed at least one safety-training class offered by the Local over the course of their membership.

Of the 615 Local members that were asked to participate via a mailed survey, 189 individuals returned the survey, resulting in a response rate of 31%. Multiple criteria were then used to determine the final sample size for the study. First, only those respondents that provided complete data for the study's variables were included. Second, some participants responded that one or more of the transfer of safety training behaviors were "not applicable" to their job. These respondents were removed from the study, because they were not performing a job that allowed the trained behaviors to be transferred. Having a "not applicable" option for each behavior provided the opportunity to differentiate between those that should be performing the trained behaviors because they are relevant for their job (of interest here) and those who received the training but are not working in jobs that require the use of the material. Though previous pilot research with samples similar to the population of the current study showed the behaviors to be relevant, some jobs being performed by the current participants might lie outside the typical work for these trades. For nine of the sixteen transfer of safety training behaviors, at least one participant indicated that it was "not applicable" for his job, and the most participants (i.e., eleven) considered the behavior "take general precautions and meet permit requirements for confined space work" to be not applicable. A series of Chi-Square tests were conducted to determine whether an individual's area (i.e., working on the *construction* of new commercial structures, the *service* of commercial appliances such as air conditioners, or *both*) or trade (i.e., pipefitter, plumber, steamfitter) was related to whether he considered a behavior to be inapplicable, and no significant relationships were found.

Finally, an analysis was conducted to see whether a sufficient number of individuals working for each contractor returned a completed survey. Of the ten contractors listed as options on the survey, sufficient sample sizes were obtained for nine contractors, with the sample sizes ranging from five to fifty-six respondents. Only two participants responded from one contractor and a few participants indicated that they now worked for a contractor "other" than those listed; therefore, these individuals were also removed from the study. By using these criteria, the final sample size for the current study was 128. It is worth noting that a test of goodness of fit showed that the response rates across contractors did possess significant variation, $\chi^2(9) = 20.46, p < .05$.

Of these participants, 97% were male, and their average age was 45 years old. With regard to ethnicity, 93% were Caucasian, 3% were Native American, 1% were Asian, 1% were Hispanic, and the remaining 2% classified themselves as "Other." With respect to their work environment, 89% indicated that they worked in construction, 5% in service, and 6% in both. Furthermore, participants had worked in their trade for 21.09 years and belonged to the Union Local for 15.69 years. Finally, 80% of the participants reported that they had attended an apprenticeship program. The full descriptive statistics associated with the continuous demographic variables are displayed in Table 1 below. Using correlation and one-way analysis of variance (ANOVA), no significant relationships were found between any demographic information and the study's variables (work locus of control, safety training transfer climate, transfer of safety training).

Table 1.
Descriptive Statistics for Continuous Demographic Variables

Variable	Obtained Range	*M*	*SD*
Age	19.00 – 61.00	45.73	9.49
Years in Trade	1.00 – 39.00	21.09	9.82
Years in Union Local	0.00 – 38.00	15.69	9.05

Note. $N = 128$.

Measures

Safety training transfer climate. Safety training transfer climate was measured by a thirteen-item scale developed for the purposes of this study. Participants were instructed to consider their formal safety training classes (not on-the-job training) that they had taken from the union, the contractor, and/or the company when responding to the statements. They indicated their agreement with each item on a six-point scale (i.e., strongly disagree, disagree, somewhat disagree, somewhat agree, agree, strongly agree). The thirteen items, five of which were reverse scored, represented nine of the ten dimensions of safety training transfer climate that were proposed by Smith-Crowe et al. (2003). Example items include "contractor management makes serious efforts to make safety training classes a high priority" and "my immediate foreman discourages me from applying my knowledge from safety training class when he thinks it is not necessary." The entire measure is included in Appendix A with notations indicating the dimension that each item represents and whether the item is to be reverse scored. Participants' responses were summed to create an overall score for perceived safety training transfer climate, with larger values representing higher perceptions. The term "*perceived* safety

training transfer climate" is used to indicate that the climate construct is measured at the individual level (for an example of climate used at the individual level, see Barling, Loughlin, & Kelloway, 2002). Upon aggregation to a higher level such as the organization, the construct is labeled "safety training transfer climate." Internal consistency reliability was .90.

As mentioned above, the targeted level of safety training transfer climate was the contractor. As such, analyses were completed to determine whether the participants' responses to the safety training transfer climate items could be aggregated to the contractor level. Specifically, two criteria should be met before aggregating individual responses to a higher level. It must be shown that (1) participants within the same group share similar perceptions and (2) participants in different groups share different perceptions. To evaluate whether participants working for the same contractor shared similar safety training transfer climate perceptions, within-group agreement was assessed using the r_{wg} statistic (James, Demaree, & Wolf, 1993). The results indicated acceptable levels of agreement for all nine contractors (average r_{wg} = .96). A one-way ANOVA was used to assess whether differences in safety training transfer climate perceptions existed across contractors, and the results were not significant, F (8, 119) = 1.37, $p > .05$. This suggested that the contractors did not possess significant differences in their levels of safety training transfer climate. However, given the high within-group agreement results, the participants' responses were still aggregated to form a single safety training transfer climate score for each contractor. Given the mixed results used to decide whether to aggregate the climate perceptions to the contractor level, the individual-level correlation

between perceived safety training transfer climate and transfer of safety training was also examined for hypothesis one.

Since there was no available measure to assess safety training transfer climate, the present study completed the necessary steps to develop a reliable self-report scale. Initially, I wrote three items to represent each of the ten dimensions of safety training transfer climate, resulting in a total of thirty items. Four union construction subject matter experts then provided initial suggestions to improve the relevance and clarity of the items for the targeted population (i.e., union construction workers). The items were then presented to the research team (i.e., four researchers in occupational health psychology, one at the doctoral level and three at the graduate level), who revised the items to improve their representativeness of the targeted dimensions, make certain they were at the appropriate literacy level, and ensure they met scale construction standards (e.g., no double-barreled wording).

After the research team had finalized the thirty items based on scale construction standards (Spector, 1992), two steps were completed to finalize the measure from a content perspective. First, five occupational safety instructors from the participating Local reviewed the items and provided feedback regarding their appropriateness for the population (i.e., union pipefitter and plumber journeymen) with respect to the reading level and terminology. The form administered to the instructors for this feedback is included in Appendix B. Finally, the measure was administered to eighty-five of the Local's apprentices who had already completed a required safety training course as part of their apprenticeship. These participants were all currently working in the field and did not participate in the actual study. Of these participating apprentices, 70% were in the

pipefitter program compared to 30% enrolled in the plumber apprenticeship. The apprentices attended one of two survey administration periods at the Local training facility, in which they were assembled in one room at the beginning of their scheduled class time. They responded to each of the thirty items by indicating their agreement with the statement on a six-point scale (i.e., strongly disagree, disagree, somewhat disagree, somewhat agree, agree, strongly agree). A copy of the survey administered to the apprentices is included in Appendix C. Based on complete data from seventy-four respondents, the results of an item analysis (e.g., item mean and standard deviation; corrected item-scale correlations; scale reliability if the item is deleted; scale mean, standard deviation, and reliability) were used, in conjunction with the criterion of adequate representation of the construct, to reduce the measure.

The final measure consisted of thirteen items and represented nine dimensions. Some of the dimensions (e.g., social and goal cues) were represented by multiple items due to the breadth of the dimension's definition. The dimension "perceptions of management's attitudes toward safety" was dropped in the final measure. From a theoretical perspective, this dimension's definition (i.e., degree to which individuals think that management values safety within their organizations) was found to be virtually identical with overall definitions of safety climate (Zohar, 2003) and dimensions within safety climate (Mueller, DaSilva, Townsend, & Tetrick, 1999). Furthermore, the dimension did not focus specifically on safety training, which was inconsistent with the overall definition of safety training transfer climate. Empirically, the participants' responses to this dimension's items were not consistent with their responses to the other dimensions' items, and the items' means were high with limited variability. Based on the

pilot data, the final thirteen-item measure possessed a mean of 54.13, a standard deviation of 8.26, and an alpha reliability estimate of .80 ($N = 74$).

Work locus of control. Locus of control about work was measured by the eight items representing external control from the Work Locus of Control Scale (WLCS; Spector, 1988). Respondents were asked to consider their beliefs about jobs in general and to indicate their agreement with each statement on a six-point scale (i.e., strongly disagree, disagree, somewhat disagree, somewhat agree, agree, strongly agree). An example item is "Getting the job you want is mostly a matter of luck," and the scale as used in the current study is included in Appendix D. The responses to the eight items were summed for each participant with high scores representing externality and low scores, internality. Internal consistency reliability was .88.

The WLCS has a total of sixteen items, eight written to assess external locus of control and eight indicating internal locus of control. For six samples, Spector (1988) reported internal consistency reliability estimates ranging from .75 to .85. Due to space limitations on the survey for the present research, the measure was reduced to only include the eight items representing external locus of control. These items were selected based on a suggestion by the creator of the measure, who related that these items tend to show greater reliability (e-mail communication with Spector, February 2005). Spector also conveyed that when the WLCS was separated into two individual scales (i.e., external work locus of control and internal work locus of control), they demonstrated convergent validity with important work criteria (e.g., job satisfaction). Furthermore, analysis of a dataset provided by Spector and containing responses to the full WLCS ($N = 136$) showed that individually constructed scales representing the internally worded items

and the externally worded items correlated significantly ($r = .45, p < .05$). Finally, evidence exists that even when two factors are found within one scale that contains positively and negatively worded items, the two-factor structure may be a statistical artifact and might not actually indicate two separate constructs (Spector, Van Katwyk, Brannick, & Chen, 1997).

