

Racing Against the Clock: The Dual Effect of Time Pressure on Creativity

Yixin Wang^{1, #}, Bingqian Liang^{1, *, #}, Weiwei Huo¹ and Xiaoyu Zhang¹

¹SILC Business School, Shanghai University, 99 Shangda Road 200444, Shanghai, China

*Corresponding author email: liangbingqian003@shu.edu.cn.

Yixin Wang and Bingqian Liang contributed equally to this article.

Abstract: Employees are increasingly required to produce creative output within limited time in the competitive business environment and facing time pressure has become a pervasive phenomenon in the workplace. Based on Conservation of Resource Theory and Job Demand-Resource model, this study explores the different effects of challenge-hindrance time pressure on employee radical and incremental creativity and the mediating role of thriving at work as well as the moderating role of the perceived organizational support. According to the data of 315 employees, the result showed that the challenge time pressure has a positive effect on employees' creativity by thriving at work. Moreover, the effect on radical creativity is more significant. The hindrance time pressure has a negative effect on employees' creativity by thriving at work, and the effect on incremental creativity is less significant. In addition, perceived organizational support moderates the relationship between challenge-hindrance time pressure and thriving at work. Implications of our findings are discussed.

Keywords: Challenge-hindrance time pressure; thriving at work; radical creativity; incremental creativity; perceived organizational support.

1. Introduction

Driven by technology transformation, enterprises are confronted with an external market environment characterized by rapid innovation iterations and fluctuating demands, leading to intensified competition among enterprises [1-3]. Employees are the primary participants in innovation activities, which has become crucial for enterprises to achieve market success and attain sustainable development goals [4-5] and their creativity serve as a crucial driving force for organizational innovation [6-8]. Research indicates that employee creativity can be categorized into radical creativity and incremental creativity based on the degree of innovation [9-10]. Radical creativity, being more novel, generates ideas that are fundamentally different from existing practices and solutions. Incremental creativity, on the other hand, focuses on refining existing processes and emphasizes short-term benefits and returns [10-11]. Given the fast-paced and highly competitive business environment, where many employees are expected to deliver creative output within limited time, time pressure has become a pervasive phenomenon in the workplace [12-13]. Consequently, the impact of time pressure on employee creativity has emerged as a focal concern for managers and researchers [14-15].

Despite current research on the impact of time pressure on creativity has garnered significant attention, existing studies on the relationship between time pressure and employee creativity present conflicting perspectives. On one hand, some scholars argue that when individuals experience a scarcity of time, their cognitive functions are impaired, hindering creativity [16-17]. On the other hand, time pressure has been found to have positive effects, enhancing motivation and the ability to creatively solve problems, thus positively influencing creativity [18-20]. Furthermore, some researchers have posited an inverted U-shaped relationship between time pressure and creativity, suggesting that moderate time

pressure stimulates creativity [14] [21-22]. This inverted U-shaped relationship between time pressure and innovative behavior provides an explanatory perspective for the existing debate. However, the discussion on time pressure has largely remained confined to a perspective of degree, viewing time pressure as a unidimensional construct and neglecting precise multidimensional distinctions based on the nature of time pressure [8]. Challenging factors such as work importance and complexity, which stimulate motivation for learning and achievement, can lead to time pressure. While hindering factors like poor work scheduling, unexpected events, and work conflicts can also inhibit initiative behaviors and result in time pressure [23]. Similarly, an increasing body of literature advocates for a multidimensional distinction of creativity, specifically differentiating between radical creativity and incremental creativity [10] [24]. Therefore, exploring the impact of time pressure on creativity, moving beyond a unidimensional perspective and conducting multidimensional research on both time pressure and creativity may partially explain previous inconsistent findings.

