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Exploration of the impact of organisational context on a workplace safety and health intervention

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ABSTRACT

The Safety and Health Improvement Program (SHIP) was designed to increase workers' safety and health using supervisor/leadership training. SHIP was implemented and evaluated in a cluster randomized controlled trial with 20 supervisors and 292 construction crew members representing a high-risk industry. The intervention had three components: (1) computer-based training to teach supervisors ways to better support worker safety and work-life challenges; (2) supervisor behavioural self-monitoring to facilitate transfer of training to practice; and (3) team-based discussions with supervisors and work crew members to identify challenges and opportunities for improvement with 30, 60, and 90 day follow-up check-in meetings. Main effects for the intervention on perceptions of family supportive supervisor behaviors, team effectiveness, and work-life effectiveness were not found, suggesting that the pre-intervention context could help explain the lack of intervention effects. We found that the intervention was more beneficial for work crew members who had poorer pre-intervention perceptions of their supervisor (lower leader-member exchange) and lower perceived team cohesion, suggesting the important impact of the organisational context on intervention effects. We argue that perhaps these work crews were more ready for change and improvements in functioning than were the crews that were already functioning well.

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Despite recommendations that multi-level strategies (i.e. individual- and organisational-level) for improving worker health- and safety-related outcomes are most effective (e.g. Hammer & Sauter, 2013; Tetrick & Winslow, 2015), the majority of business practices targeting these outcomes remain focused on individual-level approaches (e.g. changing individual behaviour) that are not evidence-based (e.g. Biron, Karanika-Murray, & Cooper, 2012; Nielsen, Randall, & Christensen, 2010; Semmer, 2006). We argue for more preventative strategies whereby training leaders/supervisors to be more supportive of safety, health, and well-being, and providing teams with tools to focus their work on achieving goals that lead to more time to focus on work-life integration, should improve both individual and organisational outcomes for workers and their employers.

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These integrated approaches have more recently been referred to as Total Worker Health® (TWH) interventions (Anger et al., 2015) by the National Institute of Occupational Safety and Health (NIOSH) in the United States.

One promising preventative strategy for improving employee health and well-being that can be implemented at multiple organisational levels is helping workers manage challenges that arise between work and non-work responsibilities through leadership support (Hammer, Demsky, Kossek, & Bray, 2016). Meta-analytic research has demonstrated that work-life conflict is associated with higher levels of absenteeism and burnout, increased health problems, psychological strain, depression, substance use, reduced job, family, and life satisfaction, and reduced job performance and commitment (Amstad, Meier, Fasel, Elfering, & Semmer, 2011). Thus, leadership interventions that are focused on work-life conflict reduction are warranted.

Furthermore, workers in certain safety sensitive occupational settings, such as field construction workers in the present study, continue to experience safety risks at work due to unsafe work environments and poor safety climates that are often triggered by leaders who disregard and do not support safe work practices. Leadership development has been recognised as an important factor in improving safety in workplaces and an ideal target of workplace interventions (Kelloway & Barling, 2010).

Given the significant effects of unsafe work conditions and high levels of work-life conflict on individual and organisational success, and the mismatch between research and practice, it is clear that more work is required to study interventions that may lead to improved worker safety, health, and well-being. Furthermore, leadership is instrumental in contributing to the reduction of stress and improvements in well-being (Kelloway, Turner, Barling, & Loughlin, 2012; Nielsen, Randall, Yarker, & Brenner, 2008; Skakon, Nielsen, Borg, & Guzman, 2010), and the contribution of leadership to the safety of workers has been well documented (Barling, Loughlin, & Kelloway, 2002; Kelloway, Mullen, & Francis, 2006). However, the effectiveness of interventions may vary dramatically depending on the organisational characteristics and settings, suggesting that examining the pre-intervention context can assist in better understanding how such interventions affect health and stress outcomes and may provide important information for future intervention development.

The Safety and Health Improvement Program (SHIP) is a research-based intervention designed to improve employee health and safety by targeting multiple organisational levels using a two-pronged approach (Hammer et al., 2015). Goals of SHIP include increasing awareness and motivating behaviour change among supervisors and teams to encourage support for managing work-life challenges and safety performance. Based in social support theory (Cohen & Wills, 1985), SHIP targets training supervisors through utilisation of computer-based training and subsequent supervisor behaviour tracking. SHIP also targets supervisors and teams collectively with facilitated team effectiveness sessions and structured follow-ups. The present study examines both the process and outcomes of the implementation of a leadership intervention designed to impact safety and well-being by implementing SHIP as a clustered, randomised controlled trial. As discussed below, in addition to testing the effectiveness of the SHIP intervention on family supportive supervisor behaviors, two pre-intervention contextual factors, team effectiveness and leader-member exchange, were examined in this study to assesses possible boundary conditions

by exploring how supervisor (leader) and team relationships prior to the intervention may differentially impact (i.e. moderate) intervention success.

Context and the impact of organizational level interventions

While most workplace interventions still focus on the individual level, we are addressing an organisational-level intervention from both an efficacy and process perspective. We acknowledge that there are few examples of stress prevention and well-being enhancement occupational interventions, and that the focus on both are important. Furthermore, less attention has been focused on *how to* implement such organisational interventions, compared to the ultimate effects (Biron et al., 2012). Using an adaptive design with a combination of qualitative and quantitative methods that is tailored to the organisational context is one approach to understanding the process of implementing organisational interventions (Nielsen et al., 2010).