Transfer of safety training. Transfer of safety training was assessed with a measure of sixteen safety behaviors shown to be the focus of safety training in a pilot study. Respondents indicated how frequently they engaged in each of the sixteen behaviors on a six-point scale (i.e., never, once in a while, sometimes, quite often, frequently if not always, always). An example item is, "Engage in appropriate methods to notify workers, supervisors, and/or emergency coordinators of emergency conditions," and the measure in its entirety is included in Appendix E. The participants' responses to all items were summed to create their transfer of safety training scores, and the internal consistency reliability was .91.

These items were taken from the GSS and SCB scales developed by Burke et al. (2002) and Hofmann et al. (2003), respectively. These items have been used as part of the GSS and SCB to measure safety performance in previous studies with pipefitter members of other Locals within the same international union. When isolating the items used to measure transfer of safety training here, the internal consistency reliability estimate was .86 ($N = 368$).

For the purposes of the present research, some initial pilot work was necessary to ensure that the safety behaviors on the GSS and SCB actually served as training content and would therefore appropriately represent the transfer of safety training outcome. To

develop the transfer of safety training outcome, a measure of 52 safety behaviors was created that included twenty-six items from both the GSS and the SCB. Though the original GSS and SCB measures were each comprised of twenty-seven items, reviews of the measures by previous focus groups of members from other Locals within the same international union indicated that one item from the GSS (i.e., inspects engineering controls as dictated by conditions) and one item from the SCB (i.e., volunteers for safety committees) were not appropriate for the population of interest.

Safety behaviors from both the GSS and SCB were included because limited research has been conducted to examine the differences in the behaviors thought to be required for the job (GSS behaviors) or outside the scope of one's required job tasks (SCB behaviors). For instance, Hofmann et al. (2003) found that their participants viewed six items from the GSS as a more required part of their job than the safety behaviors on the SCB. Furthermore, my previous studies with union pipefitter journeymen found that the participants reported engaging in the GSS and SCB behaviors with similar frequency. Finally, no research to date has investigated whether the GSS and SCB behaviors are differentially focused on during safety training, though logic would suggest that the GSS behaviors would be emphasized more heavily in safety training classes than the SCB behaviors.

The survey of the fifty-two safety behaviors was given to eighty-five pipefitter and plumber apprentices as part of the administration described above to finalize the safety training transfer climate measure. The survey is included in Appendix F. Seventy-two of the apprentices returned the survey with complete data for the fifty-two behaviors. The participants were instructed to respond to the items by thinking about the safety

training classes that they had completed as part of their apprenticeship. A prompt was included that asked whether the behavior was discussed during safety training class, and the participants responded on a three-point scale (i.e., no, sometimes, yes). Five of the Local's instructors who taught the apprentices' safety training classes as well as journeymen-level safety classes completed a similar survey, included in Appendix G. They were instructed to indicate the extent to which the information that they taught in their safety classes focused on each of the safety behaviors, and the same response scale as the apprentice survey was used.

Based on the data from the apprentices and instructors, sixteen items were retained to represent the transfer of safety training outcome. An item was retained if the average score on the three-point scale, corresponding to the extent that the behavior was the focus of safety training class, was greater than 2.50 as rated by both the apprentice and instructor samples. While thirteen of the items were from GSS dimensions (three from *using personal protective equipment*, six from *engaging in work practices to reduce risk*, and four from *communicating health and safety information*), the SCB dimensions of *helping* and *stewardship* were also represented in the final measure by one and two items, respectively. The safety performance dimension corresponding to each item is noted on the measure in Appendix E.

Procedure

Survey administration. This study was conducted in conjunction with three other surveys administered simultaneously to the rest of the Local membership. To encourage participation in the studies, the Training Coordinator announced the project at a monthly union meeting and included an article about the project in the Training Center newsletter.

As an incentive to complete the survey, each participant was awarded one hour of continuing education credit. Each member who accumulates twenty hours of continuing education credits in a calendar year receives $500.00 from the Training Center.

A survey packet was mailed to each of the 615 members that were identified as currently working for the ten contractors employing a sufficient number of members, as described above. The survey packet included a cover letter that outlined the purpose of the project, the sources financing the project, and the support for the project by the Local's leadership. Also enclosed in the packet were the survey and a business reply envelope. Two weeks following the survey administration, a reminder postcard was sent to all potential respondents encouraging them to participate if they had not done so already. An extra survey packet was mailed to those who requested one by contacting the research team.

Analytical Approach

Hierarchical linear modeling (HLM; Raudenbush & Bryk, 2002) was used as the primary analytical technique, since the constructs in the current study were multilevel in nature with safety training transfer climate at the contractor level (level two) and work locus of control and transfer of safety training at the individual level of analysis (level one). All analyses were conducted using HLM for Windows 6.0 (Raudenbush, Bryk, & Congdon, 2004).

A random coefficient model with two levels was estimated for the dependent variable transfer of safety training. At the first level, the main effect of work locus of control was estimated. At the second level, the main effect of safety training transfer climate and the cross-level interaction between work locus of control and safety training

transfer climate were estimated. When the main effects, interaction, and errors were included, the gamma coefficients in the following equation were estimated:

$Y_{ij} = \gamma_{00} + \gamma_{01}W_j + \gamma_{10}X_{ij} + \gamma_{11}W_jX_{ij} + u_{0j} + u_{1j}X_{ij} + r_{ij}$, where the subscripts i and j refer to the level one (participant) and level two (contractor) variables, respectively. Additionally, Y_{ij} represents transfer of safety training for participant *i* who works for contractor *j*, W_j represents safety training transfer climate for contractor *j*, X_{ij} represents work locus of control for participant *i* who works for contractor *j*, and W_jX_{ij} represents the interaction between safety training transfer climate and work locus of control. Furthermore, u and r represent the random effects of the model (i.e., error terms), where r_{ij} is the traditional individual level error term, u_{0j} is the variability of transfer of safety training between contractors, and u_{1j} is the variability of the relationship of work locus of control to transfer of safety training between contractors. As the level one variable, work locus of control was group-mean centered, and the level two variable (safety training transfer climate) was grand-mean centered. This centering approach is recommended when a cross-level interaction is investigated (Hofmann & Gavin, 1998).

RESULTS

Possible ranges, obtained ranges, means, standard deviations, correlations, and estimates of reliability for the study's variables are included in Table 2. As mentioned above, the descriptive statistics and correlations were computed for both individual-level safety training transfer climate (*perceived* safety training transfer climate) and contractor-level safety training transfer climate, based on the mixed results for aggregation. For contractor-level safety training transfer climate, a participant's score was represented by the average of the responses to safety training transfer climate made by all participants working for that specific contractor. Because of the method used to create the contractor-level safety training transfer climate variable (i.e., the score for all participants working for a certain contractor is a constant), the variability associated with this construct was greatly reduced. As a result, it is not appropriate to compare the correlation patterns for perceived safety training transfer climate and safety training transfer climate in Table 2. The appropriate analysis for examining support for hypothesis one at the contractor-level is HLM, which takes into consideration the individual and organizational information at the same time.

With respect to the descriptive statistics, the means for safety training transfer climate and transfer of safety training were high, while the mean for work locus of control fell in the center of the possible range of values. All variables possessed adequate variation and reliability for subsequent analyses. Histograms as well as tests of skewness

and kurtosis were conducted to examine the shape of the variables' distributions. Overall, the results showed perceived safety training transfer climate to possess a relatively normal (skewness = .05) and flat (kurtosis = -.36) distribution, work locus of control to be a positively skewed (skewness = .98) and peaked (kurtosis = 1.64) distribution, and the distribution for transfer of safety training to be negatively skewed (skewness = -1.26) and peaked (kurtosis = 1.35).

The correlation matrix in Table 2 provides some initial information about hypotheses one and two. Hypothesis one predicted a positive relationship between safety training transfer climate and transfer of safety training. Some preliminary support was found for this hypothesis, as both perceived safety training transfer climate ($r = .45, p < .05$) and contractor-level safety training transfer climate ($r = .22, p < .05$) were significantly correlated with transfer of safety training. Furthermore, hypothesis two predicted a negative relationship between work locus of control and transfer of safety training such that participants indicating more internal locus of control would report greater transfer of safety training. The correlation results did not provide support for this hypothesis, as the relationship between work locus of control and transfer of safety training was nonsignificant ($r = -.08, p > .05$). Finally, though not the focus of the current study, a significant relationship was observed between perceived safety training transfer climate and work locus of control ($r = -.34, p < .05$), where those characterized with greater internal locus of control reported higher perceptions of safety training transfer climate.

Table 2.
Descriptive Statistics and Intercorrelations Among Study Variables

Variable	Possible Range	Obtained Range	*M*	*SD*	1	2	3	4
1. Perceived Safety Training Transfer Climate	13.00 – 78.00	38.00 – 78.00	58.80	9.04	(.90)			
2. Safety Training Transfer Climate	13.00 – 78.00	53.62 – 64.20	58.80	2.63	.29*	N/A		
3. Work Locus of Control	8.00 – 48.00	8.00 – 48.00	20.80	7.01	-.34*	.04	(.88)	
4. Transfer of Safety Training	16.00 – 96.00	62.00 – 96.00	87.96	7.91	.45*	.22*	-.08	(.91)

Note. $N = 128$. Perceived safety training transfer climate is at the individual level, and safety training transfer climate is at the contractor level. Internal consistency reliabilities appear in parentheses along the diagonal. No internal consistency reliability estimate available for safety training transfer climate.
* $p < .05$.

The study's hypotheses were further tested with HLM, as described above. For the HLM analysis, safety training transfer climate was defined at the contractor level. The model's estimated fixed effects are displayed in Table 3. Additional support was found for hypothesis one, with the gamma coefficient for the level-two main effect of safety training transfer climate being significant ($t = 3.22, p < .05$). Taken together, both the correlation and HLM results suggest that higher perceptions of safety training transfer climate are associated with greater transfer of safety training.

Although the correlation results did not support hypothesis two, the findings from the HLM analysis did show a significant gamma coefficient for work locus of control predicting transfer of safety training ($t = -2.56, p < .05$). Specifically, the negative coefficient indicates that greater internal locus of control was related to more transfer of safety training, which is consistent with hypothesis two. Finally, the gamma coefficient for the cross-level interaction between work locus of control and safety training transfer climate was nonsignificant ($t = -1.55, p > .05$), providing no support for hypothesis three.

