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Production Pressure, Cognitive Failures, and Injuries Under an Insecure Job Climate

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With globalization, computerization, and accompanying fast-paced work environments, employees often work under high production pressure and in the context of heightened job insecurity. Although these hostile work conditions often co-occur, their negative synergetic effects have been rarely examined. This study aimed to investigate whether these two hostile work environments (i.e., high production pressure coupled with a qualitative job insecurity climate) are related to workplace cognitive failures and subsequent injuries. In particular, we tested the mediating role of cognitive failures in the above-mentioned relationships as well as the interaction effect between the two hostile work environments on cognitive failures. Using 1-month lagged survey data from $N = 176$ U.S. workers, we found that both production pressure and qualitative job insecurity climate were significantly and positively associated with cognitive failures, which in turn were related to injuries. Further, it was revealed that workers experienced more cognitive failures in response to production pressure when they perceived higher levels of qualitative job insecurity climate compared to workplaces that reported lower levels of qualitative job insecurity climate. We discuss these results in light of their contributions to advancing theoretical understanding of the multiplicative effect of job demands and the practical implications for workers' health.

Keywords: production pressure, cognitive failures, injuries, qualitative job insecurity climate

The globalization of markets, the changing nature of work, and the increased pace of technological changes have forced organizations to increasingly focus on performance outcomes to remain competitive in a 24/7 work culture. These changes have resulted in performance-oriented practices in organizations (e.g., high-performance work systems) and increased work pressure for employees (Gallie, 2005), which have been associated with negative job attitudes, deteriorated health, and increased work-related injuries (Han et al., 2020; Macky & Boxall, 2008).

Moreover, many workers report an increased fear of being culled from a highly competitive market (i.e., job insecurity) if they do not meet customer, contractor, or managerial expectations. Indeed, according to the Pew Research Center (2019), about half of surveyed workers expected their job security to decline, whereas only 36% thought it would stay about the same in the future. Research (e.g., Låstad et al., 2015, 2018; Sora et al., 2009) also suggests that these perceptions are shared among workers within a team or an organization, resulting in the development of a *job insecurity climate* (JIC). Importantly, it should be noted that JIC is not only predictive of individual-level job stress (Peng & Potipiroon, 2022) but also exacerbates the harmful effects of work-related stressors on safety-related outcomes (Jiang & Probst, 2016).

While earlier studies have shown adverse impacts of high production pressure and JIC on employee outcomes, relatively less research has been devoted to elucidating the cognitive processes underlying these relationships. According to the job demands–resources (JD-R) model, job demands refer to physical, social, or organizational aspects of a job that require sustained physical, cognitive, or emotional effort, which might result in health impairment (Demerouti et al., 2001). As such, high job demands can result in adverse safety outcomes (Hansez & Chmiel, 2010; Nahrgang et al., 2011) through cognitive drain. Yet, despite empirically observed links between job demands and impaired cognition (e.g., Isoard-Gautheur et al., 2019; Parker et al., 2021), as well as between impaired cognition and safety (e.g., Wallace & Vodanovich, 2003a, 2003b), explicit evaluations of the mediating role of cognition between job demands and safety are lacking (for notable exceptions, see Petitta et al., 2019; Sneddon et al., 2013).

Furthermore, little is known about how unfavorable work environments such as production pressure and JIC often interact with each other to affect safety outcomes. Previous studies have primarily focused on examining the multiplicative effects of job demands and resources (see Gonzalez-Mulé et al., 2021), while only a few studies examining the combined effects of multiple job demands (van Woerkom et al., 2016). Addressing this gap, van Woerkom et al. (2016) suggested that different types of work demands can accumulate, magnifying their negative impact. Considering the frequent occurrence of production pressure and JIC in challenging work environments, it is crucial to investigate

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their interaction. For example, low-skilled agency workers might face economic and reward pressures, such as timed tasks and the risk of being laid off, which may lead them to make compromises in safety, ultimately increasing the likelihood of incidents (Underhill & Quinlan, 2011). While there has been a focus on production pressure and job insecurity among contract and blue-collar workers, many occupations (e.g., sales, research and development, academic researchers) can fall prey to these twin stressors.

Finally, although many workers might have increased worries about potentially losing important job features in response to changing work conditions (e.g., technology changes) and share these worries in the workplace, the impacts of working within an organizational climate of qualitative job insecurity are relatively unexplored. For example, while Låstad et al. (2015) showed that qualitative JIC was predictive of higher perceived work demands, work–family conflict, psychological distress, and health problems, less is known about its negative impact on employee cognitive functioning (e.g., failures in attention, working memory, perception, or decision making; Glisky, 2007) or how it might exacerbate the indirect effects of production pressure on workplace injuries.