Our research draws upon the study by Chong et al. (2011) [23], differentiate between challenge time pressure and hindrance time pressure based on the nature of time pressure, and propose that time pressure induced by different factors may have diverse effects on employee creativity. Additionally, we respond to previous scholars' calls for a multi-dimensional distinction of creativity (i.e., radical creativity and incremental creativity) [10] [24]. By introducing a nuanced, multidimensional categorization of both time pressure and creativity, this study attempts to provide a plausible explanation for the existing debates surrounding the relationship between time pressure and creativity. Furthermore, grounded in the Conservation of Resources (COR) theory, we posit that time is a scarce resource in employees' work processes, and its scarcity will influence employee cognition and emotion [25-26]. Consequently, we introduce thriving at work, defined as a psychological state in

which employees simultaneously experience learning and vitality, as a mediating variable to examine the mechanisms through which challenge and hindrance time pressures affect creativity. Based on COR Theory, we propose that challenge time pressure positively affects radical and incremental creativity through thriving at work and hindrance time pressure negatively affects radical and incremental creativity through thriving at work. Moreover, drawing from the Job Demands-Resources (JD-R) model, this study conceptualizes time pressure as a critical demand in the work environment, while perceived organizational support is viewed as a crucial resource [27], further investigating the boundary conditions under which challenge and hindrance time pressures exert their influences.

Our research makes several contributions. First, previous studies primarily focused on the degree of time pressure [18-20], neglecting the diverse causes of time pressure in actual work, which may lead to inconsistent findings of the relationship between time pressure and creativity. Thus, this study explores the effects of different types of time pressure from the perspective of its nature based on Chong et al.'s (2011) [23] research, aiming to further clarify the existing controversies in the literature and enhance the overall understanding of time pressure. Second, we divide creativity into radical and incremental creativity in response to the call for exploring a multidimensional distinction of creativity [10] [24]. Moving beyond a uni-dimensional perspective and conducting multidimensional research on both time pressure and creativity, our study partially explains previous inconsistent findings and expands the studies on time pressure and creativity. Third, we introduce thriving at work and perceived organizational support to offer a theoretical framework for explaining how and when challenge-hindrance time pressure influences radical and incremental creativity.

2. Literature Review

2.1. Challenge-Hindrance Time Pressure and Creativity

Time pressure refers to the tension experienced by employees when they are unable to complete tasks within the deadlines set by the organization [8] [28]. Previous scholars viewed time pressure as a negative stressor, positing that it adversely affects employees' emotions and cognitive functions [17] [29]. However, subsequent research has indicated that time pressure can also exert positive effects, indicating that time pressure can enhance work motivation and performance [19] [30], and promote thriving at work [31]. The controversy surrounding the effects of time pressure may stem from the oversight of distinguishing based on the nature of time pressure. Chong et al. (2012) [32] adopting the challenge-hindrance stressor framework [33], categorize time pressure into challenge time pressure and hindrance time pressure. Challenge time pressure originates from positive aspects of work, such as its importance and complexity, encouraging employees to invest resources in learning and innovation to cope with the pressure. In contrast, hindrance time pressure arises from negative factors, such as work task conflicts and improper work scheduling, making it difficult for employees to cope. The primary distinction between challenge and hindrance time pressure lies in employees perceiving challenge time pressure as a motivating factor that facilitates goal achievement, often exhibiting a stronger willingness to overcome time pressure. Conversely,

employees view hindrance time pressure as an obstacle to goal attainment, typically adopting a negative attitude to avoid tasks [8].

Conservation of Resource (COR) theory posits that individuals strive to conserve, protect, and acquire resources [26]. Moreover, individuals experience stress and pressure when perceiving a threat to their resources or a loss of their existing resources and prefer to protect current resources. However, when existing resources can be exchanged for new resources to avoid losses, individuals are likely to invest current resources to cope [34]. Challenge time pressure elevates employees' arousal and motivation levels, thereby helping them maintain a positive psychological state. Employees often view overcoming challenge time pressure as an opportunity to enhance their abilities and promote personal growth [8]. Under challenge time pressure, employees have a strong motivation to resolve problems and will fully utilize existing resources, helping them achieve a "gain spiral" to acquire more resources [26] [34]. For instance, they may rapidly gather work-related knowledge and information to complete tasks on time. In the process of acquiring knowledge and information, they are more likely to generate creative ideas [35]. Furthermore, challenge time pressure typically stems from task complexity and importance, which helps stimulate employees' intrinsic motivation [8]. Compared to incremental creativity, radical creativity involves greater uncertainty and risk and generally requires stronger intrinsic motivation [36]. Therefore, when faced with challenge time pressure, employees are more inclined to engage in radical innovation rather than merely making small adjustments to their work.