Table 3.
Estimation of Random Coefficients Model while Predicting Transfer of Safety Training

Variable	γ	*SE* γ	*T*-ratio	*p*-value
Level 1				
Intercept	87.89	0.83	106.30	.00
Work Locus of Control	-0.14	0.05	-2.56	.04
Level 2				
Safety Training Transfer Climate	0.68	0.21	3.22	.02
Work Locus of Control X Safety Training Transfer Climate	-0.03	0.02	-1.55	.17

Note. $N = 128$.

Though the interaction between work locus of control and safety training transfer climate to predict transfer of safety training was nonsignificant, a figure representing the relationship was still created for exploratory purposes. For Figure 2, high and low safety training transfer climate as well as external and internal locus of control were defined as one standard deviation above and below the mean for the variable, respectively.

In the figure, the X-axis refers to safety training transfer climate, and the two lines represent internal and external locus of control. When compared to the pattern that was expected for hypothesis three (see Figure 1), the form of the interaction based on the study's results is somewhat consistent. Specifically, a main effect for safety training transfer climate is evident, with the slopes of both lines being markedly positive. Furthermore, the relationship between safety training transfer climate and transfer of safety training does seem to be stronger for those with external locus of control compared to internal locus of control, based on the steepness of the lines' slopes. Some aspects of

the relationship were not anticipated. For instance, the main effect of work locus of control is not as pronounced. Also, while it was anticipated that the highest transfer of safety training would be observed for those with internal locus of control and high safety training transfer climate, the results show that transfer of safety training was the highest for those with external locus of control and high safety training transfer climate. However, it was anticipated that those with external locus of control and low safety training transfer climate would engage in the least amount of transfer of safety training.

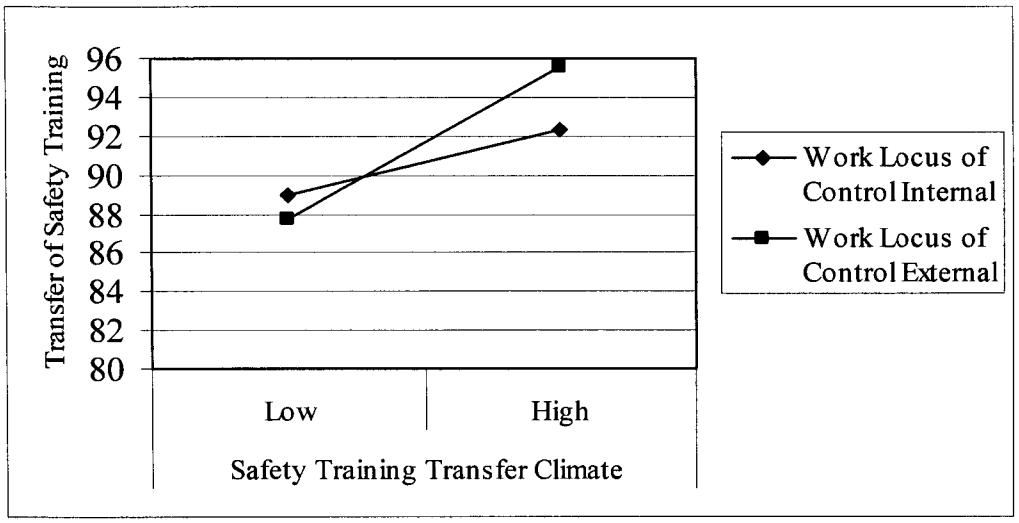

Figure 2.
Results for Hypothesis Three Depicted with Safety Training Transfer Climate as the X-Axis and Transfer of Safety Training as the Y-Axis.

The hierarchical linear model also estimates the variance components (i.e., variance of error terms), as shown in Table 4 below. In general, variance components that are different from zero indicate that variability exists in the data that is not well explained by the model. The results in Table 4 show a large level-one variance component (i.e., r_{ij} as the individual level error component) and a somewhat large level-two component representing the variability of transfer of safety training between contractors (i.e., u_{0j}). These findings suggest that incorporating other predictors at both

levels into the model may increase the model's explanatory power. Alternatively, the variability of the level-two error term for work locus of control (i.e., u_{1j}) was zero, suggesting that the variability for this aspect of the model is sufficiently explained.

Table 4.
Estimation of Variance Components while Predicting Transfer of Safety Training

Variable	σ^2	τ	χ^2	*p*-value
u_{0j}		2.53	11.24	.13
u_{1j}		0.00	6.65	.50
r_{ij}	58.24			

Note. $N = 128$.

DISCUSSION

This study examined the direct and interactive effects of work locus of control and safety training transfer climate to predict transfer of safety training. The results provided partial support for the hypotheses. Specifically, hypothesis one (i.e., positive relationship between safety training transfer climate and transfer of safety training) was supported when safety training transfer climate was defined at both the individual (correlation result) and contractor (HLM result) levels. This finding is encouraging, and its theoretical as well as practical implications will be discussed in detail below. The results associated with hypothesis two (i.e., negative relationship between work locus of control and transfer of safety training), were less conclusive, with the results of the correlation analyses being non-supportive and the results of the HLM analyses being supportive. Potential reasons for these contradictory results will be presented below. Finally, hypothesis three (i.e., interaction between safety training transfer climate and work locus of control to predict transfer of safety training) was not supported. Since this hypothesis was not supported, the pattern of the interaction that was observed will be only briefly discussed here.

Theoretical and Practical Implications

The support for hypothesis one suggests that safety training transfer climate is a viable predictor of transfer of safety training. Specifically, the positive relationship indicates that higher levels of safety training transfer climate are associated with greater

transfer of safety training. While previous research has shown that transfer climate positively predicts transfer of training (Colquitt et al., 2000), this is one of the few studies that has examined the relationship between transfer climate and transfer of training in the safety context and the first study to build on the work by Smith-Crowe et al. (2003) to further research the construct of safety training transfer climate. From a theoretical perspective, the study's results did show that (1) safety training transfer climate could be measured reliably using a self-report method and (2) participants working for the same contractor could possess consistent perceptions about safety training transfer climate. Extrapolations about the importance of the work environment in predicting transfer of safety training can also be made based upon the positive results for safety training transfer climate. In particular, the findings from this study suggest that the work environment serves a critical role in the transfer of safety training. Other potential work environment variables to consider when examining transfer of safety training are elaborated upon in a later section.

Practically speaking, one can infer from the strong relationship between safety training transfer climate and transfer of safety training that organizations can support their employees' transfer of safety training by increasing their safety training transfer climate. Specific activities that could promote a high safety training transfer climate include encouraging supervisors and coworkers to support trainees' use of safety behaviors and prioritizing safety even when faced with tight deadlines. Admittedly, the overall perceptions of safety training transfer climate for the current participants were already high, which may be a function of the union work environment, but it is asserted that maximum transfer of safety training is the goal, given the gravity of potential

consequences if the safety behaviors are not practiced. Therefore, organizations should continue to work towards better safety training transfer climates, even if employees' original perceptions are already high.

As described above, differences in the correlation and HLM results were obtained for work locus of control. Specifically, the correlation analysis showed a nonsignificant relationship between work locus of control and transfer of safety training, and a negative relationship was found with the HLM analysis. To explore potential reasons why the nonsignificant correlation was obtained, a scatterplot was conducted, displayed in Figure 3 below. The line in the figure represents the regression line for transfer of safety training being regressed on work locus of control. A negative relationship can be observed with the regression line, though the strength of the relationship is clearly weak. While it appears that the general trend of the data was consistent with hypothesis two, the scatterplot shows that not all participants' responses conformed to this trend.

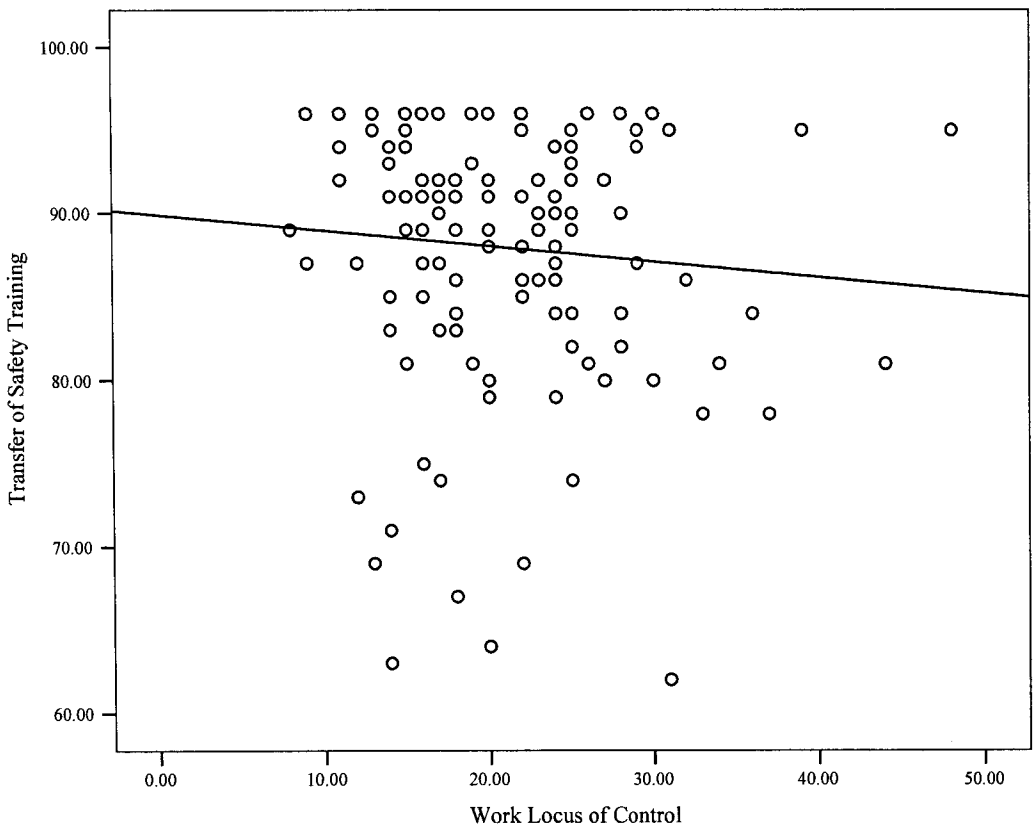

Figure 3.
Scatterplot of the Relationship between Work Locus of Control and Transfer of Safety Training.