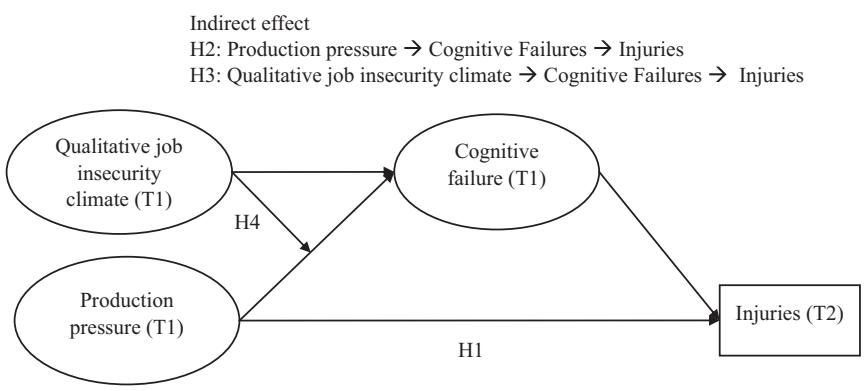
To address these gaps, the present study has three aims. First, given the lack of research on the mediating role of cognitive functioning in the relationship between job demands and safety outcomes, we fill this gap by examining the indirect effect of production pressure on injuries via cognitive failures. Second, following van Woerkom et al. (2016) call for research on the interaction between different job demands, we examine how two different organizational demands (i.e., production pressure and qualitative JIC) interact with each other and are associated with cognitive failures. Third, by examining the relatively new construct of qualitative JIC, we add empirical evidence on the potential exacerbating role of qualitative aspects of job insecurity climate on employee safety-related outcomes. Our conceptual model can be seen in Figure 1; below, we provide further theoretical and empirical justification for the proposed model.

The Relationship Between Production Pressure and Work-Related Injuries

Production pressure refers to an organizational emphasis on production to increase corporate profits and efficiency (Probst & Graso, 2013). While such an emphasis may eliminate wasteful contingencies of material, people, time, and machinery, production pressure is often accompanied by fast-paced, high-intensity work environments (Conti et al., 2006). According to the JD-R model, these adverse work environments put chronic job demands on workers, which depletes their mental and physical resources and resulting in exhaustion and health problems (Bakker & Demerouti, 2007). Indeed, recent studies have shown that high production pressure is associated with adverse safety outcomes such as less compliance with safety, poorer safety performance, greater accident underreporting, and a higher number of experienced accidents (Jiang & Probst, 2015; Longoni et al., 2013; Petitta et al., 2023; Probst & Graso, 2013).

Moreover, when working in productivity- and performance-oriented organizations, employees perceive a trade-off between production and safety (Janssens et al., 1995) and often consider safety to be a lesser secondary focus of the organization (Probst & Brubaker, 2007). As such, under high production pressure, workers believe the benefits of unsafe behaviors (e.g., keeping a fast work pace while circumventing safety rules) outweigh any unfavorable outcomes (Zohar & Erev, 2007). Additionally, under high levels of organizational production pressure, managers deemphasize safety and encourage workers to work faster to meet the schedules and expectations of clients (Guo et al., 2015). Indeed, research suggests that employees tend to take safety shortcuts and comply with safety rules to meet these management expectations (Kaminski, 2001; Keren et al., 2009). In sum, workers who perceive that their organizations prioritize production tend to deviate from safety rules to meet production schedules and quality, resulting in a higher chance of experiencing work-related injuries. Given this, we hypothesize that:

Figure 1
Hypothesized Study Model



Note. An individual perception of job insecurity is a covariate in the model but not shown in the figure for model simplicity. H1 = Hypothesis 1; H2 = Hypothesis 2; H3 = Hypothesis 3; H4 = Hypothesis 4. T1 = Time 1; T2 = Time 2.

Hypothesis 1: Production pressure will be positively associated with workplace injuries.

Cognitive Failures as a Mediator of the Production Pressure—Injuries Relationship

Workplace cognitive failures are defined as work-related errors due to memory, attention, or action lapses (e.g., failing to pay attention to specific requests, unintentionally throwing valuable documents away). These cognitive failures represent a departure from typical functional cognitive operations and can lead to unintended outcomes (Wallace & Chen, 2005). According to the JD-R model, individuals use self-regulation to cope with job demands; however, if an individual must frequently self-regulate, this will in turn deplete their cognitive resources. Successful self-regulation consists of effective allocation of task-relevant (e.g., planning a task strategy) and task-irrelevant (e.g., having disruptive thoughts unrelated to the task) efforts (Lapierre et al., 2012; Wallace & Chen, 2005). Task-relevant efforts require abundant cognitive resources which, when deficient, increase the probability of task-irrelevant efforts.

