

Innovation in times of pandemic: The moderating effect of knowledge sharing on the relationship between COVID-19- induced job stress and employee innovation

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The goal of this study is to examine knowledge sharing as a boundary condition under which employee innovation can be enhanced in response to the job stress induced by the COVID-19 pandemic. We argue that when stressed employees share knowledge, they can expand their knowledge base and thereby enhance their innovative potential. Consistent with our hypothesis, multiple regression analysis results based on a sample of 61 R&D employees of UK and US technology-based firms show that knowledge sharing moderated the relationship between COVID-19-induced job stress and employee innovation, such that the relationship was negative when knowledge sharing was lower but became positive when knowledge sharing was higher. These findings highlight the importance of investing in knowledge-based resources to promote innovation behavior at work during a pandemic.

1. Introduction

Since the outbreak of the COVID-19 pandemic, firms have begun to imagine how this virus will affect consumer behavior and, in general, business sentiment and outcomes. Uncertainty about the future of an organization's business requires a radical revision of relational schemes, not only outside the organization, but also within it. A recent article published in *The Economist* concisely captures

this concept: *The pandemic and the damage done will accelerate trends that were already reshaping business.*¹ Innovation in the time of COVID-19 is critically necessary not only in the medical and pharmaceutical fields (e.g., Gates, 2018), but also in all sectors of the economy. While a strict policy response to COVID-19 was necessary, firms will inevitably be impacted by it, sustaining both short-term effects and less-expected long-term consequences (Bartik et al., 2020). Due to these

circumstances, firms in industries with fast-changing technologies that invest in R&D activities in response to emerging global risks will be better positioned to promote not only their near-term survival, but also their future innovative performance to stay competitive (Helfat, 1997; Blake and Burrows, 2001; Verdu-Jover et al., 2005; Martínez-Sánchez et al., 2011; Aghion et al., 2018; Zhang and Zhou, 2019; Marullo et al., 2020).

The need for innovative processes to support R&D work requires careful analysis of the effects of job stress induced by COVID-19 on employee innovation – that is, a fundamental resource for firm innovation (Liu et al., 2017) and performance (Gong et al., 2013). The instability of the external environment, due to fears of a poorly understood deadly virus, increases employee exposure to extra-organizational stressors, which could impede effective work behaviors. Studies conducted at the macroeconomic level highlight the negative consequences of the spread of viruses in a population for the economy. McKibbin and Fernando (2020), in estimating the longer-term consequences of the COVID-19 shock, noted that under a favorable scenario, global unemployment would increase by 5.3 million. Using a similar model, Lee and McKibbin (2004) estimated that the SARS epidemic in 2003 would have major impacts not only on affected local economies, but also on the global economy as a whole. Recently, Correia et al. (2020) analyzed consequences of the 1918 Flu Pandemic in the United States and found mortality during the 1918 Flu to be associated with relative decreases in employment rates and firm productivity.

At the individual level, previous studies have documented the effects of pandemic viral outbreaks on individuals' nonwork stress and quality of life (e.g., Fung and Carstensen, 2006). The negative effects of infectious disease outbreaks on mental health are varied and include feelings of fear, anxiety, sadness, and uncertainty (Cheng and Cheung, 2005; Ren et al., 2020) along with post-traumatic stress symptoms and depression (Perrin et al., 2009). Because innovation is a complex process, the link between job stress and employee innovation is still unclear. Previous studies have found a significantly negative relationship between job stress and innovation (Golparvar et al., 2012; Syed et al., 2020; Wang et al., 2020) while others have found a nonsignificant relationship (Van Dyne et al., 2002; Abbas and Raja, 2015; Bani-Melhem et al., 2018; Teng et al., 2020). To date, there has been limited research on the effects of job stress induced by catastrophic extra-organizational events (i.e., COVID-19) in the work domain (for an exception, see Hochwarter et al., 2008). Importantly, to our knowledge, no studies have assessed the impact of

stress caused by catastrophic extra-organizational events on employee innovation.