The relationship between work locus of control and transfer of safety training may also be attenuated because of the nature of the constructs' distributions, with work locus of control being positively skewed and transfer of safety training being negatively skewed. Put simply, the participants' responses were clustered in the top left quadrant of Figure 3 (internal locus of control and high transfer of safety training), leaving less variation across the range of possible scores and less likelihood for a significant correlation. The author of the work locus of control scale provided the following United States norms based on thirty-seven samples totaling 5,477 people: a mean of 20.00, a

mean standard deviation of 9.90, and a mean coefficient alpha of .83 (e-mail communication with Spector, August 2005). While the scale's mean in the current study (20.80) was very similar to the norm, the standard deviation was smaller (7.01), and the coefficient alpha was larger (.88). Overall, it seems that the scale was functioning consistently with prior research using the measure, with the exception of slightly less variability being observed when compared to the norm. The less variability observed in work locus of control for this sample may be explained by the fact that individuals tend to gravitate towards certain types of jobs based on their personality characteristics such as work locus of control (Spector, 1982). Since this study focused on individuals that worked in basically the same occupation (i.e., union construction pipefitter), it is not surprising that their levels of work locus of control were similar.

Beyond the mathematical explanations offered here for the nonsignificant relationship, previous research did show mixed results for locus of control as a predictor of transfer of training (Baumgartel et al., 1984, Noe & Schmitt, 1986), with the trend of the studies using the more behavioral transfer measures obtaining nonsignificant results. Furthermore, no research to date has looked at the relationship between work locus of control (Spector, 1988) and training criteria, although Blau (1993) found work locus of control to be a better predictor of employees' self-initiated developmental activities than general locus of control.

From a theoretical perspective, locus of control may do a better job of predicting motivational constructs in the training context such as motivation to learn (Noe, 1986) than behavioral outcomes (i.e., transfer of training). During the actual training process, the positive outcome of learning new knowledge and skills is obvious and the

contingency between effort and learning is easily recognized, both of which would facilitate a positive relationship between internal locus of control and motivation to learn (Spector, 1982). In the case of the participants' union work environment, the positive outcomes for transfer of safety training, and even overall good job performance, may not be as obvious as some outcomes like compensation increases and promotions are in other work environments. This circumstance may make it less likely for work locus of control to play a large role in the transfer of safety training.

Although the scatterplot in Figure 3 seems to explain the nonsignificant correlation result, it does not account for the significant HLM result. It is likely that a suppression effect (Chen & Krauss, 2004) is occurring in the HLM analysis. Specifically, work locus of control is serving as a suppressor by removing criterion-irrelevant variance from another predictor (i.e., safety training transfer climate), which can artificially boost the predictability of both the predictor and the suppressor. The HLM results are consistent with what would be expected if work locus of control were serving as a suppressor, with the gamma coefficients for both safety training transfer climate and work locus of control being larger than their validity coefficients. In summary, it is likely that the significant relationship between work locus of control and transfer of safety training observed in the HLM analysis, though supportive of hypothesis two, is a statistical artifact.

Finally, hypothesis three was not supported, since the interaction between work locus of control and safety training transfer climate to predict transfer of safety training was not significant. For exploratory purposes, the form of the interaction is depicted in Figure 2 and does show some similarities to the pattern that was anticipated, which is

shown in Figure 1. For instance, the level and strength of the relationship between safety training transfer climate and transfer of safety training for those with internal locus of control is consistent across the two figures. Also, both figures show the relationship between safety training transfer climate and transfer of safety training to be stronger for those with external locus of control. The one difference in the figures stems from the fact that the main effect for work locus of control is not shown in Figure 2, resulting in those with external locus of control and high safety training transfer climate possessing the greatest transfer of safety training. The lack of this main effect for work locus of control has been discussed at length above.

There are also empirical and theoretical reasons for the nonsignificant interaction result. From an empirical perspective, the overall small sample size coupled with the small number of level-two units make it possible that insufficient power was available to obtain a significant result (Luke, 2004). Indeed, given the interaction pattern that did emerge, it is likely that the same analysis with a larger overall sample size and more level-two units (e.g., thirty) would have resulted in a significant finding.

Theoretically speaking, the same reasons mentioned above to explain the nonsignificant main effect for work locus of control could make it a questionable candidate for the role of moderator of the relationship between safety training transfer climate and transfer of safety training. Based on the exploratory results showing that work locus of control is moderating the relationship to some degree, maybe other control constructs more aligned with the predictor and criterion variables would play a stronger role. Control variables have been shown to be important moderators in other contexts (van der Doef & Maes, 1999), and it is asserted that the interaction hypothesis in this

study should not be disregarded at this point. Given the above empirical and theoretical explanations for the lack of support for hypothesis three, it seems that future research could (1) replicate the analysis for hypothesis three with a larger sample size in an attempt to obtain a similar interaction pattern and significant result and (2) examine the moderating role of other more aligned control constructs (e.g., safety control: Snyder, Chen, Finlinson, Krauss, & Huang, 2004) for the relationship between safety training transfer climate and transfer of safety training.

Limitations

The current research represents a sound initial investigation into the relationships of work locus of control and safety training transfer climate with transfer of safety training; however, the study still possesses some limitations. In particular, there are limitations related to the study's methodology (i.e., low response rate, single source of information, cross-sectional design) and construct measurement (i.e., focus on overall safety training rather than on one safety training program, lack of education information for work locus of control).

With respect to the low response rate, attempts were made to encourage the targeted Local members to participate. These included keeping the survey length short, using the scantron formatting, offering one hour of continuing education for returning the survey, and sending a reminder postcard. The response rate was consistent with those obtained for the other three surveys administered at the same time to the rest of the Local membership. Furthermore, the response rate was considerably higher than that obtained from mailed surveys to other Locals in the same union, which were approximately 15%. While the low response rate allows for the possibility of nonresponse bias limiting the

representativeness of the results, there is empirical evidence suggesting that the effects of this bias are small (Krosnick, 1999; Schalm & Kelloway, 2001).

Additionally, as noted above, significantly different response rates were obtained across contractors. Further analyses showed that the response rate for one contractor, from which only two surveys were returned, was significantly different from the response rates for all of the other contractors. Since the contractor and its two respondents were excluded from this study, all contractors that actually participated in the study possessed similar response rates. These analyses are not without some contamination, as a few respondents indicated that their contractors were different from those listed as options, which required them to also be removed from the study. Since they were targeted for participation because they were employed by one of the listed contractors when the mailing list was generated, their returned surveys should have been treated as responses for their prior contractors. Unfortunately, it is impossible to ascertain which of the listed contractors they were working for at that time.

Given the methodology used in the current study, the participant provided all of the information about the variables (i.e., safety training transfer climate, work locus of control, transfer of safety training). Admittedly, the exclusive use of self-report measures does increase the chances that the relationships observed between the constructs are inflated due to common method bias; however, multiple reasons exist as to why it might not have been a large problem in the current study. First, research by Crampton and Wagner (1994) has shown that the prevalence of the bias may actually be overestimated, and Spector (1992) indicated that it is just as possible that method variance attenuates relationships as it inflates them.

Second, Spector (1992) went on to say that the bias' effects may vary dependent upon the nature of the constructs under investigation. Specifically, affective constructs or those measuring job conditions are more likely to be prone to method variance. Here, the work locus of control measure assessed an individual's stable beliefs about work and was developed with the intention of the individual completing it himself (Spector, 1988). Also, the safety training transfer climate measure assessed the participants' perceptions, which is consistent with the construct's definition. Analyses did show participants' safety training transfer climate perceptions were similar when they worked for the same contractor, and hypothesis one was supported when safety training transfer climate was defined at the contractor level. These results indicate that it is unlikely that common method bias was a significant problem for safety training transfer climate.

Transfer of safety training was also self-reported, and the transfer of training construct when collected in this manner has been labeled elsewhere as "perceived training transfer" (Facteau et al., 1995). Given that the transfer of safety training construct was behavioral in nature and measured in terms of frequency, the likelihood of common method bias is reduced. While the self-report of transfer of training (Salas & Cannon-Bowers, 2001) and safety behavior (Hofmann & Stetzer, 1996) criteria is common, it is acknowledged that the study of transfer of safety training would be greatly strengthened by the incorporation of supervisory or peer ratings.

Third, the process of returning the surveys anonymously and directly to the research team may have helped to limit the effects of social desirability when participants completed the survey. Finally, high intercorrelations among all variables are symptomatic of common method bias, and this was not reflected in the study's results

(e.g., nonsignificant relationship between work locus of control and transfer of safety training).

Another limitation related to the study's methodology was the use of a cross-sectional design. Use of this design requires that no causal inferences be made between safety training transfer climate and transfer of safety training. While this design is definitely less rigorous than other alternatives (e.g., longitudinal design), it is sufficient for a preliminary examination of constructs and their relationships (Barling et al., 2002; Frone, 1998). Although the cross-sectional survey is the most popular method used to examine transfer of training (Salas & Cannon-Bowers, 2001), the personnel training literature is rich with rigorous designs used to examine the learning process during training. The adaptation of these designs to the study of the transfer of safety training and its predictors would make an excellent contribution to the literature.