Consistent with this explanation, Hockey's (1997) regulation model of compensatory control assumes that sustained job demands compel employees to reach for their resource reserves to prevent decrements in the performance of high-priority tasks. Given that each employee has finite resources, such endeavors may disrupt other less important processes (Hockey, 1997), such as attention and memory impairments. As such, workers who have high job demands put their resources toward maintaining performance while having insufficient resources to spend on other tasks such as self-regulation (Lapierre et al., 2012). In other words, resource drain due to high job demands leaves fewer resources toward attentional and informational processes needed to avoid such cognitive failures.

Not surprisingly, previous research has linked work stressors to cognitive lapses and slips (Bridger et al., 2010; Elfering et al., 2011). For instance, individuals experiencing burnout not only reported more cognitive difficulties but also exhibited lower cognitive functioning (e.g., attention lapses) when objectively measured (Van Der Linden et al., 2005). Furthermore, stressful environments, such as examination periods for students, have been linked to impairment in attention and the primacy effect (Vedhara et al., 2000). Production pressure is a demand that forces workers to put most of their work efforts into maintaining or increasing production. Indeed, Wallace and Chen (2005) suggested that role overload (i.e., having too much work in a given time) is a key situational predictor of self-regulation and safety behaviors. As such, workers will have reduced resources for executive functions, which can lead to an increased occurrence of cognitive lapses and slips. Moreover, extant studies have demonstrated the association between cognitive failures and adverse safety outcomes (Park & Kim, 2013; Petitta et al., 2019; Wallace & Chen, 2005; Wallace & Vodanovich, 2003a, 2003b).

To date, few studies have examined cognitive failures as a mediator explaining observed relationships between work-related stressors and safety outcomes (e.g., Elfering et al., 2018). Among a few notable exceptions, Petitta et al. (2019) found that greater emotional contagion of anger within the workplace was associated with increased employee cognitive failures and subsequently more workplace accidents. In another study, individuals with high self-reported levels of psychological stress were more likely to experience accidents, and this effect was transmitted via cognitive failures (Day et al., 2012). Based on these initial findings and the tenets of JD-R model, we anticipate an indirect effect of cognitive failures on the relationship between production pressure and injuries. Therefore, we predict that:

Hypothesis 2: Cognitive failures will mediate the relationship between production pressure and workplace injuries.

Qualitative JIC

Employees coexist within groups, departments, and organizations. Within these contexts, they communicate about organizational policies, procedures, and events stemming from an often uncertain and unpredictable economic environment (Sora et al., 2013). As a result, employees do not experience only individual job insecurity (i.e., employee perceptions of insecurity regarding one's *personal* job situation; Låstad et al., 2015; Shoss, 2017) but are also capable of perceiving a *climate* of job insecurity in their social surroundings (i.e., perceptions regarding the extent to which one's work context is characterized by *shared uncertainty* regarding the job situation; Hsieh & Kao, 2022; Låstad et al., 2015).

Just as individual job insecurity consists of two dimensions: *quantitative* job insecurity (i.e., perceived threat to the loss of one's entire job) and *qualitative* job insecurity (i.e., perceived threat to the loss of one's valued job features; Hellgren et al., 1999; Tu et al., 2020), Låstad et al. (2015) demonstrated that employees have perceptions regarding the extent to which their colleagues and peers worry about losing their jobs (i.e., quantitative JIC) as well as losing important job features (i.e., qualitative JIC). To date, research on JIC has heavily focused on the quantitative dimension (e.g., Guidetti et al., 2022; Låstad et al., 2018). Yet Låstad et al. (2015) demonstrated that qualitative JIC has adverse impacts on work–family conflict, psychological distress, and health beyond the effects accounted for by quantitative JIC. We aim to extend that work by considering the moderating effects of qualitative JIC on cognitive failures and subsequent safety outcomes.

Working in a Qualitative JIC: Impacts on Cognitive Failures and Injuries

Framed within JD-R model, we propose that qualitative JIC represents an organizational job demand, whereby a prevailing threat to the quality of employees' jobs is likely to be experienced as stressful and resource taxing for employees leading to various forms of psychological costs. Qualitative JIC imposes a great deal of uncertainty, unpredictability, and perceived lack of control over future undesirable events because employees do not know for sure whether, when, and how the loss of valuable job features will occur (Urbanaviciute et al., 2021; Vander Elst et al., 2014). Such circumstances are not only stressful and burdening in and of themselves (Bordia et al., 2004) but may also spark unpleasant emotions among colleagues (e.g., frustration, anger, and anxiety) leading to the development of a toxic social environment (Shoss, 2017). Accounting for these arguments and guided by JD-R model, we suggest that qualitative JIC has two potential roles in obstructing employee safety: (a) JIC may lead to more cognitive failures, which in turn result in a higher occurrence of work-related injuries; (b) JIC may

strengthen the indirect effect of production pressure on work-related injuries by exacerbating the adverse effect of production pressure on cognitive failures.