The argument here is that there are factors within the specific organisational context that may have direct impacts on the effectiveness of the intervention, and thus, must be tracked during the implementation of any intervention. An example is the introduction of a merger in the middle of the implementation of an organisational workplace intervention that ultimately impacted the intervention outcome (see Moen et al., 2016). If this merger was not tracked, some aspects of the intervention effects would not have been clearly understood. Therefore, conducting process evaluations during the implementation of organisational interventions is essential to understanding the effectiveness of interventions. Even the strongest most rigorous research design is subject to many unknown, uncontrollable variables when implemented in organisations, limiting validity and ability to replicate. Such complex contexts make interpretation of effects challenging. Thus, many have argued that we need to evaluate the intervention process and the pre-intervention context, along with the effects, when conducting organisational intervention research (e.g. Biron et al., 2012; Nielsen et al., 2010; Semmer, 2006).

To better understand the impact of the organisational context researchers have called upon extensive review of implementation fidelity (Semmer, 2006) by observing and recording the roll-out of an intervention with respect to evaluation of participation rates and exposure, management support, team support, and participation reaction to the intervention. These factors are all important to evaluate, but do not always make it into research protocols when implementing interventions.

Theoretical mechanisms

The SHIP intervention is based primarily in social support theory, as the focus is on training supervisors to be more supportive of crew members in the areas of work-life integration and safety. Scholars have repeatedly demonstrated that social support is directly related to beneficial well-being outcomes and that social support can also serve as a resource and buffer the negative effects of stressors (Cohen & Wills, 1985). In addition to social support, SHIP was developed with the expectation that when we improved the quality of the relationship between supervisors and employees through training

supervisors, we would see improvements in employee outcomes, similar to findings related to Leader Member Exchange (LMX; Graen & Uhl-Bien, 1995).

There is growing evidence that leadership training and development are of critical importance to the well-being and performance of employees and that the context, design, delivery, and implementation of leadership training impacts training outcomes (Lacerenza, Reyes, Marlow, Joseph, & Salas, 2017). Some evidence suggests that trainee readiness and trainee motivation-to-learn are important factors impacting the process and outcome of training (Bell, Tannenbaum, Ford, Noe, & Kraiger, 2017). Thus, again, we suggest that the context and pre-training environment impact the effectiveness of training (Kraiger, 2003).

SHIP was designed to train supervisors on how to enact family supportive supervisor behaviors (FSSB) integrated with training on safety communication. While there is evidence from prior research that training supervisors on FSSB leads to improved worker outcomes (e.g. Hammer, Kossek, Anger, Bodner, & Zimmerman, 2011; Odle-Dusseau, Hammer, Crain, & Bodner, 2016), no research has examined the integration of supervisor support training on work-life and safety together, or the combination of this supervisor training and team effectiveness training. Thus, this study offers an evaluation of a newly developed leadership training intervention focused on improving health and safety of workers. The effects of this supervisor training intervention were evaluated on their employees' reports of supervisor support (i.e. FSSB), team effectiveness, and work-life effectiveness.

Family supportive supervisor behaviors (FSSB)

Leaders play a critical role in employees' work experiences and directly impact psychosocial factors related to work stress, health, and safety (e.g. Nielsen et al., 2008;Thomas & Lankau, 2009; Zohar & Luria, 2003). Their unique organisational position empowers them to facilitate (or hinder) productive management of work-life challenges (e.g. Blair-Loy & Wharton, 2002; Hammer, Kossek, Zimmerman, & Daniels, 2007; Kossek, Ollier-Malaterre, Lee, Pichler, & Hall, 2016) by providing social support. FSSB consists of four dimensions shown to have a significant influence on individual and organisational outcomes beyond general supervisor support (Hammer, Kossek, Yragui, Bodner, & Hanson, 2009). The four dimensions, or behaviours, include providing emotional support, creative work-life management, role-modelling healthy work-life behaviours, and problem solving or instrumental support (Hammer et al., 2011). Previous interventions using FSSB training have demonstrated numerous positive outcomes for employees including reduced blood pressure (Hammer et al., 2015), decreased work-family conflict, improved sleep (Olson, Crain, et al., 2015), increased job satisfaction (Hammer et al., 2011), and lowered organisational costs in terms of turnover, presenteeism, and health care utilisation (Barbosa et al., 2015). SHIP expanded the FSSB training to also include supervisor training on support for safety in the workplace through increased safety communications based on the work of Zohar on leadership and safety climate (Zohar & Luria, 2003). Thus, we examined the effects of the SHIP intervention on employee reports of FSSB.

Team effectiveness

Co-worker and team support are also important factors impacting employee health and well-being and a critical leverage point for culture change. (e.g. Kelly et al., 2014).

Teamwork processes such as reviewing and modifying objectives, discussing work methods and their effectiveness (De Dreu, 2007; LePine, Piccolo, Jackson, Mathieu, & Saul, 2008), openness to innovation, adherence to rules, and accountability (Shortell et al., 2004) are important factors influencing team effectiveness. These processes were targeted as part of the SHIP intervention with an overall goal to improve team efficiency, communication, morale, and support for work-life challenges and safety. The Team Effectiveness Process™ (TEP) sessions conducted as part of SHIP have been implemented in numerous organisations and across industries, but never formally evaluated in a randomised controlled trial. Thus, we expected that SHIP will have a positive effect on reports of team effectiveness by employees.