This gap is in urgent need of attention, as the stressful experiences of employees have been shown to impair R&D effectiveness (Lee and Sukoco, 2011). Indeed, on the one hand, feelings of fear, pressure, and uncertainty might lead employees to experience crises and anxiety, which could inhibit their capacities to function effectively (Akgun et al., 2006). Yet, on the other hand, exposure to traumatic experiences can unleash individuals' capacities to enact positive change in response to stressful situations and thereby effectively realize work outcomes (e.g., Runco, 1999; Tedeschi and Calhoun, 2004). In a similar vein, acute stress reactions, such as those induced by catastrophic events, have been associated with performance deficits in cognitively complex tasks (Regehr and LeBlanc, 2017), namely, tasks that are characteristic of R&D activities (Cassiman and Veugelers, 2006). These findings have critical implications for the management of R&D activities in the face of future catastrophic events. Indeed, the COVID-19 crisis has already been estimated to have reduced organizational ability to sustain R&D and innovation activities in the future (Roper and Turner, 2020). However, such activities represent a critical driver of recovery post-COVID-19 (Roper and Turner, 2020) and a key resource enabling organizations and societies to survive and thrive in the face of crises (Cincera et al., 2012; Rhaïem and Amara, 2019). Because new or evolved pandemic-related crises cannot be excluded from consideration in the years to come (Scudellari, 2020), the working population will remain exposed to the risk of possible acute stress. Thus, and in light of the potentially slack external support for future R&D activities, further research efforts are needed to detect those inner individual resources (i.e., knowledge-sharing behaviors) on which R&D employees can promptly access and exploit to boost their innovative performance in the face of acute stress reactions and, thereby, help organizations and the broader society successfully overcome such challenges.

In order to clarify the stress-innovation relationship during a pandemic, this study addresses the following question: *how can employee innovation be enhanced in response to COVID-19-induced job stress?* Previous studies have noted the importance of knowledge-sharing behavior as a way to cope with difficult business conditions (e.g., Connelly and Zweig, 2015). Moreover, knowledge-sharing activities have been theoretically and empirically recognized as a key driver of innovation at work (e.g., Tranfield et al., 2003; Yu et al., 2013; Radaelli et al., 2014; Kim and Park, 2015) and have

been found to enhance R&D effectiveness (e.g., Yu and Lee, 2017; Chang et al., 2019). Despite these encouraging findings, evidence for the role of knowledge sharing in enabling employee innovation in response to stress induced by a pandemic is lacking. Drawing from the transactional theory of stress (Lazarus and Folkman, 1984), the present study identifies knowledge sharing as a key active coping behavior that can shape the effects of COVID-19-induced job stress on employee innovation. We posit that employees experiencing COVID-19-induced job stress are more likely to enhance their innovative performance when they engage in extensive knowledge-sharing behaviors. Conversely, COVID-19-induced stress experiences lead to limited innovative behaviors when employees do not share knowledge in their work. By testing this hypothesis, the present study advances currently limited understanding of the factors that help enhance employee innovation in response to stress provoked by the spread of extra-organizational distressing events and helps clarify prior inconsistent findings regarding the relationship between job stress and employee innovation.

2. Theory and hypothesis development

Job stress refers to the experience of a person who is required to deviate from normal or self-desired functioning in the workplace as a result of constraints (Parker and DeCotiis, 1983). Research on the relationship between job stress – stress not induced by catastrophic events – and employee innovation has provided mixed results. A number of empirical studies have found support for the negative impact of job stress on employee innovation (Golparvar et al., 2012; Syed et al., 2020; Wang et al., 2020). However, several others have observed that, contrary to theoretical predictions, job stress has a nonsignificant impact on employee innovation (Van Dyne et al., 2002; Abbas and Raja, 2015; Bani-Melhem et al., 2018; Teng et al., 2020). Moreover, this stream of literature has not considered the effects of job stress induced by extra-organizational events (i.e., COVID-19) on employees' innovative behaviors, which is surprising given that this type of stress leads to acute or chronic forms of tension that elicit unfavorable reactions (Hendrix et al., 1994; Byron and Peterson, 2002). Unlike ordinary stressful conditions, acute stressors extending beyond organizational boundaries are connected to a specific event (Kleber and van der Velden, 1996). A pandemic outbreak represents such an acute extra-organizational stressful event since it involves a violent encounter with nature (Norris, 1992).