Further, we expect that high levels of qualitative JIC require the mobilization of excessive effort which over time depletes employees' cognitive resources (e.g., attention and information processing capacity) resulting in strain in the form of increased cognitive lapses and slips (Bakker & Demerouti, 2017; Lapierre et al., 2012). Like individuals working under high production pressure, those who work in an environment where fears of losing important job features are rampant might be more likely to allocate their resources on task-irrelevant efforts (e.g., being overloaded with worrying about the quality of the job; Wallace & Chen, 2005). Subsequently, workers tend to have insufficient resources to successfully self-regulate at work and have more chances of unintentional lapses in on-task attention. Although previous studies have not yet explored cognitive failures as an outcome of qualitative JIC, research has demonstrated their relationship with other job demands (e.g., Lapierre et al., 2012; Petitta et al., 2019), including the effect of individual job insecurity on attentional capacity and cognitive failures (Probst et al., 2020; Van Egdom et al., 2022) as well as downstream effects on work outcomes such as reduced job performance (Probst et al., 2020) and safety (Park & Kim, 2013; Petitta et al., 2019; Wallace & Chen, 2005). As such, we hypothesize that:

Hypothesis 3: Cognitive failures will mediate the relationship between qualitative JIC and workplace injuries.

In addition to the additive effects of production pressure and qualitative JIC on cognitive failures, we further suggest that these two prominent job demands can interact to exert a multiplicative detrimental effect on employees' functional cognitive operation. As argued by Bakker and Demerouti (2017), coping with one demanding aspect of a job drains employees' finite resources leaving scarce reserves needed for coping with other job demands. Thus, one job demand may strengthen the adverse effect of another demand surpassing the cognitive resource reserves needed for adequate cognitive functioning.

In particular, we expect that qualitative JIC and production pressure jointly form a particularly detrimental combination of working conditions. Production pressure forces employees to invest excessive efforts into maintaining or increasing production. The harmful effects of such demand on employee cognitive functioning may be even more pronounced when employees simultaneously perceive that many people in their workplace worry about the diminishing quality of their jobs. In such an unfortunate constellation of working conditions, employees are pressured to achieve demanding goals and meet stringent deadliness, while at the same time coping within a climate of perceived impending loss of essential job features. Such a situation may trigger a synergistic depletion of cognitive resources, resulting in a significant increase in cognitive lapses and slips, and consequently, a higher number of workplace injuries. Similar studies examining the interplay between different job demands on employee strain are still exceptionally rare even though work environments are multivariate in nature, and the examination of only a direct effect of job demands may paint an overly simplistic picture of their detrimental influences (for notable exceptions, see Petitta et al., 2023; van Woerkom et al., 2016). In this study, we comport with the JD-R model to fill this gap by hypothesizing that:

Hypothesis 4: High levels of qualitative JIC will exacerbate the indirect relationship between production pressure and injuries via cognitive failures.

Method

Participants and Procedure

We tested our hypotheses using online survey data collected via United States-based Amazon Mechanical Turk (MTurk) over two time points (Time 1 [T1]: July 2018; Time 2 [T2]: August 2018).[1] The study was classified as exempt by Washington State University, IRB No. 15,967. Participation was limited to "high quality" MTurk workers (i.e., a minimum of 90% prior approval rating, completion of at least 100 tasks, and having a job outside the MTurk platform; see Peer et al., 2014). At T1, 730 respondents finished the survey, and among those, 575 participants responded at T2 (retention rate: 79%). Only a subset of the sample answered workplace safety-related questions (i.e., those who previously had indicated that they were working in jobs where they faced job-related hazards), resulting in a final sample size of 176 cases. The majority of respondents were White (60.2%), male (69.3%), and had graduated from college or higher (58.5%). The mean age of respondents was 34.01 (SD = 8.96), and respondents were working an average of 40.84 hr (SD = 11.55). The three most representative industries were manufacturing (15.9%), health care and social assistance (10.2%), and construction (9.1%).

Measures

In order to reduce common source bias (Podsakoff et al., 2003), production pressure, JIC, and cognitive failures were measured at T1, whereas injuries was measured at T2.

Production pressure was measured using Probst and Graso's (2013) five-item scale. Participants were asked the extent to which they agree with the statements (e.g., "The main focus of this organization is on production.") on a Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Cronbach's α for this study was .92.