Work-life effectiveness

Work-life effectiveness occurs when employees experience support for personal and family responsibilities across organisational levels (supervisor, co-workers, senior management), resulting in reduced stress and an increased ability to focus and perform at work. Meta-analytic research has demonstrated that support from all organisational levels has significant impacts on experiences of work-family conflict (Michel, Kotrba, Mitchelson, Clark, & Baltes, 2011). Furthermore, a review of job-stress interventions indicates that systems approaches benefit both the individual and organisation (LaMontagne, Keegel, Louie, Ostry, & Landsbergis, 2007). For example, a comparison of interventions indicated that those targeted at the psychosocial work environment, as opposed to focusing on individual employee behaviours, resulted in the greatest decrease in absenteeism (LaMontagne et al., 2007).

Supervisor and team training components were implemented as part of SHIP to improve reports of work-life effectiveness. As reviewed above, the SHIP intervention focused on key organisational relationships and work processes, specifically targeting improvement of supervisor and team support for safety and work-life challenges. Based on this empirically-supported and targeted approach, it was expected that SHIP would have a direct effect on employee reports of FSSB, team effectiveness, and work-life effectiveness.

> *Hypothesis 1*: Employees in the SHIP condition will have significantly higher reports of FSSB, team effectiveness processes, and work-life effectiveness compared to those employees in the control group who are not exposed to the workplace intervention.

Pre-intervention organisational context effects: leader-member exchange and team cohesion

Leader-member exchange (LMX)

Leader-member exchange, or LMX, (Graen & Uhl-Bien, 1995; Scandura & Graen, 1984) is defined as a unique, supervisor-employee relationship characterised by levels of respect, trust, and obligation. Leaders who are high in transformational leadership, a key to improved health and well-being of employees, are more likely to exhibit high quality LMX (Wang, Law, Hackett, Wang, & Chen, 2005). Dyads who experience high levels of these dimensions are said to have a high-quality LMX relationship with transformational social exchange, whereas a low-quality LMX relationship is lacking in these dimensions

and the social exchange is purely transactional. Other characteristics of high-quality LMX are better communication, support, and feeling valued.

Perhaps it can be argued that those supervisors who have poor quality relationships with their employees based on reports of LMX see greater value in the training and thus are more ready and motivated to pay attention to and learn from the training, and more likely to transfer learned behaviours (Bell et al., 2017; Colquitt, LePine, & Noe, 2000). Furthermore, we expected that the relationship an employee has with their supervisor prior to the intervention will affect the degree of change in employee attitudes. The SHIP intervention, targeted at improving emotional and instrumental supervisor support for employees, is likely to have a greater impact for those who report low LMX at baseline because they are already lacking in both support and resources and therefore will have the most to gain from the intervention.

Hypothesis 2: The intervention effects of SHIP will be moderated by baseline levels of LMX such that the intervention effects will be more beneficial for those employees with lower levels of baseline LMX based on the outcomes of FSSB, team effectiveness processes, and work-life effectiveness.

Team cohesion

Bollen and Hoyle (1990) defined perceptions of team cohesion as "an individual's sense of belonging to a particular group and his or her feelings of morale associated with membership in the group" (p. 482). A sense of belonging and morale are determined by both cognitive and affective appraisals of experiences with the group and group members. Research suggests that a single event can initiate interplay of cognitive and affective responses resulting in an increased sense of belonging and higher morale (Bollen & Hoyle, 1990; Zajonc & Markus, 1984). Similar to our hypothesis relating to LMX, we expect team members who report lower baseline levels of team cohesion will perceive the training to have more value because they will have the most to gain. Higher value perceptions will increase motivation to learn and training transfer (Colquitt et al., 2000) thereby driving stronger intervention effects, particularly from the TEP component.

Hypothesis 3: The intervention effects of SHIP will be moderated by baseline levels of Team Cohesion such that the intervention effects will be more beneficial for those with lower levels of baseline Team Cohesion based on the outcomes of employee reports of FSSB, team effectiveness processes, and work-life effectiveness.

Method

Procedure and design

A randomized controlled trial design was utilised to test the effectiveness of the SHIP intervention. Workgroups from a municipal public works department who were primarily field construction workers were randomly assigned to treatment ($n = 11$) or wait-list control ($n = 9$) groups. Two-hundred and ninety-two employees were invited to participate in pencil-and-paper surveys administered on-site, during working hours, in October-November 2012 (baseline) and again in May 2013 (post-intervention). All employees were expected to attend the session, but participation was voluntary. A $25

gift card was offered to those who opted-in. Two-hundred and forty-nine participated in total (Intervention: $n = 148$; Control: $n = 101$) for an 85% response rate, with 195 having participated at both pre- and post-intervention time points (Intervention: $n = 125$; Control: $n = 70$) for a 67% response rate. Three of the five variables in this study were collected on both measurement occasions (LMX, team cohesion, and FSSB). Measures of team effectiveness process (TEP) and work-life effectiveness indicators (WLEI) were only collected post-intervention.

Participants

Employees were construction workers with job titles including electrician, plumber, and utility worker, and 81% worked at least a 40-hour week. They were predominantly White (78%) males (90%), and over half (63%) were married and had children at home (56%). Additionally, 35% reported being responsible for the care of an adult relative. Most had completed high school (97%) and about half had college experience (53%). Average tenure was 11.4 years. Team size ranged from 6–20 employees, and work crew members reported directly to one supervisor.