In the contrast, under hindrance time pressure, employees face numerous unreasonable task arrangements that are difficult to overcome, leading to a sense of continuous resource depletion. According to COR theory, when experiencing resource depletion, employees tend to adopt negative or avoidance behaviors to cope with work to prevent further resource loss [34] [37]. Additionally, hindrance time pressure weakens intrinsic motivation and reduces their proactivity [8]. In such situations, employees decrease their willingness to learn on the job, making it difficult to acquire new knowledge and generate creative ideas. Engaging in radical innovation typically involves greater risk and requires more resources [36]. In the context of hindrance time pressure, employees' intrinsic motivation is weakened, and the ongoing depletion of resources significantly impacts their radical creativity. In contrast, incremental creativity focuses on small, procedural improvements, carries lower risk, and provides short-term external rewards that can help offset resource loss. Therefore, compared to radical creativity, hindrance time pressure has a lesser negative impact on incremental creativity. Consequently, we propose the following hypotheses:

H1: Challenge time pressure has a positive effect on both radical and incremental creativity, with the positive effect on radical creativity being greater.

H2: Hindrance time pressure has a negative effect on both radical and incremental creativity, with the negative effect on radical creativity being greater.

2.2. The mediating role of thriving at work

Thriving at work is a psychological state in which employees simultaneously experience learning and vitality. The vitality dimension refers to employees feeling energized and enthusiastic about their work, while the learning

dimension denotes the acquisition of knowledge and skills, enhanced confidence, and a sense of growth during the work process [38]. Research indicates that when employees are in a state of thriving at work, they experience vitality and growth, providing them with greater motivation to engage in their work and pursue goals and achievements [39]. This state can enhance employee proactivity, improve job performance [40], and promote higher levels of work-related innovation [41].

When facing challenge time pressure, employees believe that acquiring new knowledge and skills can improve work efficiency and expedite task completion, thus successfully coping with pressure. Consequently, while perceiving pressure, they also perceive opportunities for personal growth. Moreover, overcoming challenge pressure provides employees with a sense of achievement, making them more likely to demonstrate higher levels of enthusiasm and effort in their work [42]. Therefore, challenge time pressure positively influences thriving at work. Conversely, under hindrance time pressure, employees perceive more constraints on achieving work goals, significantly diminishing their sense of growth at work. Factors such as poor time management and unreasonable work demands exacerbate feelings of burnout, resulting in reduced vitality during work [23] [42]. When confronted with hindrance time pressure, employees are more likely to feel that their growth is restricted, leading to an increased likelihood of negative emotions. Thus, hindrance time pressure negatively impacts thriving at work.

Vitality and learning are key factors in promoting employee creativity [43] [44]. A positive psychological state filled with vitality has a beneficial effect on employee creativity [29] [45]. Furthermore, learning is the foundation of creativity, as the knowledge and skills acquired by employees enable them to effectively handle current tasks. A sufficient knowledge reserve is essential for generating more creative ideas [41] [45]. Therefore, employees in a thriving state are more likely to acquire new knowledge and have greater energy and passion to leverage their knowledge reserves during work, allowing them to propose and implement creative solutions and improve both radical and incremental creativity. Consequently, we propose the following hypotheses:

H3: Thriving at work mediates the positive relationship between challenge time pressure and creativity (radical creativity H3a; incremental creativity H3b) and mediate the negative relationship between hindrance time pressure and creativity (radical creativity H3c; incremental creativity H3d).