Due to their traumatic nature, pandemic outbreaks such as COVID-19 (Di Giuseppe et al., 2020) are likely to engender feelings of anger, depression, and anxiety in the workplace (Lane and Hobfoll, 1992), which can hamper employees' innovative capacity (Montani et al., 2018). However, the tension and disequilibrium caused by exposure to crisis events can lead to creative adaptation, disrupt conventional patterns of thinking, and facilitate the discovery of new opportunities and perspectives (Runco, 1999; Tedeschi and Calhoun, 2004; Damian, 2017), thereby setting fertile ground for the development and realization of innovative ideas (Moenkemeyer et al., 2012; Orkibi and Ram-Vlasov, 2019). Due to the ambiguous impact of COVID-19-induced job stress, research identifying factors that can shape the effects of tension is needed to positively contribute to research and practice on job stress and employee innovation.

In this study, we build on the transactional theory of stress (Lazarus and Folkman, 1984) to hypothesize that knowledge sharing acts as a key coping behavior that can help employees face stress related to COVID-19 and thereby enhance their innovation. The transactional theory of stress suggests that when a situation, such as a catastrophic event, is appraised as stressful, the relationship between the stressful experience and work outcomes depends on the coping strategies that employees can adopt (Lazarus and Folkman, 1987). According to this framework, active coping behaviors can lead employees to enact effective change-oriented proactive efforts that facilitate the accomplishment of work outcomes (Lazarus and Folkman, 1984, 1987; Folkman, 2011; Biggs et al., 2017). Given that successful innovation inherently implies conspicuous investment in proactive endeavors (Potočník and Anderson, 2016), active coping is deemed particularly salient in spurring proactive innovative actions in response to stress induced by COVID-19.

Knowledge sharing is defined as the provision of task-related information and knowledge to benefit others (Wang and Noe, 2010). Extensive theoretical and empirical evidence has been provided for the benefits of knowledge sharing for innovation at work. For example, at the theoretical level, Tranfield et al. (2003) developed a process model of knowledge sharing, whereby this activity was conceptualized as entailing multiple routines that underlie effective innovation in organizations. At the empirical level, Radaelli et al. (2014) and Kim and Park (2017) hypothesized and showed that employees who share knowledge are more likely to be involved in the development and application of new and useful ideas. Moreover, knowledge transfer – a broader process that

encompasses knowledge sharing (Tangaraja et al., 2016) – was meta-analytically shown to enhance organizational innovativeness (Van Wijk et al., 2008).

Knowledge sharing has also been shown to enhance individual and group performance and innovation in R&D contexts. For example, at the individual level, Yu and Lee (2017) found that R&D personnel's knowledge sharing was positively related to job performance, while Chang et al. (2019) showed that knowledge sharing positively mediated the relationship between participative leadership and R&D employee exploratory innovation. At the group level, Liu et al. (2011) provided evidence for a positive relationship between team knowledge-sharing intention and team performance in R&D project teams, while Cheung et al. (2016) found that knowledge sharing positively predicted R&D team innovation and mediated the negative effect of functional diversity on such innovation.

Knowledge sharing is recognized as a type of active coping behavior that occurs when individuals provide knowledge to other people in organizations to help solve problems and improve work outcomes (Cummings, 2004; Connelly and Zweig, 2015; McCarthy et al., 2019). Accordingly, we contend that knowledge sharing may serve as an effective coping behavior from which employees can effectively handle stress induced by the pandemic and in this way improve their innovative performance. Specifically, when stressed, individuals who share knowledge can elaborate on and recombine information related to the stressful pandemic-related conditions in a clear and relevant form (Davenport and Prusak, 1998; Szulanski, 2002; Hansen et al., 2005). This allows them to more fully reflect on the acute stressful situation and on its potential fit with existing practices, facilitating the detection of opportunities for change (Radaelli et al., 2014). As a result, stressed employees can flexibly explore alternative cognitive pathways that facilitate the conception of creative solutions to problems associated with COVID-19-induced stressful experience (Zhang and Bartol, 2010). Likewise, they will more readily identify and act on potential COVID-19-related obstacles and barriers to innovation, thus, improving their chances of successfully promoting and implementing their creative ideas (Montani et al., 2014).