Intervention description and procedures

SHIP consists of a supervisor/leader component and a team component. The supervisor aspect of SHIP involves computer-based training and behavioural self-monitoring. The team aspect involves professional-facilitators, or trained facilitators, leading team-based meetings focused on improving the work-flow and effectiveness of team processes and follow-up sessions.

Supervisor training and behaviour tracking

SHIP involved two components targeting the supervisor, computer-based training and behavioural tracking. First, a *1-hour, computer-based training* educated supervisors about the importance of addressing work-life conflict (i.e. FSSB) and safety communications, and teaching them strategies for how to foster a culture of support. The training platform (cTRAIN) was specifically developed based on validated behavioural training principles to ensure competency in essential skills and knowledge for a broad range of workers. Key elements of the training format included fully specified learning objectives, carefully ordered training content, learner-paced progression, and regular feedback (Anger et al., 2001). The computer-based training was based on a programmed instruction model where supervisors were required to go through modules sequentially and respond to embedded test questions. The content was developed from existing interventions based on interdisciplinary theories and pilot testing (Hammer et al., 2011; Zohar, 2002; Zohar & Luria, 2003). It contained eight interactive modules: four focused on supervisor behaviours aimed at improving family and personal support, and four supervisor behaviours aimed at improving safety support.

The family and personal support behaviours included: (1) creative management, (2) emotional support, (3) daily job and personal problem solving, and (4) role-modelling healthy work-life behaviours. *Creative management* refers to ways in which a supervisor can organise work to help employees meet both work and non-work demands, such as implementing cross-training or helping to create back-up systems. *Emotional support*

involves behaviours that express genuine concern for employees' work-life challenges. These behaviours can be as simple as increasing face-to-face contact and asking employees how they are doing. *Daily job and personal problem solving* is the instrumental support supervisors provide. For example, adjusting work assignments to support employees' family or personal needs for both ongoing and unexpected emergency events. *Role-modeling healthy work-life behaviors* refers to a supervisor's own actions that indicate making time for family and personal life is a valued priority. These behaviours might include sharing stories of taking time for personal needs, or simply setting the example of leaving work at reasonable hours.

Safety supportive behaviours included in the training were: (1) safety communication, (2) providing resources, (3) safety role modelling, and (4) feedback and coaching. *Safety communication* focuses on quality and quantity of discussions with employees about the importance of safety. This includes emphasis on safety as a priority, and also maintaining open and honest dialog to encourage employee feedback about safety concerns. *Providing resources* are the behaviours supervisors engage in to ensure employees have the tools and equipment they need to perform their jobs safely. *Safety role-modeling* demonstrates that supervisors put safety first and includes behaviours such as following safety protocols and talking about safety as a personal priority. *Feedback and coaching* are supervisor actions that acknowledge and positively reinforce when an employee is acting safely, and redirection of employees when safety performance should be improved.

The second supervisor-focused component involved *behavioral tracking* on the job to increase transfer of skills and behaviours included in the computer-based training. Specifically, upon completion of the computer-based training, supervisors were asked to set personal goals for enacting the learned behaviours within their team. Goals were entered by the supervisors, who then tracked their own behaviour for two weeks using an iPod Touch® enabled with a software application designed for use in behavioural interventions (HabiTrak). This intervention component was used to facilitate transfer of training and is based on an abundance of research illustrating that better training outcomes result from individual goal-setting (e.g. Salas, Tannenbaum, Kraiger, & Smith-Jentsch, 2012), and behavioural observation and evaluation (e.g. Hickman & Geller, 2005; Olson & Austin, 2001; Olson & Winchester, 2008). In addition to providing tracking functionality, the application also provided resources to support the training such as behavioural definitions and video instructions for each of the eight learned behaviours.

Supervisor and work crew (team) processes and follow up sessions

The third component of SHIP was team- focused. Specifically, the intervention utilised a multi-level approach aimed at maximising the effects of supervisor training and creating work-life and safety support within teams. After completing the supervisor-only portion of the intervention (computer-based training and behaviour tracking), each supervisor participated in a four-hour TEP session with their work crew. The TEP sessions were developed in collaboration with WFD Consulting specialising in organisational work-family integration practices (http://wfd.com/services/TEP.html) based on social support and locus of control theories (e.g. Gottlieb & Bergen, 2010) and modified from existing team interventions. Each session was led by a WFD-trained facilitator.

Prior to the TEP session, employees completed an assessment that was used to drive discussions about areas for improving their team's practices relating to work-life

challenges, safety, and overall effectiveness and efficiency. During the TEP session, teams reviewed the results of the pre-TEP surveys, worked together to identify root causes of common issues and brainstormed solutions for maximising team performance and support. The supervisor and their crew worked together to develop operating principles, or agreements for work climate, and specific action plans to drive change.

The final component of the intervention included regular check-ins and follow-up. These were held at 30, 60, and 90 days after the TEP sessions. Check-in meetings included revisiting the operating principles and action plan to ensure progress was being made, and to revise as needed. WFD-trained facilitators attended and assisted with these meetings.