2.3. The moderating role of perceived organizational support

The Job Demands-Resources (JD-R) model posits that all

job characteristics can be categorized as either job demands or job resources [46]. Job demands refer to factors that require individual effort, such as time pressure, while job resources are positive factors obtained from the organization, supervisors, or colleagues that facilitate the achievement of work goals and promote learning and development [31]. Eisenberger et al. (2001) [47] discovered that when employees perceive care and recognition from the organization, they become motivated, leading to the concept of perceived organizational support. Perceived organizational support refers to employees' perception and belief regarding how the organization values their contributions and responds with both material and psychological encouragement [47]. According to the JD-R model, when individuals face high job demands, they require resources to cope with the pressure. Concurrently, the COR theory suggests that individuals with more resources are more resistant to resource loss and are better equipped to gain additional resources and achieve gain spirals [34] [37]. When perceived organizational support is high, employees have ample resources, enabling them to fully engage in work, continuously learn, and acquire new resources. This process enhances employees' sense of growth. Furthermore, high perceived organizational support fosters a strong sense of responsibility [48], which can ignite employees' enthusiasm for their work. Consequently, with high perceived organizational support, employees are likely to experience high levels of thriving at work under challenge time pressure. Conversely, under low perceived organizational support, employees may view hindrance as an excessive workload. Without adequate organizational support, they are more likely to focus on the negative aspects of hindrance time pressure, fearing punishment for not meeting deadlines. This reduces their job security and leads to negative emotions, such as burnout [31]. Moreover, various hindrance factors may obstruct task completion, resulting in lower levels of learning and growth experiences. In contrast, when perceived organizational support is high, employees trust that the organization will provide assistance and support in their work. According to the buffering hypothesis of the JD-R model, high job resources can mitigate the strain caused by job demands. Thus, higher perceived organizational support can alleviate the negative impact of hindrance time pressure on thriving at work.

H4: Perceived organizational support positively moderates the relationship between challenge time pressure and thriving at work.

H5: Perceived organizational support negatively moderates the relationship between hindrance time pressure and thriving at work.

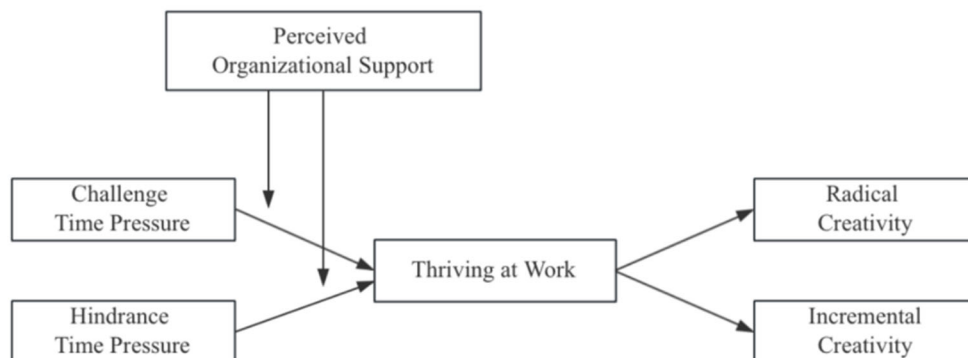


Figure 1. Research model

3. Method

3.1. Sample and data collection

This study was conducted among employees designated by Credamo, which is widely used questionnaire collection platform in China [49]. This study distributed a total of 360 questionnaires, ultimately collecting 316 valid responses, yielding a response rate of 87.78%. The subjects comprised 40.4% males and 59.6% females, mainly aged 26 to 35 (76.8%). In terms of education, 91.1% of the participants had a bachelor's degree or above. In terms of job tenure, 2.5% had less than 1 year of experience, 11.1% had 1-3 years, 35.6% had 4-6 years, 37.1% had 7-10 years, and 13.7% had more than 10 years of experience.

3.2. Measures

All variables except control variables were measured by a five-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The measurements were translated from English to Chinese following back-translation procedures [50]. The adapted scales and their sources can be found in the Appendix.

Challenge-Hindrance Time Pressure. We referred to the time pressure 13 items scale developed by [23], with the first five items measuring challenge time pressure and the Cronbach's alpha was 0.721. The latter eight items assess hindrance time pressure and the Cronbach's alpha was 0.858.

Thriving at Work. We referred to the thriving at work scale developed by [39]. In our study, we use 6 items that have demonstrated good reliability and validity in research to measure thriving at work. The Cronbach's alpha was 0.796.

Radical and incremental creativity. We adapted a six-item scale developed by Madjar et al (2011) [10]. The first three items measure radical creativity and the Cronbach's alpha was 0.858. The last three items measure incremental creativity and the Cronbach's alpha was 0.739.

Perceived Organizational Support. We adapted a six-item scale developed by Eisenberger et al (2001) [47]. The Cronbach's alpha was 0.868.

Control Variables. Based on related research [51-52], this study selected gender, education level, job tenure, and age as control variables.