Conversely, when stressed employees do not share knowledge in their work environments, they miss opportunities to reflect extensively on the stressful condition induced by the COVID-19 pandemic. Consequently, they might have a narrower view of the situation, which limits their capacity to recognize and act on potential opportunities for change that the stressful condition may offer. As a result, they

will be less likely to create and realize innovative ideas in response to their acute stressful experiences. This line of reasoning leads us to hypothesize that high (vs low) levels of knowledge-sharing behavior improve (vs decrease) employees' innovative performance in response to stress induced by COVID-19. Accordingly, we posit the following hypothesis:

Hypothesis 1 Knowledge sharing will moderate the relationship between COVID-19-induced job stress and employee innovation. Specifically, COVID-19-induced job stress will be negatively related to employee innovation when coupled with low levels of knowledge sharing and will be positively related to employee innovation when coupled with high levels of knowledge sharing.

3. Methodology

3.1. Sample and procedure

Data were collected from R&D employees working in various UK and US technology-based firms through an online crowdsourcing research platform, Prolific Academic. This platform enables researchers to recruit participants for applied and experimental research projects from a large and varied workforce. Studies have shown that the reliability and diversity of data collected via online platforms are comparable to those of data those obtained through traditional approaches (e.g., Cheung et al., 2017; Walter et al., 2019). Furthermore, research has shown that Prolific Academic users tend to report a higher level of unfamiliarity with commonly used research materials, as well as to provide more truthful responses, than users of alternative, popular online platforms, such as Mechanical Turk or CrowdFlower (Peer et al., 2017). Respondents were paid £1.46 upon completion of the online survey questionnaire. We adopted the recommended procedures for quality checks (Mason and Suri, 2012; Porter et al., 2019), including the use of attention checks (i.e., a basic arithmetic question), limiting participation to individuals who were employed, and setting upper and lower limits on the survey completion times, rejecting responses that exceeded those limits. The survey was conducted on April 2020, that is when the COVID-19 pandemic was spreading in the surveyed countries. The recruited participants consisted of 61 full-time R&D employees from the computer and technology and the R&D service sectors. All the employees who were contacted provided complete responses, and none of them failed

the attention check. Respondents were 40.44 years old on average ($SD = 10.02$), 63.90% of them were male, and 79.60% had attained an undergraduate degree or higher. Additionally, the surveyed participants reported an average organizational tenure of 7.80 years ($SD = 6.07$), and 55.70% of them worked in enterprises with fewer than 300 employees.

3.2. Measures

3.2.1. Employee innovation

Innovative behavior was measured using Janssen's (2000) 9-item scale, which assesses how often employees report that they are involved in the generation, promotion, and realization of new ideas in the workplace. Responses were assessed on a 5-point scale ranging from 1 (never) to 5 (always). A sample item is 'I participate in generating original solutions for problems' ($\alpha = 0.92$).

3.2.2. COVID-19-induced stress

Since a measure of COVID-19-induced job stress did not exist at the time this study was conducted, we adapted the 6-item scale developed by Hochwarter et al. (2008) that had been used to measure job stress induced by a hurricane (i.e., an acute extra-organizational stressful event similar to an infectious disease outbreak). Specifically, the adaptation was made by replacing the word 'hurricane' with the word 'COVID-19 pandemic'. Responses were rated on a scale ranging from 1 (totally disagree) to 5 (totally agree). A sample item is 'The COVID-19 pandemic has made things more stressful at work' ($\alpha = 0.81$).

3.2.3. Knowledge sharing

We measured knowledge sharing with Bock et al.'s (2005) 5-item scale, which captures how often employees report that they engage in knowledge-sharing behaviors. Each item was assessed on a scale ranging from 1 (never) to 5 (always). A sample item is 'I share my experience or know-how from work with my coworkers' ($\alpha = 0.89$).