Measures

FSSB

Employees reported perceptions of their supervisor's Family Supportive Supervisor Behaviors with a four-item scale (Hammer, Kossek, Bodner, & Crain, 2013). FSSB was measured at the six-month follow-up time period. These items directly map onto computer-based training content. An example item is "My supervisor works effectively with employees to creatively solve conflicts between work and non-work". Item responses are indicated on a 5-point Likert-type scale with options ranging from 1 = "strongly disagree" to 5 = "strongly agree". Scale scores are the average of item responses with higher scores indicating higher levels of FSSB. The scale demonstrated acceptable reliability ($\alpha = .90$).

Team effectiveness processes

Employee perceptions of the team effectiveness processes were measured at the six-month follow-up period with a seven-item scale (Civian, Richman, Shannon, Shulkin, & Brennan, 2008) that assessed work group practices in terms of morale, communication, teamwork, and flexibility. An example item is "Roles and responsibilities are clearly defined and communicated". Item responses are indicated on a 5-point Likert-type scale with options ranging from 1 = "to no extent" to 5 = "to a very great extent". Scale scores are the average of item responses with higher scores indicating higher levels of Team Effectiveness Processes. The scale demonstrated acceptable reliability ($\alpha = .87$).

Work-life effectiveness indicators

Employee perceptions of work-life effectiveness were measured at the six-month follow-up with a three-item scale (Civian et al., 2008). An example item is "Senior management is supportive of my personal/family responsibilities". The other two items referenced supervisor and co-worker support. Item responses are indicated on a 5-point Likert-type scale with options ranging from 1 = "strongly disagree" to 5 = "strongly agree". Scale scores are the average of item responses with higher scores indicating higher levels of Work-Life Effectiveness. The scale demonstrated acceptable reliability ($\alpha = .73$).

Leader-member exchange (LMX)

LMX was measured at baseline and refers to the quality of social exchange relationship between a supervisor and employee. Employee perceptions of this relationship including supervisor support, understanding of job problems, and loyalty were measured using a seven-item scale (Scandura & Graen, 1984). An example item is "How would you

characterise your working relationship with your supervisor". Item responses are indicated on a 5-point Likert-type scale. For the example item, response options range from 1 = "extremely ineffective" to 5 = "extremely effective". Response options for other items include response options ranging from 1 = "strongly disagree" to 5 = "strongly agree" and 1 = "none" to 5 = "very high". Scale scores are the average of item responses with higher scores indicating higher levels of LMX. The scale demonstrated acceptable reliability ($\alpha = .90$). LMX was examined as a moderator of the SHIP intervention effects.

Team cohesion

Team cohesion was measured at baseline with a six-item scale assessing individual perceptions of belonging and team morale (Chin, Salisbury, Pearson, & Stollak, 1999) and was also assessed as a moderator of the intervention effects. An example item is "I feel that I belong to this team". Item responses are indicated on a 5-point Likert-type scale with options ranging from 1 = "strongly disagree" to 5 = "strongly agree". Scale scores are the average of item responses with higher scores indicating higher levels of Team Cohesion. The scale demonstrated acceptable reliability ($\alpha = .92$).

Results

Missing data and analytic strategy

In light of the amount of missing data at either time point, Mplus (v. 4.2) was used for analyses using full information maximum likelihood estimation to account for the inferential uncertainty due to the missing data (Muthén & Muthén, 2006). As the employees were nested within 21 functional workgroups and these workgroups were randomly assigned to either the intervention or control condition, initial analyses were conducted to explore the lack of independence of employee data due to this hierarchical structure. Unconditional general linear mixed effects models using full information maximum likelihood estimation were used to quantify the amount of variability in the study outcomes attributable to workgroup membership. The unconditional intraclass correlations for the TEP, WLEI, and FSSB outcomes were .06, .07, and .13, respectively. Thus, general linear mixed models were used to test study hypotheses to estimate and account for workgroup level random effects (e.g. Hox, 2010; Raudenbush & Bryk, 2002). Finally, because the TEP and WLEI outcomes were only assessed at the 6-month follow-up, we used the Post Test Only model—as described in Bodner and Bliese (2017)—to estimate and test for intervention effects.

Finally, because of the interest in moderated intervention effects (i.e. Hypotheses 2 and 3), initial analyses were conducted to explore whether the relationship between the baseline moderator variables and the outcomes varied across workgroups within the two intervention arms. The variances of these random slopes were neither large nor statistically significant (p-values: min. = .12, median = .57). Therefore, for parsimony, these slopes were modelled as fixed effects within each intervention condition. To aid in the interpretation of the simple effects of the intervention on the outcomes, all baseline moderator variables were grand mean centred for the analyses (Aiken & West, 1991).

Table 1 provides means and standard deviations for, and correlations among, study variables separately for the intervention and control conditions. We note that these correlations are positive and statistically significant; although some of these correlations

Table 1. Means and standard deviations of and correlation among study variables by intervention condition.