Two additional limitations associated with construct measurement are also present in the study. First, the safety training and its respective transfer under examination here encompassed multiple safety training programs available to the participants from different sources. As such, a broad measure of the transfer of safety training was constructed from measures of general safety performance (Burke et al., 2002) and safety citizenship behavior (Hofmann et al., 2003). In essence, the pilot work to ensure that the safety behaviors were the target of training was the only difference between the behaviors representing transfer of safety training and safety performance. A more homogeneous and traditional method of studying the transfer of safety training and its predictors would be to focus on a certain safety training program and build a specific transfer of safety training measure based on the program's content. Second, information about the

participants' level of education was not available, which has been shown to positively correlate with internal locus of control (Spector, 1982). Since this information was not available, analyses were not able to be conducted to determine whether work locus of control was related to education level in the current study. Some evidence exists that work locus of control does not possess a significant relationship with education. In particular, a recent correspondence from Spector indicated that no relationship was found between work locus of control and education for samples from four different countries (i.e., United States, Canada, United Kingdom, New Zealand) (e-mail communication with Spector, August 2005).

Suggestions for Future Research

Based on the positive results for safety training transfer climate predicting transfer of safety training, research should continue to build on the initial development of the self-report measure of safety training transfer climate that was completed for the purposes of this study. Future research efforts associated with this measure could include (1) examining the applicability of the measure to other occupations concerned with safety (e.g., manufacturing) and making the necessary adaptations of terminology, (2) conducting a large-scale study to assess the dimensionality of the measure based on Smith-Crowe et al.'s (2003) model of safety training transfer climate, and (3) using the measure to assess its relationships with other safety-oriented variables (e.g., safety-specific transformational leadership: Barling et al., 2002; safety communication: Hofmann & Morgeson, 1999; safety climate: Zohar, 2003).

Future research should also build upon the current work by fortifying some of the limitations identified above. For instance, a study could focus on one safety training

program offered by the union and develop the transfer of safety training criterion based on that specific program's course content. This would allow the continued examination of work environment variables across contractors, which was shown to be a significant predictor in the current study. Furthermore, the respondents' supervisors or coworkers could complete the transfer of safety training criterion measure, after a standard amount of time elapsed since they participated in the training program. Incorporating responses from another individual (e.g., a supervisor) instead of collecting the data solely from the trainee would also alleviate the concern regarding the single source of information present in the current study.

Additional directions for future research are concerned with the transfer of safety training criterion. As stated above, Baldwin and Ford (1988) defined transfer of training as both the generalization of the training content to the work environment and the maintenance of the content in the work environment over a period of time. As the current study assessed the generalization component of the transfer of training, future research could examine via a longitudinal design the extent to which the trained safety behaviors are maintained over time. Another avenue for research with respect to the transfer of safety training is the distinction between near and far transfer. While near transfer refers to training stimuli that closely parallel the workplace stimuli (e.g., safety behaviors learned in training should be performed identically on the job), far transfer requires an adaptation of the training content to a much different work environment (Royer, 1979). The subject of near transfer was under examination in the current study, as the training content and transfer criterion were very similar. Future studies might identify safety behaviors that indicate far transfer (e.g., using a safety harness in

appropriate situations that are not described in the training) and investigate the predictors and process for this type of transfer. The safety behaviors from the GSS (Burke et al., 2002) and the SCB (Hofmann et al., 2003) that were rated as not taught in the safety training program could serve as a starting point for developing a far transfer measure, given that they possess similar content and have been shown to occur with similar frequency as those included on the transfer of safety training measure.

Finally, the occupational safety literature could benefit from the examination of how other personal and work environment variables besides those studied here relate to the transfer of safety training. Indeed, the size of the variance components in the HLM analyses indicated that unexplained variance remained in transfer of safety training after accounting for the model's predictability and that the model could benefit from the addition of both individual-level and organizational-level variables. Based upon research in either the personnel training or occupational safety area, additional variables likely to be related to the transfer of safety training include conscientiousness (Colquitt et al., 2000) and anxiety (Colquitt et al., 2000) at the individual level and safety climate (Zohar, 2003) at the group or organizational level.

The variables investigated in the current study as well as the ones suggested for future research here are regarded as distal variables (Campbell, McCloy, Oppler, & Sager, 1993), which refer to those constructs that are hypothesized to affect the criterion through a process mechanism such as another construct (i.e., a proximal variable). In general, the relationships between distal variables and criteria are smaller compared to those between proximal variables and criteria. In the case of the transfer of safety training, the gaps in the process of prediction for variables such as safety training transfer

climate can be filled by considering a proximal variable such as motivation. Results from Krauss (2004) showed that when adapted to the safety context, the components of expectancy theory (Vroom, 1964), particularly expectancy, predicted various safety criteria including safety performance. The role of instrumentality as the process by which safety climate affects safety behavior has been theorized (Zohar, 2003), and Colquitt et al. (2000) found that valence positively predicted transfer of training in their meta-analysis. Taken together, further investigation of the role of motivation as the proximal variable in the relationship between safety training transfer climate or other work environment variables and transfer of safety training could provide valuable information about the transfer of safety training process. Finally, future research should study the relationship between transfer of safety training and injury incidence, since the reduction in the experience of workplace injuries is the ultimate purpose for which safety training is implemented.

Conclusion

Safety training is a standard component of most any job within an industry characterized by a hazardous work environment (e.g., construction, transportation, manufacturing); however, negligible research has been conducted to evaluate these safety training programs. The evaluation of these programs could occur on many levels from assessing whether the participants have learned the material to examining how the participation in the safety training program is related to overall organizational injury incidence.

This study investigated the potential predictors of one type of evaluative criteria, namely transfer of safety training. Transfer of training is the important link between

learning the information in the training environment and using the information in the work environment. In the safety context, it encompasses the use of the trained safety behaviors on the job. This study possessed several strengths (e.g., including participants that work for different employers) and made significant contributions to the understanding of transfer of safety training (e.g., demonstrating its relationship with safety training transfer climate). Given the importance of transfer of safety training and the results obtained by this study demonstrating the significance of the work environment in predicting transfer of safety training, it is imperative that future research continue to investigate the predictors of transfer of safety training and practical efforts be made to facilitate a high safety training transfer climate in organizations. Safety training should not only be viewed as an administrative hurdle that is necessary to work on the job, but also as a fundamental component of employees' training that should be used by employees on the job and supported by organizational leadership.

REFERENCES

Alliger, G. M., Tannenbaum, S. I., Bennett Jr., W., Traver, H., & Shotland, A. (1997). A meta-analysis of the relations among training criteria. Personnel Psychology, 50, 341-358.

Baldwin, T. T., & Ford, J. K. (1988). Transfer of training: A review and directions for future research. Personnel Psychology, 41, 63-105.

Barling, J., Loughlin, C., & Kelloway, E. K. (2002). Development and test of a model linking safety-specific transformational leadership and occupational safety. Journal of Applied Psychology, 87, 488-496.

Baumgartel, H., & Jean-pierre, F. (1972). Applying new knowledge in the back-home setting: A study of Indian managers' adoptive efforts. Journal of Applied Behavioral Science, 8, 674-694.

Baumgartel, H., Reynolds, M., & Pathan, R. (1984). How personality and organizational-climate variables moderate the effectiveness of management development programmes: A review and some recent research findings. Management and Labour Studies, 9, 1-16.

Blau, G. (1993). Testing the relationship of locus of control to different performance dimensions. Journal of Occupational and Organizational Psychology, 66, 125-138.

Bureau of Labor Statistics. (2003). Occupational Injuries and Illnesses: Injury Data.

Bureau of Labor Statistics. (2003). Census of Fatal Occupational Injuries.

Burke, M. J., Sarpy, S. A., Tesluk, P. E., & Smith-Crowe, K. (2002). General safety performance: A test of a grounded theoretical model. Personnel Psychology, 55, 429-457.

Campbell, J. P., McCloy, R. A., Oppler, S. H., & Sager, C. E. (1993). A theory of performance. In N. Schmitt, W. C. Borman, & Associates (Eds.), Personnel Selection in Organizations (35-70). San Francisco: Jossey-Bass.

Chen, P. Y., & Krauss, A. D. (2004). Suppressor effect. In M. Lewis-Beck, A. Bryman, & T. F. Liao (Eds.). Encyclopedia of Research Methods for the Social Sciences. Newbury Park, CA: Sage.

Chhokar, J. S., & Wallin, J. A. (1984). Improving safety through applied behavior analysis. Journal of Safety Research, 15, 141-151.

Cohen, H. H., & Jensen, R. C. (1984). Measuring the effectiveness of an industrial lift truck safety training program. Journal of Safety Research, 15, 125-135.

Colquitt, J. A., LePine, J. A., & Noe, R. A. (2000). Toward an integrative theory of training motivation: A meta-analytic path analysis of 20 years of research. Journal of Applied Psychology, 85, 678-707.

Colquitt, J. A., & Simmering, M. S. (1998). Conscientiousness, goal orientation, and motivation to learn during the learning process: A longitudinal study. Journal of Applied Psychology, 83, 654-665.

Crampton, S. M., & Wagner, J. A. (1994). Percept-percept inflation in microorganizational research: An investigation of prevalence and effect. Journal of Applied Psychology, 79, 67-76.

Facteau, J. D., Dobbins, G. H., Russell, J. E. A., Ladd, R. T., & Kudisch, J. D. (1995). The influence of general perceptions of the training environment on pretraining motivation and perceived training transfer. Journal of Management, 21, 1-25.

Fahlbruch, B, & Wilpert, B. (1999). System safety – An emerging field for I/O Psychology. International Review of Industrial and Organizational Psychology, 14, 55-93.

Fisher, C. (1980). On the dubious wisdom of expecting job satisfaction to correlate with performance. Academy of Management Review, 5, 607-612.

Fleishman, E. A., & Mumford, M. D. (1989). Individual attributes and training performance. In I. L. Goldstein (Ed.), Training and Development in Organizations (pp. 183-255). San Francisco, CA: Jossey-Bass.