Qualitative job insecurity climate (JIC) was measured using the four-item scale developed by Låstad et al. (2015). We asked participants to indicate the extent to which they agree with each statement (e.g., "Many people at my workplace express anxiety over their career development in the organization."). This scale uses a referent-shift approach to measuring JIC, which Låstad et al. (2015) demonstrated predicts variance in work-related outcomes above and beyond individual self-referent perceptions of job insecurity. Items were answered on a Likert scale (1 = *strongly disagree*; 7 = *strongly agree*). Cronbach's α for this study was .92.

Cognitive failures were measured using the 15-item Workplace Cognitive Failure Scale (Wallace & Chen, 2005). Using a Likert

[1] Prior research has demonstrated that a 1-month interval is sufficient time for effects to manifest while abating effects of decay (e.g., Omidi et al., 2021; Petitta et al., 2019; Probst et al., 2020).

scale (1 = *never*; 5 = *very often*), participants were asked to indicate how often they experienced cognitive failures across three subcomponents: memory (e.g., "cannot remember what materials are required to complete a particular task"), attention (e.g., "are easily distracted by coworkers"), and action (e.g., "accidentally drop objects or things"). Cronbach's α for this study was .98.

Job-related injuries were measured using a 16-item checklist developed by Probst et al. (2013) in which participants indicate "Yes" = 1 or "No" = 0 if they experienced each of 16 unique job-related injuries (e.g., shoulder or neck problems, back injuries, or "other") within the past year. This formative scale could range from 0 to 16.

Self-referent *cognitive job insecurity* was measured using the nine-item Job Security Index (JSI; Probst, 2003) at T1 and used as a covariate. Participants were asked to indicate what their future employment be like in the organizations (e.g., "My future employment is unpredictable.") on a scale ranging from 0 (*no*) to 3 (*yes*). The responses were coded such that higher numbers reflect greater perceived insecurity. Cronbach's α for this study was .87.

Statistical Analysis

Before testing the hypothesized model, preliminary analysis consists of checks for normality of our data, and the fit of the measurement model was assessed. We conducted a confirmatory factor analysis (CFA) with the proposed four latent variables (i.e., production pressure, qualitative JIC, workplace cognitive failure, and cognitive job insecurity) and a single indicator manifest variable (i.e., injuries). To increase model parsimony (Little et al., 2013), we used item parcels to build our measurement model (cognitive job insecurity: three three-item parcels; cognitive failures: three five-item parcels corresponding to the three subdimensions; see Matsunaga, 2008). Next, we constructed two structural equation models (i.e., Model 0 and Model 1) as recommended by Maslowsky et al. (2015). Model 0, which did not include the latent interaction term (i.e., Production Pressure × Qualitative JIC), was used to test Hypotheses 1–3 regarding the total effect and indirect effects. Finally, Model 1 included the latent interaction to test moderation effects of JIC (i.e., Hypothesis 4).

Results

First, we conducted preliminary checks to confirm the normality of the data and assess the fit of the measurement model using Mplus 8.3 with the maximum likelihood estimator (Muthén & Muthén, 1998–2017). Skewness and kurtosis were computed, and none of the variables exceeded the recommended threshold of 3 for skewness and 10 for kurtosis (Brown, 2015). The measurement model showed root-mean-square error of approximation (RMSEA) value of .09, exceeding the cutoff value recommended by Hu and Bentler (1999). Thus, a correlation between errors of two items related to production pressure was introduced, resulting in an improved model fit, $\chi^2(94) = 182.66$, comparative fit index, CFI = .97, Tucker–Lewis index, TLI = .96, RMSEA = .07, standardized root-mean-square residual, SRMR = .04.[2] Table 1 shows descriptive statistics, scale reliabilities, and Pearson correlations. Of note, production pressure and qualitative JIC were positively associated with cognitive failures ($r = .77$, $p < .001$; $r = .79$, $p < .001$, respectively), and such cognitive failures were correlated with experienced injuries 1 month later ($r = .65$, $p < .001$).

Next, a latent moderated structural equation model was constructed to test the hypothesized moderated mediation model shown in Figure 1. First, following Maslowsky et al. (2015), Model 0, a model without the latent interaction term was used to estimate the fit of the structural equation model. The model provided an acceptable fit: $\chi^2(95) = 182.95$, CFI = .97, TLI = .96, RMSEA = .07 (90% CI [.06, .09]), SRMR = .04. Then, Model 1 was built by adding the latent interaction term (i.e., production pressure with qualitative JIC) to Model 0. The relative fit of Model 1 compared to Model 0 was determined using a log-likelihood ratio test ($D = -2$ [(log-likelihood for Model 0)−(log-likelihood for Model 1)]), which yielded D of 20.58 ($df = 1$, $p < .001$), indicating a significant difference between the models.