Variable	*M*	*M* *SD**SD*	1. 3.03 0.76	2. 3.21 0.75	3. 3.30 0.96	4. 3.53 0.76	5. 3.20 0.89
1. Team Effectiveness Processes (Follow-up)	3.15	0.71	1.00	.55*	.68*	.52*	.53*
2. Work-Life Effectiveness Indicators (Follow-up)	3.28	0.74	.52*	1.00	.64*	.46*	.56*
3. Family-Supportive Supervisor Behaviours (Follow-up)	3.22	0.80	.33*	.37*	1.00	.38*	.68*
4. Team Cohesion (Baseline)	3.70	0.82	.38*	.27*	.22*	1.00	.46*
5. Leader-Member Exchange (Baseline)	2.99	0.85	.26*	.32*	.45*	.46*	1.00

Notes: Descriptive statistics below the main diagonal are for the Intervention condition, above the main diagonal for the Control condition. Intervention condition *N*s 121–136; Control condition *N*s 68–89.
*$p < .05$ (*p*-values do not account for nesting of employees in workgroups).

are large in magnitude, none are so large to indicate that these variables measure the same construct. Initial analyses explored whether there were differences across intervention conditions at baseline for the study variables assessed at baseline. No significant differences across conditions were observed for Leader-Member Exchange ($B = -0.19$, $p = .32$, $\Delta R^2 < .01$) or Team Cohesion ($B = 0.19$, $p = .19$, $\Delta R^2 < .01$).

Intervention process evaluation

Several sources of information were used to evaluate the intervention process. First, all teams assigned to the intervention condition participated in the TEP sessions and completed the 30–60–90 day check-ins. Second, all supervisors in the intervention condition completed the computer-based training with an average post-training quiz score of 85% correct indicating an adequate knowledge of the training information. Third, the behaviour tracking component was completed by all supervisors in the intervention condition. Qualitative data obtained from interviews with supervisors revealed emotional support and role-modelling as the easiest behaviours to practice, whereas providing resources and helping to manage work-life conflicts were more challenging, often due to organisational priorities and limitations.

Fourth, at follow-up participants in the intervention condition completed a 6-item survey to assess changes in team characteristics. Items included "Morale," "Efficient use of time and resources," and "Communication." Item responses ranged from 1 = "much worse" to 5 = "greatly improved" with a mid-point of 3 = "stayed about the same". Factor analysis supported a single dimension underlying these items responses and so item responses were averaged to create an overall scale score. Higher scores on this scale indicate greater improvement. The scale demonstrated acceptable reliability ($\alpha = .79$). When compared to the scale mid-point of 3 = "stayed about the same", the mean score ($M = 3.26$) was significantly greater than this mid-point, 95% CI (3.14, 3.38). Thus, team members in the intervention condition on average indicated some degree of improvement to their team characteristics.

Testing research hypotheses

Hypothesis 1 stated that those in the intervention group would exhibit higher FSSB, team effectiveness processes (TEP), and work-life indicators (WLEI), compared to those in the control condition. This hypothesis was not supported. No significant intervention effects

were observed at follow-up for TEP ($B = 0.11$, $p = .34$, $\Delta R^2 = .01$), WLEI ($B = 0.08$, $p = .52$, $\Delta R^2 < .01$), or FSSB ($B = -0.08$, $p = .63$, $\Delta R^2 < .01$). It should be noted that evidence of intervention effects are not required to test for moderators of intervention effects (i.e. Hypotheses 2 and 3). These analyses and results follow.

Table 2 provides the mixed model results for the effect of the intervention on FSSB, TEP, and WLEI at follow-up as moderated by baseline LMX. In each model, baseline LMX is significantly related to the three outcomes in the control condition (i.e. when Intervention = 0). Evaluated at the grand mean for baseline LMX, participants in the intervention condition had significantly higher TEP and WLEI scores on average at follow-up than participants in the control condition (i.e. $B = 0.28$, $p = .02$, $\Delta R^2 = .05$, and $B = 0.24$, $p = .03$, $\Delta R^2 = .03$, respectively), but not for FSSB scores at follow-up (i.e. $B = 0.12$, $p = .36$, $\Delta R^2 = .01$). As also reported in Table 2, baseline LMX significantly moderated the effects of the intervention on TEP scores ($B = -0.27$, $p = .04$, $\Delta R^2 = .03$) and FSSB scores ($B = -0.35$, $p = .04$, $\Delta R^2 = .03$) at follow-up. Figure 1 displays the nature of the moderated intervention effect on TEP scores at follow-up ranging from 1 *SD* below to 1 *SD* above the baseline LMX mean (cf. Dawson, 2014); descriptively interpreted, the intervention had a more beneficial impact on TEP scores at follow-up for those participants with lower, rather than higher, LMX scores at baseline. The graph of the moderated intervention effect on FSSB scores (not shown) is similar. The moderated intervention effect on WLEI scores at follow-up, however, was not statistically significant (i.e. $B = -0.21$, $p = .11$, $\Delta R^2 = .02$). Thus, Hypothesis 2 was partially supported.

Table 3 provides the mixed model results for the effect of the intervention on TEP, WLEI, and FSSB at follow-up as moderated by baseline Team Cohesion. In each model, baseline Team Cohesion was significantly related to the three outcomes in the control condition (i.e. when Intervention = 0). No significant intervention effects were observed when evaluated at the grand mean for baseline Team Cohesion. As also reported in Table 3, however, baseline Team Cohesion significantly moderated the effects of the intervention on TEP scores ($B = -0.28$, $p = .03$, $\Delta R^2 = .02$), WLEI scores ($B = -0.30$, $p = .02$, $\Delta R^2 = .03$), and FSSB scores ($B = -0.36$, $p = .04$, $\Delta R^2 = .03$) at follow-up. Figure 2 displays the nature of the moderated intervention effect on TEP scores at follow-up ranging from 1 *SD* below to 1 *SD* above the baseline Team Cohesion mean; descriptively interpreted, the intervention had a more beneficial impact on TEP scores at follow-up for

Table 2. General linear mixed model results with FIML estimation of intervention effects on TEP, WLEI, and FSSB at follow-up as moderated by baseline leader-member exchange.