Ford, J. K., Smith, E. M., Weissbein, D. A., Gully, S. M., & Salas, E. (1988). Relationships of goal orientation, metacognitive activity and practice strategies with learning outcomes and transfer. Journal of Applied Psychology, 83, 218-233.

Frone, M. R. (1998). Predictors of work injuries among employed adolescents. Journal of Applied Psychology, 83, 565-576.

Georgenson, D. L. (1982). The problem of transfer calls for partnership. Training and Development Journal, 36, 75-78.

Hickman, J. S., & Geller, E. S. (2003). A safety self-management intervention for mining operations. Journal of Safety Research, 34, 299-308.

Hicks, W. D., & Klimoski, R. J. (1987). Entry into training programs and its effects on training outcomes: A field experiment. Academy of Management Journal, 30, 542-552.

Hofmann, D. A., & Gavin, M. B. (1998). Centering decisions in hierarchical linear models: Implications for research in organizations. Journal of Management, 24, 623-641.

Hofmann, D. A., & Morgeson, F. P. (1999). Safety related behavior as a social exchange: The role of perceived organizational support and leader-member exchange. Journal of Applied Psychology, 84, 286-296.

Hofmann, D. A., Morgeson, F. P., & Gerras, S. J. (2003). Climate as a moderator of the relationship between leader-member exchange and content specific citizenship: Safety climate as an exemplar. Journal of Applied Psychology, 88, 170-178.

Hofmann, D. A., & Stetzer, A. (1996). A cross-level investigation of factors influencing unsafe behaviors and accidents. Personnel Psychology, 49, 307-339.

Holladay, C. L., & Quinones, M. A. (2003). Practice variability and transfer of training: The role of self-efficacy generality. Journal of Applied Psychology, 88, 1094-1103.

Huczynski, A. A., & Lewis, J. W. (1980). An empirical study into the learning transfer process in management training. Journal of Management Studies, 17, 227-240.

James, L. R., Demaree, R. G., & Wolf, G. (1993). R_{wg}: An assessment of within-group interrater agreement. Journal of Applied Psychology, 78, 306-309.

Janicak, C. A. (1996). Predicting accidents at work with measures of locus of control and job hazards. Psychological Reports, 78, 115-121.

Jones, J. W., & Wuebker, L. J. (1993). Safety locus of control and employees' accidents. Journal of Business & Psychology, 7, 449-457.

Judge, T. A., & Bono, J. E. (2001). Relationship of core self-evaluations traits-self esteem, generalized self-efficacy, locus of control, and emotional stability-with job satisfaction and job performance: A meta-analysis. Journal of Applied Psychology, 86, 80-92.

Kirkpatrick, D. L. (1959a). Techniques for evaluating training programs. Journal of ASTD, 13, 3-9.

Kirkpatrick, D. L. (1959b). Techniques for evaluating training programs: Part 2-Learning. Journal of ASTD, 13, 21-26.

Kirkpatrick, D. L. (1960a). Techniques for evaluating training programs: Part 3-Behavior. Journal of ASTD, 14, 13-18.

Kirkpatrick, D. L. (1960b). Techniques for evaluating training programs: Part 4-Results. Journal of ASTD, 14, 28-32.

Knoop, R. (1981). Locus of control as moderator between job characteristics and job attitudes. Psychological Reports, 48, 519-525.

Kowalski-Trakofler, K. M., & Barrett, E. A. (2003). The concept of degraded images applied to hazard recognition training in mining for reduction of lost-time injuries. Journal of Safety Research, 34, 515-525.

Krauss, A. D. (2004). Examination of the motivational component of safety performance: An application of expectancy theory. Unpublished master's thesis, Colorado State University, Fort Collins, CO.

Krosnick, J. A. (1999). Survey research. Annual Review of Psychology, 50, 537-67.

Kuo, C., & Tsaur, C. (2004). Locus of control, supervisory support, and unsafe behavior: The case of construction industry in Taiwan. Chinese Journal of Psychology, 46, 293-305.

Linton, S. J. (1991). A behavioral workshop for training immediate supervisors: The key to neck and back injuries? Perceptual & Motor Skills, 73, 1159-1170.

Luke, D. A. (2004). Multilevel Modeling. Quantitative Applications in the Social Sciences Series. Thousand Oaks, CA: Sage.

Miles, M. B. (1965). Changes during and following laboratory training: A clinical-experimental study. Journal of Applied Behavioral Science, 1, 215-242.

Mueller, L., DaSilva, N., Townsend, J., & Tetrick, L. (1999). An empirical evaluation of competing safety climate measurement models. Paper presented at the annual meeting of the Society for Industrial and Organizational Psychology, Atlanta, GA.

Naswall, K., Sverke, M., & Hellgren, J. (2005). The moderating role of personality characteristics on the relationship between job insecurity and strain. Work and Stress, 19, 37-49.

National Safety Council. (1996). Injury facts 1996 edition. Itasca, IL: Author.

Noe, R. A. (1986). Trainees' attributes and attitudes: Neglected influences on training effectiveness. Academy of Management Review, 11, 736-749.

Noe, R. A., & Schmitt, N. (1986). The influence of trainee attitudes on training effectiveness: Test of a model. Personnel Psychology, 39, 497-523.

Parkes, K. R. (1991). Locus of control as moderator: An explanation for additive versus interactive findings in the demand-discretion model of work stress? British Journal of Psychology, 82, 291-312.

Quinones, M. A. (1995). Pretraining context effects: Training assignment as feedback. Journal of Applied Psychology, 80, 226-238.

Raudenbush, S. W., & Bryk, A. S. (2002). Hierarchical linear models: Applications and data analysis methods. Thousand Oaks, CA: Sage.

Raudenbush, S. W., Bryk, A. S., & Congdon, R. (2004). HLM: Hierarchical linear and nonlinear modeling (Version 6.0). Lincolnwood, IL: Scientific Software International.

Reber, R. A., & Wallin, J. A. (1984). The effects of training, goal setting, and knowledge of results on safe behavior: A component analysis. Academy of Management Journal, 27, 544-560.

Reber, R. A., Wallin, J. A., & Chhokar, J. S. (1990). Improving safety performance with goal setting and feedback. Human Performance, 3, 51-61.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. Psychological Monographs, 80, 1-28.

Rouiller, J. Z., & Goldstein, I. L. (1993). The relationship between organizational transfer climate and positive transfer of training. Human Resource Development Quarterly, 4, 377-390.

Royer, J. M. (1979). Theories of the transfer of learning. Educational Psychologist, 14, 53-69.

Salas, E., & Cannon-Bowers, J. A. (2001). The science of training: A decade of progress. Annual Review of Psychology, 52, 471-499.

Schalm, R. L., & Kelloway, E. K. (2001). The relationship between response rate and effect size in occupational health psychology research. Journal of Occupational Health Psychology, 6, 160-163.

Schneider, B. (1983). Interactional psychology and organizational behavior. In I. L. Cummings and B. Staw (Eds.), Research in Organizational Behavior (Vol. 5, pp. 1-31). Greenwich, CT: JAI Press.

Schneider, B. (1990). Organizational climate and culture. San Francisco, CA: Jossey-Bass.

Schneider, B., & Reichers, A. E. (1983). On the etiology of climates. Personnel Psychology, 36, 19-39.

Sinclair, R. C., Smith, R., Colligan, M., Prince, M., Nguyen, T., & Stayner, L. (2003). Evaluation of a safety training program in three food service companies. Journal of Safety Research, 34, 547-558.

Smith, M. J., Karsh, B., Carayon, P., & Conway, F. T. (2003). Controlling occupational safety and health hazards. In J. C. Quick & L. E. Tetrick (Eds.), Handbook of Occupational Health Psychology (pp. 35-68). Washington, DC: American Psychological Association.

Smith, L., Tanigawa, T., Takahashi, M., Mutou, K., Tachibana, N., Kage, Y., & Iso, H. (2005). Shiftwork locus of control, situational and behavioural effects on sleepiness and fatigue in shiftworkers. Industrial Health, 43, 151-170.

Smith-Crowe, K., Burke, M. J., & Landis, R. S. (2003). Organizational climate as a moderator of safety knowledge-safety performance relationships. Journal of Organizational Behavior, 24, 861-876.

Smith-Jentsch, K. A., Salas, E., & Brannick, M. T. (2001). To transfer or not to transfer? Investigating the combined effects of trainee characteristics, team leader support, and team climate. Journal of Applied Psychology, 86, 279-292.

Snyder, L. A., Chen, P. Y., Finlinson, S., Krauss, A. D., & Huang, Y. E. (2004). Roles of safety control and supervisory support in work safety. Paper presented at the annual meeting of the Society for Industrial and Organizational Psychology, Chicago, IL.

Spector, P. E. (1982). Behavior in organizations as a function of employee's locus of control. Psychological Bulletin, 91, 482-497.

Spector, P. E. (1988). Development of the Work Locus of Control Scale. Journal of Occupational Psychology, 61, 335-340.

Spector, P. E. (1992). Summated rating scale construction: An introduction. Quantitative Applications in the Social Sciences Series. Thousand Oaks, CA: Sage.

Spector, P. E., Cooper, C. L., Sanchez, J. I., O'Driscoll, M., Sparks, K., Bernin, P., Bussing, A., Dewe, P., Hart, P., Lu, L., Miller, K., De Morales, L. R., Ostrognay, G. M., Pagon, M., Pitariu, H. D., Poelmans, S. A., Radhakrishnan, P., Russinova, V., Salamatov, V., Salgado, J. F., Shima, S., Siu, O., Stora, J. B., Teichmann, M., Theorell, T., Vlerick, P., Westman, M., Widerszal-Bazyl, M., Wong, P. T., Yu, S. (2002). Locus of control and well-being at work: How generalizable are Western findings? Academy of Management Journal, 45, 453-466.