3.2.4. Control variables

Following prior innovation research, we controlled for several sets of variables. We controlled for age and organizational tenure since these factors reflect the personal knowledge, expertise, and domain-relevant skills that are beneficial for innovation-related behaviors (Amabile, 1983). Moreover, to rule out organizational and national heterogeneity, we controlled for organization size (1 = less than 300 employees, 2 = 300 to 1,000 employees, 3 = more than 10,000 employees), industry sector (1 = computer and technology, 2 = R&D services),

and country (1 = United Kingdom, 2 = United States). Because the respondents had different hierarchical levels within their organizations, we likewise controlled for the effects of their respective positions (1 = technician, 2 = employee, 3 = supervisor, 4 = manager). We also controlled for creative self-efficacy (three items, $\alpha = 85$; Tierney and Farmer, 2002), task interdependence (three items, $\alpha = 75$; Campion et al., 1993), and knowledge hiding (four items, $\alpha = 82$; Rhee and Choi, 2017), as these factors have been shown to be key determinants of employee innovation (Staples and Webster, 2008; Hammond et al., 2011; Černe, et al., 2017). Finally, we controlled for the extent to which the respondents telework (1 = not at all, 2 = less than once a week, 3 = once per week, 4 = twice per week, 5 = 3 days per week, 6 = 4 days per week, 7 = 5 days per week) because this type of work arrangement was extensively adopted by organizations during the time of COVID-19, and the effects of teleworking on employee innovation-related performance are documented by prior research (e.g., Vega et al., 2015).

4. Results

Table 1 reports the descriptive statistics and correlations of all the variables.

Hypothesis 1 suggests that knowledge sharing will moderate the relationship between COVID-19-induced job stress and employee innovation. This hypothesis was tested using multiple regression analyses. Following Cohen (1988), statistical power analysis suggests that for a multiple regression study involving 13 predictors of employee innovation (i.e., 10 control variables, COVID-19-induced job stress, knowledge sharing, and the COVID-19-induced job stress X knowledge-sharing interaction term), the minimum required sample size would be $N = 57$ to have 80% power to detect an effect size (F^2) of 0.40. In the present investigation, the sample size ($N = 61$) was larger than the minimum required size. Accordingly, despite the limitations associated with the absolute low sample size, our study had sufficient statistical power to test the regression models.

Following Aiken and West (1991), COVID-19-induced job stress and knowledge sharing, as continuous variables, were mean-centered before entering them into the regression models to prevent multicollinearity problems. Moreover, in line with Cohen and Cohen's (1983) recommendations, the control variables were entered at Step 1, COVID-19-induced job stress and knowledge sharing were

Table 1. Descriptive statistics and correlations

Variables	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Country	-	-	-												
2. Industry sector	-	-	-0.08	-											
3. Organization size	-	-	-0.00	0.10	-										
4. Age	40.44	10.02	0.23	-0.10	0.08	-									
5. Organizational tenure	7.80	6.07	0.10	0.05	-0.05	0.37**	-								
6. Hierarchical position	-	-	0.21	0.34**	0.13	-0.13	0.27*	-							
7. Telework	6.34	1.62	0.17	-0.12	0.06	-0.13	-0.21	0.15	-						
8. Creative self-efficacy	3.97	0.74	-0.17	-0.07	-0.13	0.06	0.09	0.12	0.04	(0.85)					
9. Task interdependence	3.66	0.84	-0.01	0.09	0.07	0.20	0.08	0.28*	-0.06	0.19	(0.75)				
10. Knowledge hiding	1.79	0.90	-0.02	0.30*	-0.00	-0.19	-0.14	0.22	0.00	-0.01	0.21	(0.82)			
11. COVID-19-induced job stress	3.32	0.88	0.13	0.32*	0.08	-0.00	0.17	0.45**	-0.09	0.31**	0.36**	0.35**	(0.81)		
12. Knowledge sharing	4.15	0.80	-0.20	0.15	0.10	0.10	0.20	0.21	0.05	0.45**	0.27*	-0.14	0.22	(0.89)	
13. Employee innovation	3.64	0.74	-0.16	-0.03	-0.08	0.08	0.02	0.15	0.04	0.78**	0.30*	-0.01	0.29**	0.56**	(0.92)

N = 61 groups. Internal consistency coefficients (Cronbach's alphas) are reported in parentheses along the diagonal.

*P < 0.05, **P < 0.01.