	DV: Team Effectiveness Process		DV: Work-Life Effectiveness Indicators		DV: Family Supportive Supervisor Behaviors	
	Est.	95% CI	Est.	95% CI	Est.	95% CI
Intercept	2.87*	(2.70, 3.05)	3.09*	(2.96, 3.23)	3.14*	(2.95, 3.32)
Intervention	0.28*	(0.05, 0.52)	0.24*	(0.03, 0.44)	0.12	(−0.14, 0.39)
Baseline Leader-Member Exchange (BLMX)	0.49*	(0.29, 0.68)	0.49*	(0.32, 0.66)	0.74*	(0.44, 1.04)
Intervention × BLMX	−0.27*	(−0.53, −0.01)	−0.21	(−0.47, 0.05)	−0.35*	(−0.67, −0.02)
Residual Variance	0.43*	(0.36, 0.51)	0.44*	(0.36, 0.52)	0.45*	(0.35, 0.54)
Intercept Variance	0.03	(0.00, 0.08)	0.01	(0.00, 0.04)	0.04	(0.00, 0.11)
Model Pseudo R^2	.17*		.20*		.34*	

Notes: FIML = Full Information Maximum Likelihood. Intervention (coded: 1 = Intervention; 0 = Control). Baseline Leader-Member Exchange is grand mean centred.
*$p < .05$.

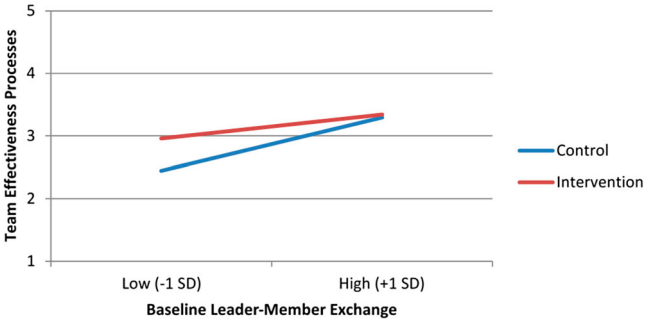

Figure 1. Intervention effects on team effectiveness processes as moderated by baseline levels of leader-member exchange.

Table 3. General linear mixed model results with FIML estimation of intervention effects on TEP, WLEI, and FSSB at follow-up as moderated by baseline team cohesion.

	DV: Team Effectiveness Process		DV: Work-Life Effectiveness Indicators		DV: Family Supportive Supervisor Behaviors	
	Est.	95% CI	Est.	95% CI	Est.	95% CI
Intercept	3.00*	(2.83, 3.16)	3.20*	(3.05, 3.34)	3.32*	(3.11, 3.53)
Intervention	0.11	(−0.12, 0.34)	0.08	(−0.15, 0.31)	−0.11	(−0.43, 0.22)
Baseline Team Cohesion (BTC)	0.61*	(0.44, 0.79)	0.53*	(0.31, 0.75)	0.58*	(0.28, 0.88)
Intervention × BTC	−0.28*	(−0.54, −0.02)	−0.30*	(−0.55, −0.04)	−0.36*	(−0.71, −0.02)
Residual Variance	0.41*	(0.33, 0.49)	0.45*	(0.35, 0.55)	0.57*	(0.40, 0.73)
Intercept Variance	0.02	(0.00, 0.07)	0.02	(0.00, 0.07)	0.09	(0.00, 0.18)
Model Pseudo R^2	.23*		.17*		.12*	

Notes: FIML = Full Information Maximum Likelihood. Baseline Team Cohesion is grand mean centred.
*$p < .05$.

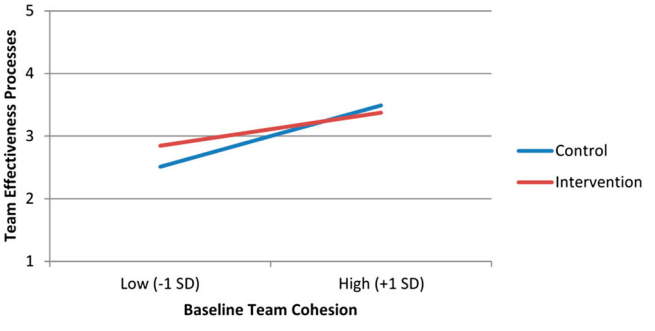

Figure 2. Intervention effects on team effectiveness processes as moderated by baseline levels of team cohesion.

those participants with lower, rather than higher, Team Cohesion scores at baseline. The graphs of the moderated intervention effects on WLEI and FSSB scores (not shown) are similar. Thus, Hypothesis 3 was supported.

Discussion

While the main effects of the intervention on well-being outcomes were not significant, the results of this study indicate that SHIP, based on leadership training and TEP, was more

beneficial for work crew members who had poorer perceptions of their relationship with their supervisor based on LMX, and poorer perceptions of their work crew relations based on Team Cohesion, at baseline. These boundary condition results suggest that the pre-intervention context in which an intervention is implemented deserves thorough consideration and understanding as we attempt to identify organisational interventions (e.g. Biron et al., 2012; Nielsen et al., 2010; Semmer, 2006).