The results of the latent moderated structural models are presented in Table 2. Model 0 was used to test Hypothesis 1–Hypothesis 3 while Hypothesis 4 on the interaction effect was tested using Model 1. First, we hypothesized that production pressure would be positively associated with injuries. The total effect of production pressure on injuries (i.e., direct effect of production pressure on injuries plus indirect effect via cognitive failures) was significant ($b_{\text{total effect}} = 2.15$, $p < .001$), supporting Hypothesis 1. Additionally, the path from production pressure to cognitive failures was positive and significant ($b = 0.97$, $p < .001$), as was the path from cognitive failures to injuries ($b = 0.97$, $p = .001$). Consistent with this pattern of results, the indirect effect of production pressure via cognitive failures was also significant ($b = 0.94$, $p = .004$, 95% boot CI [0.37, 1.63]), providing support for Hypothesis 2 (see Table 3). Similarly, qualitative JIC was positively related to cognitive failures ($b = 1.25$, $p < .001$), and the indirect effect of qualitative JIC on injuries via cognitive failures was also significant ($b = 1.21$, $p = .004$, 95% boot CI [0.43, 2.09]). Finally, qualitative JIC moderated the relationship between production pressure and cognitive failures ($b = 0.54$, $p < .001$, 95% boot CI [0.28, 0.87]). Furthermore, the indirect effect grew stronger as the level of qualitative job insecurity increased ($b_{\text{low}} = 0.50$, $p = .021$, $b_{\text{average}} = 0.98$, $p = .002$, $b_{\text{high}} = 1.47$, $p = .002$; see Table 3). Figure 2 illustrates the conditional indirect effect of production pressure on injuries depending on the level of qualitative JIC. As can be seen, the positive relationship was stronger under high (+1 *SD*) qualitative JIC compared to low (−1 *SD*). Thus, Hypothesis 3 and Hypothesis 4 on the indirect and moderating effects of qualitative JIC were confirmed.

Discussion

As production pressure and job insecurity have increased due to globalization and automation, we aimed to examine the interaction between those two stressors and their impact on cognitive failures and injuries at work. First, we found that cognitive failures played a significant mediating role in contributing to work-related injuries. As predicted, the total effect of production pressure on injuries was

[2] Although the RMSEA value still does not meet the criteria set by Hu and Bentler (1999), it is important to note that TLI and RMSEA tend to be more conservative in model selection for small samples and may penalize models with greater complexity (West et al., 2012). Some researchers have suggested that relying solely on a single cutoff criterion should be avoided (e.g., West et al., 2012). Despite the RMSEA not indicating a good fit for our model, the other fit indices generally suggest a good fit to the data.

Table 1
Descriptive Statistics and Correlations

Variable	*M*	*SD*	1	2	3	4	5
1. Self-referent cognitive job insecurity (T1)	0.92	0.93	(.87)				
2. Qualitative job insecurity climate (T1)	4.04	1.85	.55***	(.92)			
3. Production pressure (T1)	4.11	1.69	.45***	.74***	(.92)		
4. Workplace cognitive failure (T1)	2.53	1.20	.35***	.79***	.77***	(.98)	
5. Injuries (T2)	5.80	4.95	.33***	.58***	.59***	.65***	(—)

Note. $N = 176$. Values on the diagonal (in parentheses) are Cronbach's α coefficients. T1 = Time 1; T2 = Time 2.
*** $p < .001$.

significant and cognitive failures fully mediated this relationship. Specifically, cognitive failures transmitted the adverse effect of production pressure on injuries, as this pressure to prioritize efficiency for profits resulted in a drain on workers' cognitive resources needed to sustain memory, attention, and action toward safety behaviors. In a similar way, qualitative JIC was significantly related to cognitive failures, which then led to injuries. Further, we found that qualitative JIC exacerbated the detrimental effect of production pressure on work-related injuries via cognitive failures. When shared perceptions regarding threats to valued job features were higher, this added stressor further depleted cognitive resources that resulted in a subsequent increase in injuries.

Theoretical and Practical Implications

These findings on the negative impacts of production pressure and job insecurity on injuries add to the growing body of research that demonstrates the adverse safety-related consequences of unfavorable work environments. Theoretically, the present study contributes to the JD-R model by adding further explanation of *how* job demands lead to adverse health outcomes. Previously, most of studies drawing upon JD-R have focused on the direct health impairment or motivation processes as well as interaction of job demands and resources; however, less attention has been given to underlying mechanisms and boundary conditions on the association between job demands and health/work outcomes (van Woerkom et al., 2016).