4. Results

4.1. Analyses

We used CFA procedures to examine whether each variable can represent a distinct construct. Five alternative models (five-factor, four-factor, three-factor, two-factor and one factor) were examined against the benchmark (six-factor) model. The result showed that the six-factor model fitted the data well ($\chi^2 = 813.573$, $df = 412$, $CFI = 0.908$, $IFI = 0.909$, $RMSEA = 0.056$) and was significantly better than the alternative models. As such, we retained the six constructs for our analyses. We further examined common method bias (CMB) using Harman single-factor analysis and found that six factors were extracted. The variance contribution rate of the first factor extracted was below the threshold of 50% (specifically, it was 27%), indicating that the CMB is acceptable [53].

4.2. Descriptive statistics and correlations

Table 1 summarizes descriptive statistics and correlations for the focal variables. The results showed a significant and positive correlation between challenge time pressure and thriving at work ($r = 0.306$, $p < 0.01$), radical creativity ($r = 0.284$, $p < 0.01$), and incremental creativity ($r = 0.291$, $p < 0.01$). Moreover, hindrance time pressure was negatively correlated with thriving at work ($r = -0.256$, $p < 0.01$), radical creativity ($r = -0.253$, $p < 0.01$), and incremental creativity ($r = -0.273$, $p < 0.01$). These results provided support for further analyses.

Table 1. Descriptive statistics and correlations (N=315).

Variable	Mean	SD	1	2	3	4	5	6	7	8	9
1. Gender	1.594	0.492									
2. Education level	3.121	0.545	-0.066								
3. Job tenure	3.483	0.949	-0.022	-0.144*							
4. Age	31.559	5.181	-0.072	-0.003	0.737**						
5. CTP	3.734	0.685	0.058	0.202**	0.073	0.069					
6. HTP	2.798	0.824	0.026	0.136*	0.053	0.088	0.350**				
7. RC	4.247	0.521	0.073	-0.013	0.215**	0.146**	0.284**	-0.253**			
8. IC	3.821	0.808	0.057	0.011	0.094	0.008	0.291**	-0.273**	0.543**		
9. THW	4.104	0.671	0.073	0.024	0.196**	0.155**	0.306**	-0.256**	0.638**	0.624**	
10. POS	4.193	0.606	0.057	-0.037	0.125*	0.088	0.152**	-0.236**	0.598**	0.460**	0.521**

Note: CTP: challenge time pressure; HTP: hindrance time pressure; RI: radical creativity; IC: incremental creativity; THW: thriving at work; POS: perceived organizational support.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

4.3. Hypothesis testing

Linear regression was used to examine the direct effect of challenge-hindrance time pressure on creativity (see Table 2). Specifically, the results from Models 4 and 7 demonstrate that challenge time pressure significantly and positively predicts both radical creativity ($\beta = 0.510$, $p < 0.001$) and incremental creativity ($\beta = 0.423$, $p < 0.001$). However, the regression coefficient for challenge time pressure is larger for radical creativity, indicating a more pronounced effect. Conversely,

hindrance time pressure exhibits significant negative correlations with both radical creativity ($\beta = -0.418$, $p < 0.001$) and incremental creativity ($\beta = -0.345$, $p < 0.001$), with the absolute value of the regression coefficient being larger for radical creativity. These findings provide support for H1 and H2. In Models 5 and 8, thriving at work demonstrates significant positive correlations with radical creativity ($\beta = 0.615$, $p < 0.001$) and incremental creativity ($\beta = 0.639$, $p < 0.001$), providing preliminary support for H3a, H3b, H3c, and H3d.

Table 2. Regression results (N=315).

Variable	Thriving at Work		Radical Creativity			Incremental Creativity		
	M1	M2	M3	M4	M5	M6	M7	M8
Gender	0.083	0.068	0.089	0.065	0.023	0.113	0.093	0.049
Education level	0.025	-0.008	0.063	0.009	0.014	0.070	0.025	0.030
Job tenure	0.131**	0.109**	0.171*	0.135*	0.068	0.136*	0.106*	0.037
Age	-0.002	0.001	-0.021	-0.015	-0.016	0.002	0.007	0.007
CTP		0.311***		0.510***	0.318***		0.423***	0.225***
HTP		-0.258***		-0.418***	-0.259***		-0.345***	-0.181***
THW					0.615***			0.639***
R2	0.053	0.268	0.021	0.259	0.374	0.048	0.284	0.464
ΔR^2		0.215		0.237	0.115		0.236	0.180
F	4.345**	18.823***	1.677	17.900***	26.157***	3.912**	20.400***	37.995***