Spector, P. E., & O'Connell, B. J. (1994). The contribution of personality traits, negative affectivity, locus of control, and Type A to the subsequent reports of job stressors and job strains. Journal of Occupational and Organizational Psychology, 67, 1-11.

Spector, P. E., Van Katwyk, P. T., Brannick, M. T., & Chen, P. Y. (1997). When two factors don't reflect two constructs: How item characteristics can produce artifactual factors. Journal of Management, 23, 659-677.

Storms, P. L., & Spector, P. E. (1987). Relationships of organizational frustration with reported behavioural reactions: The moderating effect of locus of control. Journal of Occupational Psychology, 60, 227-234.

Tang, T. L., Baldwin, L. J., & Frost, A. G. (1997). Locus of control as a moderator of the self-reported performance feedback-personal sacrifice relationship. Personality & Individual Differences, 22, 201-211.

Tracey, J. B., Tannenbaum, S. I., & Kavanagh, M. J. (1995). Applying trained skills on the job: The importance of the work environment. Journal of Applied Psychology, 80, 239-252.

Tziner, A., & Falbe, C. M. (1993). Training-related variables, gender and training outcomes: A field investigation. International Journal of Psychology, 28, 203-221.

Tziner, A., Haccoun, R. R., & Kadish, A. (1991). Personal and situational characteristics influencing the effectiveness of transfer of training improvement strategies. Journal of Occupational Psychology, 64, 167-177.

van der Doef, M., & Maes, S. (1999). The job demand-control(-support) model and psychological well-being: A review of 20 years of empirical research. Work & Stress, 13, 87-114.

Vroom, V. H. (1964). Work and Motivation. New York: Wiley.

Wells, M., Stokols, D., McMahan, S., & Clitheroe, C. (1997). Evaluation of a worksite injury and illness prevention program: Do the effects of the REACH OUT training program reach the employees? Journal of Occupational Health Psychology, 2, 25-34.

Witt, L. A. (1989). Person-situation effects in the explanation of self-presentation on the job: Locus of control and psychological climate. Journal of Social Behavior & Personality, 4, 521-530.

Wuebker, L. (1986). Safety locus of control as a predictor of industrial accidents and injuries. Journal of Business & Psychology, 1, 19-30.

Zohar, D. (2003). Safety climate: Conceptual and measurement issues. In J. C. Quick & L. E. Tetrick (Eds.), Handbook of Occupational Health Psychology (pp. 123-142). Washington, DC: American Psychological Association.

APPENDIX A

Items Measuring Safety Training Transfer Climate

Regarding your formal safety training classes (not on-the-job training) that you have taken from the union, the contractor, and/or the company.

Item	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
The information from safety training class is presented in a manner that makes it easy for me to apply it at work *(perceived appropriateness of safety training)*						
At work, my immediate foreman encourages me to use what I learn during safety training class *(social & goal cues)*						
My job allows me to use what I learned during safety training class *(task cues)*						
My immediate foreman discourages me from applying my knowledge from safety training class when he thinks it is not necessary[R] *(punishment consequences)*						
My coworkers appreciate when I display behaviors on the job that I learned during safety training class *(intrinsic reinforcement consequences)*						
Contractor management is more concerned about how fast the work is completed than using the proper safety behaviors to complete the work[R] *(perceived effects of required work pace on safety)*						
Contractor management makes serious efforts to make safety training classes a high priority *(perceived importance of safety training programs)*						
When a project is running behind schedule, applying knowledge from safety training class is viewed as less important by contractor management[R] *(perceived effects of required work pace on safety)*						

Item	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
My immediate foreman and I often discuss specific ideas about how to apply my knowledge from safety training class *(social & goal cues)*						
My immediate foreman is not interested in whether I apply my knowledge from safety training class to my work on the job[R] *(no-feedback consequences)*						
My immediate foreman disapproves of me using what I know from safety training class when it would make me work slower[R] *(punishment consequences)*						
Workers are rewarded by contractor management when they apply their knowledge from safety training class to the job *(extrinsic reinforcement consequences)*						
I know I am a valuable employee when I use what I learn during safety training class on the job *(intrinsic reinforcement consequences)*						

[R] = *item is reverse scored*

APPENDIX B

Survey of Safety Training Transfer Climate for Instructors

The section includes a list of statements concerned with how the information learned in safety training classes is used in the workplace. Please review each statement and provide feedback about how to improve the clarity of the statement. Also edit the statements as needed so that they use the proper terminology and would make sense to a Local 290 journeyman (plumber or pipefitter).

1.The information from safety training class is presented in an effective manner.
Feedback:
2. At work, my journeyman encourages me to use what I learn during safety training class.
Feedback:
3. My job provides me with opportunities to use what I learn during safety training class.
Feedback:
4. My journeyman does not care whether I use what I learn during safety training class.
Feedback:
5. My journeyman discourages me from applying my knowledge from safety training class when he thinks it is not necessary.
Feedback:
6. I receive rewards (e.g., awards and prizes) when I demonstrate behaviors on the job that I learn during safety training class.

Feedback:
7. My coworkers appreciate when I display behaviors on the job that I learn during safety training class.
Feedback:
8. Contractor management genuinely thinks that taking safety training classes is an important aspect of the job.
Feedback:
9. Contractor management takes serious steps to demonstrate that they value safety in the workplace.
Feedback:
10.Contractor management is more concerned about how fast the work is completed than using the proper safety behaviors to complete the work.
Feedback:
11. The information from safety training class is useful.
Feedback:
12. My co-workers encourage me to use what I learn from safety training class.
Feedback:
13. When I work on the job, it is obvious how to apply the information I learn in safety training class.
Feedback:
14. My journeyman would fail to notice if I used knowledge from safety training class on the job.
Feedback:

15. When I use what I know from safety training class to do my work, my journeyman criticizes me.
Feedback:
16. Contractor management has a system in place that is designed to reward the kinds of behaviors that I learn during safety training class.
Feedback:
17. I am proud when I display behaviors on the job that I learn during safety training class.
Feedback:
18. Contractor management makes serious efforts to make safety training classes a high priority.
Feedback:
19. Contractor management makes sure that workplace safety is discussed at project meetings.
Feedback:
20. When a project is running behind schedule, applying knowledge from safety training class is viewed as less important by contractor management.
Feedback:
21. The information that I receive in safety training class is necessary for me to work on the job effectively.
Feedback:
22. My journeyman and I often discuss specific ideas about how to apply my knowledge from safety training class.
Feedback:
23. While I am working on the job, it is easy for me to determine when information from safety training class applies.

Feedback:
24. My journeyman is not interested in whether I apply my knowledge from safety training class to my work on the job.
Feedback:
25. My journeyman disapproves of me using what I know from safety training class when it would make me work slower.
Feedback:
26. Workers are rewarded by contractor management when they apply their knowledge from safety training class to the job.
Feedback:
27. I feel a sense of satisfaction when I use what I learn during safety training class to work on the job.
Feedback:
28. Contractor management ensures that workers have adequate opportunities to take safety training classes.
Feedback:
29. Contractor management retaliates against workers who raise safety concerns.
Feedback:
30. Contractor management only views using knowledge from safety training class as important when the project is running according to schedule.
Feedback:

APPENDIX C

Survey of Safety Training Transfer Climate for Apprentices

Below is a list of statements concerned with the safety training classes that you have taken as part of your apprenticeship. Please answer these questions by thinking about your work with your current journeyman supervisor and contractor. Place an "X" in the box that corresponds to your response.

Item	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
The information from safety training class is presented in an effective manner						
At work, my journeyman encourages me to use what I learn during safety training class						
My job provides me with opportunities to use what I learn during safety training class						
My journeyman does not care whether I use what I learn during safety training class						
My journeyman discourages me from applying my knowledge from safety training class when he thinks it is not necessary						
I receive rewards (e.g., awards and prizes) when I demonstrate behaviors on the job that I learn during safety training class						
My coworkers appreciate when I display behaviors on the job that I learn during safety training class						
Contractor management genuinely thinks that taking safety training classes is an important aspect of the job						
Contractor management takes serious steps to demonstrate that they value safety in the workplace						
Contractor management is more concerned about how fast the work is completed than using the proper safety behaviors to complete the work						

Item	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
The information from safety training class is useful						
My co-workers encourage me to use what I learn from safety training class						
When I work on the job, it is obvious how to apply the information I learn in safety training class						
My journeyman would fail to notice if I used knowledge from safety training class on the job						
When I use what I know from safety training class to do my work, my journeyman criticizes me						
Contractor management has a system in place that is designed to reward the kinds of behaviors that I learn during safety training class						
I am proud when I display behaviors on the job that I learn during safety training class						
Contractor management makes serious efforts to make safety training classes a high priority						
Contractor management makes sure that workplace safety is discussed at project meetings						
When a project is running behind schedule, applying knowledge from safety training class is viewed as less important by contractor management						
The information that I receive in safety training class is necessary for me to work on the job effectively						
My journeyman and I often discuss specific ideas about how to apply my knowledge from safety training class						
While I am working on the job, it is easy for me to determine when information from safety training class applies						
My journeyman is not interested in whether I apply my knowledge from safety training class to my work on the job						
My journeyman disapproves of me using what I know from safety training class when it would make me work slower						

Item	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Workers are rewarded by contractor management when they apply their knowledge from safety training class to the job						
I feel a sense of satisfaction when I use what I learn during safety training class to work on the job						
Contractor management ensures that workers have adequate opportunities to take safety training classes						
Contractor management retaliates against workers who raise safety concerns						
Contractor management only views using knowledge from safety training class as important when the project is running according to schedule						

APPENDIX D

Items Measuring Work Locus of Control

This section is concerned with your beliefs about <u>jobs in general</u>.