Our findings suggest that subjective perceptions of impaired cognitive functioning act as a mediator in the health impairment process in addition to previously suggested mediators including psychological resources (Desrumaux et al., 2015; Fernet et al., 2013) and work–home interface (Janssen et al., 2004). Moreover, this finding aligns with Demerouti et al. (2019) recent propositions regarding individual cognitive strategies in demanding situations. They proposed that additional self-control demands can lead to cognitive deficits, resulting in burnout.

Additionally, our findings add evidence concerning the simultaneous experience of multiple job demands, which was

Table 2
Unstandardized Path Coefficients With 95% Bootstrap Confidence Intervals for the Hypothesized Structural Model

	Outcome						
	Cognitive failure (T1)				Injury (T2)		
			95% boot CI				
Predictors and covariates	*b*	(*SE*)	*LL*	*UL*	*b*	(*SE*)	95% boot CI
Model 0							
Predictors							
Production pressure	0.97***	(0.25)	0.54	1.51	1.21	(0.62)	[0.04, 2.47]
Qualitative job insecurity climate	1.25***	(0.27)	0.81	1.88			
Cognitive failure					0.97**	(0.29)	[0.36, 1.53]
Covariates							
Cognitive job insecurity	−0.43*	(0.17)	−0.79	−0.11	0.47	(0.36)	[−0.20, 1.21]
Model 1							
Predictors							
Production pressure	1.09***	(0.27)	0.67	1.72	1.08	(0.62)	[−0.10, 2.32]
Qualitative job insecurity climate	1.33***	(0.27)	0.91	1.98			
Cognitive failure					0.90***	(0.26)	[0.37, 1.38]
Covariates							
Cognitive job insecurity	−0.38*	(0.18)	−0.78	−0.06	0.51	(0.36)	[−0.16, 1.24]
Two-way interactions							
Production Pressure × Qualitative Job Insecurity Climate	0.54***	(0.15)	0.28	0.87			

Note. $N = 176$. Parameter estimates are unstandardized. 95% boot CI = 95% bootstrap confidence interval based on 10,000 draws. LL and UL indicate the lower and upper limits of a confidence interval, respectively. T1 = Time 1; T2 = Time 2; *SE* = standard error.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3
Indirect and Total Effect Estimates of Moderated-Mediation Model With 95% Bootstrap Confidence Intervals

Type of effect	The level of qualitative job insecurity climate	Estimate	95% boot CI
Indirect effect	Low	0.50*	[0.13, 0.99]
	Average	0.98**	[0.42, 1.67]
	High	1.47**	[0.60, 2.48]
Total effect	Low	1.58**	[0.48, 2.69]
	Average	2.07***	[1.16, 2.98]
	High	2.55***	[1.68, 3.37]

Note. $N = 176$. Parameter estimates are unstandardized. 95% boot CI = 95% bootstrap confidence interval based on 10,000 draws. Low = $-1SD$ qualitative job insecurity climate; average = the mean of qualitative job insecurity climate; high = $+1SD$ qualitative job insecurity climate.
* $p < .05$. ** $p < .01$. *** $p < .001$.

initially examined by van Woerkom et al. (2016). While van Woerkom et al. (2016) found the interaction effect of two personal contradictory job demands (i.e., Workload × Emotional Demands) on absenteeism, our results revealed that when harsh workplace situations arise (i.e., production pressure coupled with qualitative JIC), these can interact to produce negative synergistic effects on workers' safety. In particular, as previous studies have shown that both production pressure and job insecurity are related to safety knowledge and safety motivation (e.g., Guo et al., 2016; Probst & Brubaker, 2001), workers who are under the combination of these two job demands tend to experience magnified reductions in cognitive functioning and subsequent safety-related outcomes.

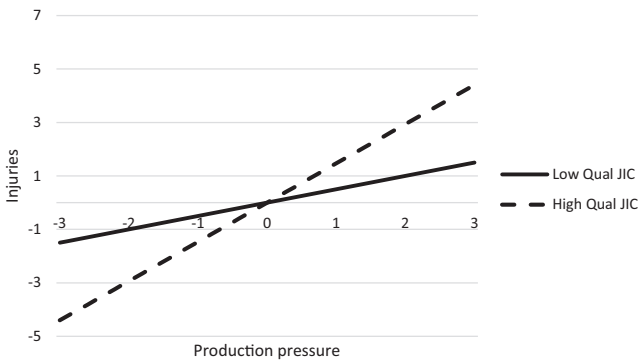
Moreover, while most prior research has focused on the perceived threat to one's *own* job, this study is unique in that it evaluated the extent to which employees *express* and *share* concerns about adverse qualitative changes to the nature of their jobs. Specifically, we used an innovative approach where a participant was asked to gauge overall perceptions among workers, as opposed to his/her perceptions. While traditional measures that assess self-perceptions provide limited information regarding climate, a referent-shift approach can explain phenomenon beyond self-referent perceptions (Låstad et al., 2015).