In addition, the results add to a growing body of literature indicating that workplace interventions may benefit employees who, at baseline, are marginalised or experiencing particular work-life challenges. For example, this finding is consistent with those of Hammer et al. (2011) who demonstrated significant beneficial workplace intervention effects for workers who reported high work-family conflict at baseline.

In the present study, LMX and team cohesion acted as boundary conditions in the intervention's effectiveness, suggesting that the SHIP intervention may only be effective when LMX and team cohesion are perceived to be low by employees. Thus, when leader-member relations are perceived to be less positive, there is more of a need to train managers on FSSB and safety communication, as was done with SHIP. For example, some of the action items that emerged as part of the TEP sessions included supervisors and team members taking inventory of materials to assess status of resources, organising and maintaining storage areas, and establishing career development plans for employees. Through developing root causes and solutions, leaders were made aware of employees' needs (resources and development), and the team members communicated the importance of demonstrating respect through taking care of tools and proper storage. Highly functioning teams were likely already completing these objectives and did not require facilitated conversations to integrate these into their work. Collaboration to establish and clarify expectations was therefore most beneficial where poorer working relationships hindered efficient work processes and social support.

Alternatively, it is possible that the post-intervention assessment was constrained as we did not measure everything we could have measured about team effectiveness and supervisor support at the 6 and 12 month follow-up. Perhaps with a more in-depth analysis of the intervention process using qualitative methods in addition to quantitative methods, we would have discovered more about the boundary conditions of the effects of the intervention beyond the outcomes and moderators examined here.

It also is important to note that the intervention moderation effect sizes were small, consistent with most interaction effect sizes in social science research. We believe that while this may only represent an intervention with limited effects, it can also be argued that it is a WISE (Walton, 2014) intervention that is focused on discreet psychological processes and that may be scalable in contexts where resources are minimal and unable to implement and evaluate more extensive embedded interventions.

Limitations of the study

This study is clearly not without limitations. As mentioned above, the main effects of the intervention were not significant and the moderation effects had small, but significant effects sizes. While we did conduct a process evaluation of the intervention implementation and fidelity, and interviews with key stakeholders and observations of the environment were conducted to evaluate the organisational context upon entry, a systematic

evaluation of the environment-intervention fit did not take place (Nielsen & Randall, 2012). Perhaps the context did not appropriately facilitate the SHIP intervention. For example, many of the workers were field workers who needed to travel to worksites and the demands of the intervention may have created more stress than alleviated stress because it required a four-hour session of face-to-face interactions between the workers, as well as follow-up meetings and actions. Alternatively, some of the results could be a function of workers being frustrated with supervisors/management that may not have followed through on implementing the actions raised during the TEP session and in turn, creating frustration and cynicism of the workers. In addition, the primary evaluation of the intervention was based on self-reported measures from the employees. Even though data were collected at baseline and post-intervention and thus separated in time, and work crews were randomised to the intervention and control conditions, the reliance on self-report data limits some of the conclusions that can be drawn.

Suggestions for future research and practice

We suggest that more theoretical and empirical work is needed to clarify the conditions under which baseline workplace characteristics moderate leadership intervention effects. On the one hand, our SHIP leadership training intervention appears to be more helpful when LMX and team cohesion are low, but on the other, these results suggest that research focus on developing a better understanding of leadership interventions when conditions are favourable is needed. We also acknowledge that these findings add to the body of literature suggesting the importance of transformational leadership in improving employee health and well-being (e.g. Kelloway et al., 2012; Nielsen et al., 2008).

Interestingly, the present study, while failing to demonstrate significant direct effects on employee perceptions of FSSB, team effectiveness, and work-life effectiveness, the significant moderating effects of LMX and Team Cohesion offer several important suggestions for practice. This study suggests that SHIP benefits employees when the conditions at baseline are not ideal. More specifically, when employees perceive low levels of LMX and team cohesion, SHIP can lead to improved well-being. This suggests that future investigation of supervisor training, behaviour tracking, and TEP that takes more of the pre-intervention environment-intervention fit into consideration, may lead to improved well-being outcomes for employees which may extend beyond the outcomes examined in this study.

Conclusion

The main contributions of the present manuscript include presenting a study that used a cluster randomised design, in a high-risk industry, to evaluate the effectiveness of a workplace leadership training and team process intervention to improve well-being outcomes for employees. Limited leadership training is available that directly addresses how leaders can provide support to workers and this training focused on detailing support behaviours that can be implemented. Furthermore, findings indicate that important pre-intervention contextual factors impacted the SHIP leadership training, suggesting the intervention may be more helpful in less than ideal environments when supervisor and team relations are perceived to be poor. This suggests that

workplace interventions may have differential effects depending on how ready organisational members are for change.

Investments in workplace programmes that are aimed at improving supervisor/leadership support and team processes from a multi-level perspective may be more beneficial than simply focusing on individual level interventions. Consistent with the Total Worker Health® approach to workplace strategies for improving health and safety of workers, the SHIP intervention provided here offers an example of an evidence-based programme available for workplaces. As noted by Hammer et al. (2016), workplace interventions focused on work-life stress and safety are difficult to develop and test due to the competing demands of work organisations, resources needed, and the limited funding available for conducting such research. Thus, the present study provides a test of an evidence-based strategy that may improve well-being of workers, potentially leading to improved cost savings for employers, as well.

Disclosure statement

No potential conflict of interest was reported by the authors.

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