Item	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Getting the job you want is mostly a matter of luck						
Making money is primarily a matter of good fortune						
In order to get a really good job you need to have family members or friends in high places						
Promotions are usually a matter of good fortune						
When it comes to landing a really good job, who you know is more important than what you know						
To make a lot of money you have to know the right people						
It takes a lot of luck to be an outstanding employee on most jobs						
The main difference between people who make a lot of money and people who make a little money is luck						

APPENDIX E

Items Measuring Transfer of Safety Training

How often do you...	Never	Once in a while	Sometimes	Quite often	Frequently, if not always	Always
Use the appropriate personal protective equipment as indicated by the company's health and safety plan *(using personal protective equipment)*						
Take action to avoid contamination *(engaging in work practices to reduce risk)*						
Engage in appropriate methods to notify workers, supervisors, and/or emergency coordinators of emergency conditions *(communicating health and safety information)*						
Put on personal protective equipment correctly *(using personal protective equipment)*						
Assist others to make sure they perform their work safely *(helping)*						
Appropriately report incidents, accidents, or illnesses *(communicating health and safety information)*						
Take appropriate action to prevent recurrence of injuries, illnesses, accidents, and/or near misses *(engaging in work practices to reduce risk)*						

How often do you...	Never	Once in a while	Sometimes	Quite often	Frequently, if not always	Always
Properly perform work while wearing personal protective equipment *(using personal protective equipment)*						
Apply the appropriate work practices to reduce exposures to hazards including applicable standard operating procedures relating to operations and construction *(engaging in work practices to reduce risk)*						
Properly use lockout/tagout procedures *(engaging in work practices to reduce risk)*						
Protect fellow crew members from safety hazards *(stewardship)*						
Contact appropriate personnel when faced with questions and/or issues regarding potentially unsafe conditions *(communicating health and safety information)*						
Properly dispose of materials and/or equipment that pose a health risk *(engaging in work practices to reduce risk)*						
Take general precautions and meet permit requirements for confined space work *(engaging in work practices to reduce risk)*						
When necessary, communicate potential exposure(s) to hazardous substances to key personnel responsible for site health and safety *(communicating health and safety information)*						
Try to prevent other crew members from being injured on the job *(stewardship)*						

APPENDIX F

Survey of Transfer of Safety Training for Apprentices

Below is a list of safety behaviors. Please indicate the extent to which the information that you receive in safety training class as part of your apprenticeship focuses on each of the following behaviors. Place an "X" in the box that corresponds to your response for that item.

Is this behavior discussed during safety training class?	NO	SOMETIMES	YES
1. Use the appropriate personal protective equipment as indicated by the site health and safety plan			
2. Correctly inspect and test all personal protective equipment			
3. Put on personal protective equipment correctly			
4. Remove personal protective equipment correctly			
5. Correctly store all personal protective equipment			
6. When required, properly assist your partner in checking, putting on, and removing personal protective equipment or breathing apparatus			
7. Conduct positive and negative pressure tests to ensure proper fit of air purifying respirator according to procedures outlined in the training manual			
8. Properly perform work while wearing personal protective equipment			
9. Appropriately communicate with other workers while wearing personal protective equipment			
10. Take action to avoid contamination			
11. Take appropriate action to prevent recurrence of injuries, illnesses, accidents, and/or near misses			

Is this behavior discussed during safety training class?	NO	SOMETIMES	YES
12. Make appropriate decisions about use of monitoring equipment and interpretation of instrument readings			
13. Apply the appropriate work practices to reduce exposures to hazards including applicable standard operating procedures relating to operations and construction			
14. Properly use lockout/tagout procedures			
15. Properly dispose of materials and/or equipment that pose a health risk			
16. Accurately follow established decontamination procedures			
17. Take general precautions and meet permit requirements for confined space work			
18. Practice safe spill handling procedures			
19. Correctly use applicable hazard controls and equipment (e.g., ventilation, physical barriers)			
20. Take the appropriate steps if prevented from or punished for exercising your rights under OSHA policies and procedures			
21. Appropriately use MSDS and other reference materials that may provide additional health and safety information			
22. When necessary, exert your rights and responsibilities to provide input into altering the site safety procedures			
23. When necessary, communicate potential exposure(s) to hazardous substances to key personnel responsible for site health and safety			
24. Engage in appropriate methods to notify workers, supervisors, and/or emergency coordinators of emergency conditions			
25. Appropriately report incidents, accidents, or illnesses			
26. Contact appropriate personnel when faced with questions and/or issues regarding potentially unsafe conditions			
27. Assist others to make sure they perform their work safely			
28. Help teach safety procedures to new crew members			

Is this behavior discussed during safety training class?	NO	SOMETIMES	YES
29. Help other crew members learn about safe work practices			
30. Help others with safety related responsibilities			
31. Get involved in safety activities to help your crew work more safely			
32. Tell other crew members to follow safe working procedures			
33. Explain to other workers that you will report safety violations			
34. Tell new crew members that violations of safety procedures will not be tolerated			
35. Report workers that violate safety procedures			
36. Monitor new crew members to ensure they are performing safely			
37. Try to change policies and procedures to make them safer			
38. Try to change the way the job is done to make it safer			
39. Make suggestions to improve the safety of a project			
40. Try to improve safety procedures			
41. Express opinions on safety matters even if others disagree			
42. Raise safety concerns during planning sessions			
43. Make safety related recommendations about work activities			
44. Speak up and encourage others to get involved in safety issues			
45. Protect fellow crew members from safety hazards			
46. Go out of your way to look out for the safety of other crew members			
47. Take action to stop safety violations in order to protect the well-being of other crew members			
48. Try to prevent other crew members from being injured on the job			
49. Take action to protect other crew members from risky situations			

Is this behavior discussed during safety training class?	NO	SOMETIMES	YES
50. Attend safety meetings			
51. Attend non-mandatory safety oriented training			
52. Keep informed of changes in safety policies and procedures			

APPENDIX G

Survey of Transfer of Safety Training for Instructors

Below is a list of safety behaviors. Please indicate the extent to which the information that you teach during safety training class focuses on each of the following behaviors. Place an "X" in the box that corresponds to your response for that item.

Is this behavior discussed during safety training class?	NO	SOMETIMES	YES
1. Use the appropriate personal protective equipment as indicated by the site health and safety plan			
2. Correctly inspect and test all personal protective equipment			
3. Put on personal protective equipment correctly			
4. Remove personal protective equipment correctly			
5. Correctly store all personal protective equipment			
6. When required, properly assist your partner in checking, putting on, and removing personal protective equipment or breathing apparatus			
7. Conduct positive and negative pressure tests to ensure proper fit of air purifying respirator according to procedures outlined in the training manual			
8. Properly perform work while wearing personal protective equipment			
9. Appropriately communicate with other workers while wearing personal protective equipment			
10. Take action to avoid contamination			
11. Take appropriate action to prevent recurrence of injuries, illnesses, accidents, and/or near misses			
12. Make appropriate decisions about use of monitoring equipment and interpretation of instrument readings			

Is this behavior discussed during safety training class?	NO	SOMETIMES	YES
13. Apply the appropriate work practices to reduce exposures to hazards including applicable standard operating procedures relating to operations and construction			
14. Properly use lockout/tagout procedures			
15. Properly dispose of materials and/or equipment that pose a health risk			
16. Accurately follow established decontamination procedures			
17. Take general precautions and meet permit requirements for confined space work			
18. Practice safe spill handling procedures			
19. Correctly use applicable hazard controls and equipment (e.g., ventilation, physical barriers)			
20. Take the appropriate steps if prevented from or punished for exercising your rights under OSHA policies and procedures			
21. Appropriately use MSDS and other reference materials that may provide additional health and safety information			
22. When necessary, exert your rights and responsibilities to provide input into altering the site safety procedures			
23. When necessary, communicate potential exposure(s) to hazardous substances to key personnel responsible for site health and safety			
24. Engage in appropriate methods to notify workers, supervisors, and/or emergency coordinators of emergency conditions			
25. Appropriately report incidents, accidents, or illnesses			
26. Contact appropriate personnel when faced with questions and/or issues regarding potentially unsafe conditions			
27. Assist others to make sure they perform their work safely			
28. Help teach safety procedures to new crew members			
29. Help other crew members learn about safe work practices			

Is this behavior discussed during safety training class?	NO	SOMETIMES	YES
30. Help others with safety related responsibilities			
31. Get involved in safety activities to help your crew work more safely			
32. Tell other crew members to follow safe working procedures			
33. Explain to other workers that you will report safety violations			
34. Tell new crew members that violations of safety procedures will not be tolerated			
35. Report workers that violate safety procedures			
36. Monitor new crew members to ensure they are performing safely			
37. Try to change policies and procedures to make them safer			
38. Try to change the way the job is done to make it safer			
39. Make suggestions to improve the safety of a project			
40. Try to improve safety procedures			
41. Express opinions on safety matters even if others disagree			
42. Raise safety concerns during planning sessions			
43. Make safety related recommendations about work activities			
44. Speak up and encourage others to get involved in safety issues			
45. Protect fellow crew members from safety hazards			
46. Go out of your way to look out for the safety of other crew members			
47. Take action to stop safety violations in order to protect the well-being of other crew members			
48. Try to prevent other crew members from being injured on the job			
49. Take action to protect other crew members from risky situations			
50. Attend safety meetings			

Is this behavior discussed during safety training class?	NO	SOMETIMES	YES
51. Attend non-mandatory safety oriented training			
52. Keep informed of changes in safety policies and procedures			

AUTHOR NOTE

Autumn D. Krauss, Department of Psychology, Colorado State University.

This study serves as the dissertation requirement for the Doctor of Philosophy Degree in Psychology from Colorado State University.

This study is funded by the Center to Protect Workers' Rights (CPWR) as part of a cooperative agreement with the National Institute for Occupational Safety and Health (NIOSH), (NIOSH grant OH008307). The research is solely the responsibility of the author and does not primarily represent the official views of NIOSH.

Correspondence concerning this paper should be addressed to Autumn D. Krauss, Unicru, Inc., 9525 SW Gemini Drive, Beaverton, OR, 97008. E-mail: akrauss@unicru.com