Table 2. Multiple regression results: employee innovation, COVID-19-induced job stress, and knowledge sharing

Variable/Model	Dependent variable: employee innovation		Dependent variable: employee innovation		Dependent variable: employee innovation	
	Model 1		Model 2		Model 3	
	Estimate	SE	Estimate	SE	Estimate	SE
Step 1						
Country	-0.13	0.20	-0.04	0.19	-0.23	0.19
Industry sector	0.00	0.15	-0.08	0.15	-0.15	0.14
Organization size	-0.02	0.08	-0.04	0.07	-0.03	0.07
Age	0.00	0.01	0.00	0.01	0.01	0.01
Organizational tenure	-0.01	0.01	-0.02	0.01	-0.02	0.01
Hierarchical position	0.07	0.08	0.05	0.08	0.08	0.07
Telework	0.00	0.04	-0.01	0.04	-0.01	0.04
Creative self-efficacy	0.74**	0.09	0.63**	0.10	0.62**	0.09
Task interdependence	0.12	0.08	0.07	0.08	0.06	0.08
Knowledge hiding	-0.05	0.08	0.00	0.08	0.03	0.07
Step 2						
COVID-19-induced job stress (CIJS)			0.01	0.09	0.00	0.08
Knowledge sharing			0.25*	0.09	0.44**	0.11
Step 3						
CIJS X Knowledge sharing					0.32*	0.11
Adjusted R^2	0.59**		0.63**		0.67**	
ΔR^2			0.04*		0.04*	

$N = 61$. Estimates are unstandardized regression coefficients.
* $P < 0.05$, ** $P < 0.01$.

entered at Step 2, and the interaction term between COVID-19-induced job stress and knowledge sharing was introduced at Step 3. As shown in Table 2, COVID-19-induced job stress significantly interacted with knowledge sharing to affect employee innovation ($B = 0.32$, $P < 0.05$, Model 3). This interaction is graphically depicted in Figure 1. To interpret the nature of this interaction, we performed a simple slope test, as recommended by Aiken and West (1991). As hypothesized, the relationship between COVID-19-induced job stress and employee innovation was significantly negative in the case of low knowledge sharing ($B = -0.27$, $P < 0.05$) but became significantly positive in the case of high knowledge sharing ($B = 0.23$, $P < 0.05$). Thus, these results support Hypothesis 1.

5. Discussion

Job stress induced by highly taxing extra-organizational events such as pandemics can be harmful to the functioning of employees in the workplace, and can also serve as input for effective innovations

that help them thrive during a pandemic. However, the effects of this job stress on work-related behaviors have been neglected by prior studies. The present research addresses this issue by making a first empirical attempt to reveal boundary conditions associated with the effects of job stress induced by the spread of the COVID-19 pandemic on employee innovation – that is, as a necessary resource to determine the effectiveness of employees and their work units. Consistent with our hypothesis, our results show that knowledge sharing played a key moderating role in the relationship between COVID-19-induced job stress and employee innovation such that this type of job-related tension harmed employee innovation only among employees not engaged in knowledge-sharing behaviors. Conversely, those frequently engaged in individual knowledge sharing in the workplace reported being able to enhance their innovative potential in the face of COVID-19-induced stress.

These findings have relevant implications for theory, research, and practice. First, our study takes an important step forward in addressing prior inconsistent findings regarding the relationship between job