Note: CTP: challenge time pressure; HTP: hindrance time pressure.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Furthermore, we followed a bootstrapping method based on Model 4 of PROCESS macro version 3.5 in SPSS 26.0 to examine the mediators. The results are presented in Table 3. Thriving at work mediated the relationship between challenge time pressure and radical creativity (indirect effect: 0.163, 95% CI = [0.053, 0.285]), and incremental creativity (indirect

effect: 0.157, 95% CI = [0.045, 0.286]). In addition, thriving at work mediated the relationship between hindrance time pressure and radical creativity (indirect effect: -0.136, 95% CI = [-0.253, -0.041]), and incremental creativity (indirect effect: -0.132, 95% CI = [-0.253, -0.035]). These results supported H3a, H3b, H3c, and H3d.

Table 3. The results of mediation effects (N=315).

Model			Effect	95% CI
Model 1	CTP→THW→RC	Indirect effect	0.163	[0.053,0.285]
		Direct effect	0.181	[0.070,0.347]
		Total effect	0.343	[0.150,0.511]
Model 2	CTP→THW→IC	Indirect effect	0.157	[0.045,0.286]
		Direct effect	0.129	[0.040,0.215]
		Total effect	0.286	[0.122,0.444]
Model 3	HTP→THW→RC	Indirect effect	-0.136	[-0.253, -0.041]
		Direct effect	-0.145	[-0.267, -0.008]
		Total effect	-0.282	[-0.420, -0.132]
Model 4	HTP→THW→IC	Indirect effect	-0.132	[-0.253, -0.035]
		Direct effect	-0.100	[-0.193, -0.002]
		Total effect	-0.232	[-0.369, -0.091]

Note: CTP: challenge time pressure; HTP: hindrance time pressure; RI: radical creativity; IC: incremental creativity; THW: thriving at work.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

We conducted the hierarchical regression analysis to examine the moderating effect of perceived organizational support. As shown in Table 4, perceived organizational support negatively moderated the positive relationship between challenge time pressure and thriving at work ($\beta = -$

0.274, $p < 0.001$), which did not support H4. In addition, perceived organizational support negatively moderated the negative relationship between hindrance time pressure and thriving at work ($\beta = 0.122$, $p < 0.01$), which supported H5.

Table 4. The results of mediation effects (N=315).

Variable	Thriving at Work				
	M1	M2	M3	M4	M5
Gender	0.083	0.034	0.018	0.055	0.053
Education	0.025	-0.008	-0.052	0.052	0.017
Job tenure	0.131**	0.082*	0.126***	0.096**	0.094
Age	-0.002	-0.002	-0.005	-0.001	0.000
CTP		0.145***	0.134***		
HTP				-0.089**	-0.077**
POS		0.473***	0.393***	0.467***	0.440***
CTP * POS			-0.274***		
HTP * POS					0.122**
R2	0.053	0.415	0.484	0.399	0.423
ΔR^2		0.362	0.069	0.346	0.024
F	4.345**	36.370***	41.168***	34.125***	32.130***

Note: CTP: challenge time pressure; HTP: hindrance time pressure; POS: perceived organizational support.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

As depicted in Figure 2, by comparing different levels of perceived organizational support, it is evident that when perceived organizational support is at a low level, the predictive effect of challenge time pressure on thriving at work is stronger. Employees' level of thriving at work shows a marked upward trend as challenge time pressure increases.

Conversely, when perceived organizational support is at a relatively high level, employees generally exhibit higher levels of thriving at work. Consequently, this study concludes that perceived organizational support exerts a negative moderating effect on the positive relationship between challenge time pressure and thriving at work.