From a practical perspective, when job insecurity concerns are shared amongst a workgroup, this can intensify the already deleterious effects of production pressure on safety outcomes via increased cognitive failures. This comports with research by Petitta et al. (2019) who found that shared negative emotions (i.e., contagion of anger) can result in cognitive failures and worsened safety outcomes. Such a shared climate of job insecurity can be perpetuated by organizational rumor mills where fears and worries about impending job and organizational changes can quickly spread throughout an organization. Unfortunately, organizations often focus on performance outcomes while neglecting the adverse effects of accompanying stressful environments that can occur in the wake of high levels of production pressure and a pervasive climate of job insecurity.

Our results indicate that the interplay of production pressure and JIC can be costly to employers and employees alike. Workplace injuries were estimated to cost employers $58.61 billion in 2020 alone (Liberty Mutual, 2023). Importantly, these numbers do not attest to the consequential and sometimes lifelong impacts on the workers who bear these injuries. Thus, organizations operating under just-in-time or lean production principles coupled with high and fast-paced production demands need to attend to the potentially deleterious effects of these demands on employees' cognitive processes and the risks these demands place on worker safety.

When these processes are occurring in an organizational context of job insecurity and fears of negative qualitative changes to the work environment, it is even more imperative for employers to reduce the otherwise high burden to employers and their injured workers. Prior research has found that establishing clear lines of organizational communication (Jiang & Probst, 2014) and increasing employee opportunities for participative decision making (Probst, 2005) can help alleviate the effects of individually perceived job insecurity on employees. Thus, these might be two fruitful interventions to explore in future research with respect to production pressure and JIC.

Figure 2
Conditional Indirect Effect of Production Pressure on Injuries Depending on the Level of Qualitative Job Insecurity Climate (Qual JIC)



Note. Qual JIC = qualitative job insecurity climate. Low qual JIC = $-1SD$ qual JIC, high qual JIC = $+1SD$ qual JIC. The metrics of production pressure and qual JIC have been set by fixing the variances at 1.

Limitations and Future Directions

Despite the contributions mentioned above, there are limitations to note. First, while our survey design introduced a 1-month temporal lag to reduce common method bias, future research should use a fully cross-lagged design in order to test reverse and/or reciprocal causal. Similarly, three waves of data would more appropriately model the purported mediating effect of cognitive failures. For example, Lesener et al. (2019) in their meta-analysis study showed that the reciprocal model of job demands–resources better fit the data than the standard model in which job demands and resources lead to burnout and reduced work engagement. Future research should also test if the reciprocal model holds even when mediators are introduced to the model.

Future research should also focus on obtaining multilevel data, as this would allow for an evaluation of whether the referent-shift climate results replicate when using an aggregated approach to operationalize shared consensus regarding JIC (i.e., aggregating

individual JI perceptions to a workgroup or organizational level). Conceptually, this distinction may not be just operational. Using an aggregation approach to estimate JIC only allows the researcher to infer that members of a workgroup have similar perceptions. It does not allow one to infer that members of the workgroup actively discuss, share, or know the perceptions of their fellow coworkers. In contrast, the referent-shift approach directly assesses the extent to which respondents perceive (presumably via conversations with coworkers) that there are shared fears of job insecurity among their work colleagues. Thus, research directly comparing JIC results from the aggregate versus referent-shift approaches would be valuable.

Similarly, multilevel and dyadic data would allow researchers to evaluate whether employee injuries increase due to cognitive failures experienced by their coworkers when working under production pressure. Oftentimes, the safety of an employee relies heavily on the actions of those around them. Therefore, experienced injuries may not only be attributed to increases in one's own cognitive failures but may also increase as a function of the cognitive failures of their coworkers.

Conclusion

Competitive global markets often result in high levels of production pressure. Increasingly, research suggests this pressure for production has negative safety outcomes for workers. Our research adds to this body of literature by indicating that the effect of production pressure on attentional failures and cognitive errors is exacerbated when working in a climate of qualitative job insecurity. While our data were collected prepandemic, the COVID-19 pandemic accelerated many of these workforce trends (e.g., rapid and historic job losses, supply chain demands increasing production pressure). As individuals continue to have a multitude of stressors competing for their limited attention, it is of the utmost importance to consider the potential effects of the demands being placed upon workers and ensure their safety and those around them.

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