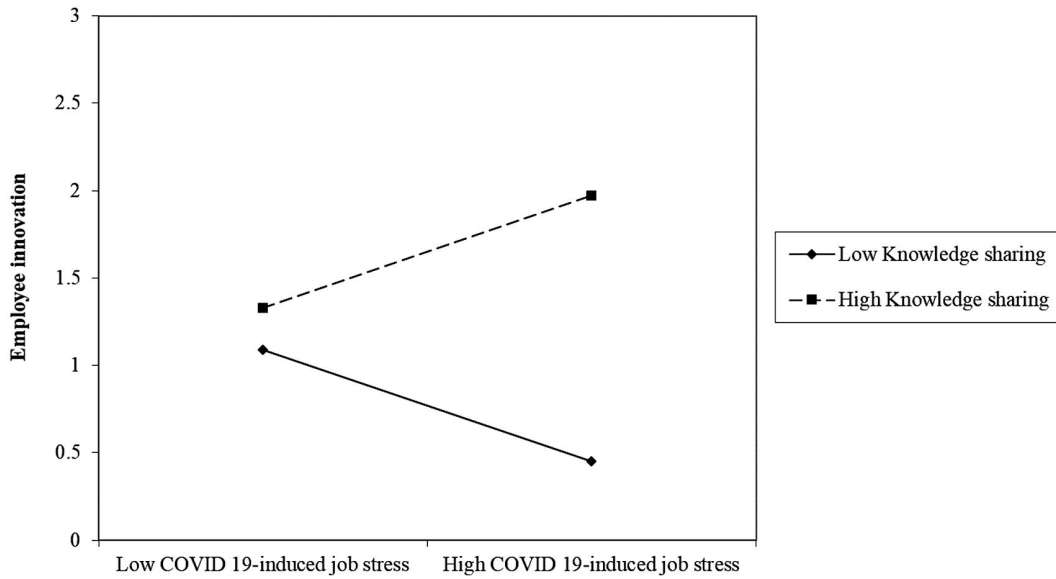


Figure 1. Moderating effect of knowledge sharing on the relationship between COVID-19-induced job stress and employee innovation.

stress – stress not related to acute extra-organizational event – and innovation-related work behaviors. Our results show that while COVID-19-induced job stress alone was unrelated to employee innovation, its interaction with knowledge sharing was significantly related to individual engagement in innovative behaviors such that these behaviors increased in response to this form of job tension when knowledge sharing was high (vs low). Thus, knowledge sharing was found to be a key enabler of employee innovativeness against COVID-19 stress reactions. When knowledge sharing was low, job stress was negatively related to employee innovation, but when knowledge sharing was high, the relationship between stress and innovation became significantly positive. These findings are in line with a few studies highlighting the importance of protective factors – for example, personal characteristics (Montani et al., 2018) and social relationships (Van Dyne et al., 2002) – for preserving employee’s innovative potential against the potentially impairing effects of job-related tensions.

However, our study provides a unique ‘portrait’ of which coping behaviors employees adopt to *positively* shape their responses to stressful aspects specific of the COVID-19 catastrophic event. In this regard, contrary to the previous stream of research highlighting the attenuating role of boundary conditions in stress-outcome relationships, our study for the first time documents knowledge sharing as a relevant boundary condition that, by helping employees face stress induced by the COVID-19 pandemic, improves their innovative performance. In doing so, the present investigation contributes to the extant theory and research on the positive and negative effects

of knowledge sharing, which have neglected how varying levels of knowledge sharing can be beneficial or detrimental for innovation under the stressful conditions brought about by catastrophic events. Our findings extend this research stream by suggesting that knowledge sharing, although it represents a resource-consuming and, thereby, potentially stressful activity in and of itself (Haas and Hansen, 2007; Wang and Noe, 2010), can nonetheless offset the impairing effects caused by acute stress reactions and increase employee engagement in innovative behaviors. The present investigation thus contributes to the present debate on the advantages and disadvantages of knowledge sharing in the workplace (Mahnke et al., 2009; Ahmad and Karim, 2019) by providing evidence of its positive effect on the innovative performance of employees exposed to stress induced by the pandemic outbreak. By shedding light on the beneficial effects of knowledge sharing for innovation under acute stress, our investigation may hence serve as input for future research aimed at elucidating whether and how knowledge-sharing behaviors will help employees innovate in response to the job stress induced by ordinary stressful work conditions, such as workload, role conflict, and role ambiguity.

Our study also advances currently limited understanding of the consequences and boundaries of job stress induced by catastrophic extra-organizational events. Prior to this study, only Hochwarter et al. (2008) had addressed this issue by examining the moderating role of perceived general resources (including intraindividual, social, and material resources) in the relationships between hurricane-induced job stress and both employee job tension and job satisfaction.

Our results take a step forward by identifying a specific type of resource – that is, knowledge-sharing behavior – that can spur employee innovation against the impairing effect of COVID-19-induced job stress and by for the first time identifying individual innovation as a relevant work-related outcome that can be seriously affected by tensions caused by extra-organizational events.

Moreover, by providing evidence for the significant moderating role of knowledge sharing in the relationship between COVID-19-induced job stress and employee innovation, our study extends current research on the role of knowledge sharing in the workplace. Prior to this investigation, research had primarily examined the direct or indirect effect of knowledge sharing on innovation-related behaviors (e.g., Radaelli et al., 2014; Rhee and Choi, 2017). Our study departs from this previous stream of literature to demonstrate for the first time that employee knowledge-sharing behavior acts as a key boundary condition that shapes the effects of COVID-19-induced stress on employee innovation. In doing so, our study reveals a relevant, yet, overlooked function of knowledge sharing as a resource enhancing the innovative potential of R&D in response to job-related stress experiences induced by a pandemic outbreak. These findings thus serve as important input for future research further examining the moderating effect of knowledge sharing on relationships between other types of job-related tensions (e.g., emotional exhaustion and post-traumatic stress symptoms) and different work outcomes (i.e., in- and extra-role performance and proactive behavior).

Finally, our results extend prior research on crisis management suggesting that crises, due to their occasional and unexpected nature, may lead to erroneous interpretations of crises and to cognitive rigidity, which hamper innovative thinking (Amabile et al., 1996; Lampel et al., 2009; Bundy et al., 2017). In contrast, our study provides an alternative perspective showing that the impact of crisis-induced stress on employee innovative performance is not unequivocally negative, but rather can become positive when stressed employees engage in knowledge-sharing behaviors.

Our findings are relevant from a practical standpoint, as they inform organizations and employees on specific, practical solutions that can be implemented during a pandemic to successfully cope with the stress induced by such extra-organizational events and thereby improve innovative performance. Specifically, given the potentially ‘toxic’ impact that COVID-19-induced stress can have on employees’ innovative performance, our study highlights the relevance of regularly monitoring such stress levels

among employees involved in intense R&D innovative activities to identify any deviations from normal work-related functioning that may be induced by the pandemic outbreak. Likewise, our findings suggest that to help employees effectively manage the COVID-19 crisis and specifically enhance their innovative performance in response to related stressful experiences, organizations should create fertile conditions for the exchange of information and knowledge among employees. To accomplish this, organizations can rely on information and communication technologies, as they allow for an efficient and straightforward exchange of knowledge while minimizing risks of additional costs to employees such as increased workloads or lower-quality interpersonal relationships (Radaelli et al., 2014).

Considering the possible spread of pandemic events and the related acute stress reactions at work in the future, innovation management practices should be adapted to equip employees who are intensively involved in innovative job tasks (e.g., R&D employees) with the necessary resources to successfully innovate, even under acute stressful conditions. In this respect, by providing evidence of the innovation-supportive effect of knowledge sharing, our results suggest that the current innovation management routines can be supplemented by a knowledge management approach focused on networking development, participation, and the interindividual transfer of applicable knowledge among employees involved in innovative activities. This approach, which can imply the regular introduction of effective knowledge-sharing activities, such as informal communication, monitoring and coaching, and brainstorming sessions (Kianto et al., 2016), can be integrated into the current innovation management tasks involving the conception and planning of creative ideas in the workplace to optimize the chances of successfully actuating innovative projects in the face of acute stressful experiences.

Our results should, however, be interpreted in light of the following limitations. First, this study relies on self-reported data, which can lead to common method bias problems. Future research should thus consider the combined use of self- and other-reported measures to replicate the current results with a minimized risk of method bias. However, in the case of employee innovation, the use of other ratings might not be ideal. Indeed, employees have more information than other colleagues do about the background of their work activities (Janssen, 2000) and on the degree to which they are involved in innovation-related behaviors such as idea exploration and conceptualization (Shalley et al., 2009). Moreover, studies have also shown

that self-reported ratings of employee innovation are consistent with other types of ratings (e.g., Janssen, 2000). Thus, the use of self-ratings to examine employee innovation was justifiable in the present study.

Second, the cross-sectional nature of the present research design precludes considerations of causal relationships between the studied variables. The adoption of a full-longitudinal research design is thus warranted for future research to draw more accurate inferences about the (moderated) causal effects of COVID-19-induced job stress on employee innovation. Third, our study was conducted on a small sample, thereby limiting the generalizability of our conclusions. Future research is thus necessary to replicate the current results using larger samples of R&D employees from a varied range of industries to improve the external validity of our findings. Finally, our exclusive reliance on online panel participants did not allow access specific populations (e.g., Fortune 100 executives) that are generally unlikely to participate in online panel surveys (Porter et al., 2019). Accordingly, future studies should adopt traditional field surveys to examine our hypothesized framework among diversified populations not reachable via such online panel surveys.

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Note

¹The Economist, April 11, 2020, p. 13.

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