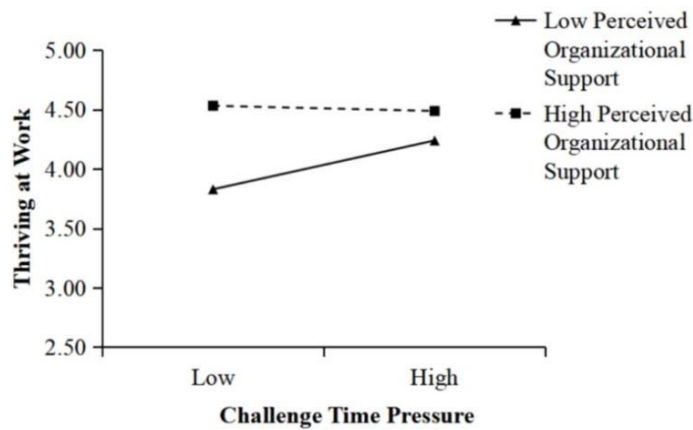


Figure 2. The Moderating Effect of Perceived Organizational Support on the Relationship between Challenge Time Pressure and Thriving at Work

As depicted in Figure 3, comparing different levels of perceived organizational support reveals that when perceived organizational support is at a lower level, employees' thriving at work demonstrates a significant downward trend as hindrance time pressure increases. However, when perceived organizational support is at a relatively high level, the decline

in employees' thriving at work is mitigated as hindrance time pressure increases. This indicates that the negative relationship between hindrance time pressure and thriving at work is attenuated, suggesting that perceived organizational support plays a negative moderating role in this relationship.

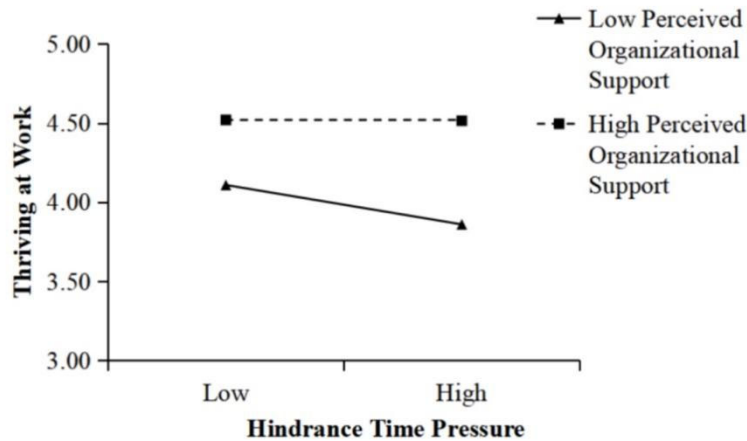


Figure 3. The Moderating Effect of Perceived Organizational Support on the Relationship between Hindrance Time Pressure and Thriving at Work

5. Discussion

The results of our study provided support for our hypotheses. As expected, challenge time pressure positively affects radical creativity and incremental creativity, whereas hindrance time pressure negatively affect radical and incremental creativity. In addition, thriving at work plays a mediating role between challenge-hindrance time pressure and creativity. Notably, perceived organizational negatively moderates the positive relationship between challenge time pressure and thriving at work and negatively moderates the negative relationship between hindrance time pressure and

thriving at work. Below, we discuss how these findings contribute to research and practice.

5.1. Theoretical implications

This research provides several theoretical contributions. First, our research transcends the uni-dimensional perspective by conducting a multidimensional investigation into the impact of time pressure on creativity, providing an explanatory framework for the previously conflicting views on the relationship between time pressure and creativity [14] [16] [19]. Past studies have primarily focused on discussing the effects of the degree of time pressure on outcome

variables [14] [19], neglecting the diverse causes of time pressure in actual work environments, which has led to inconsistent findings regarding the relationship between time pressure and creativity. Based on the research of [23], this study distinguishes time pressure into challenge time pressure and hindrance time pressure according to its causal factors. Our findings reveal that challenge time pressure positively influences creativity, while hindrance time pressure negatively impacts creativity, thus deepening the overall understanding of time pressure. Second, this study examines the influence of time pressure as a contextual factor on employee creativity. By differentiating creativity into radical and incremental creativity, we respond to scholars' calls for dimensional research on creativity [10] [24], enriching the preliminary research on radical and incremental creativity. Furthermore, this study integrates COR theory and JD-R model, introducing thriving at work as a mediating variable and perceived organizational support as a moderating variable, thereby enhancing our understanding of the potential mechanisms and boundary conditions through which time pressure affects creativity. By introducing thriving at work, a positive psychological state that simultaneously experiences a sense of learning and vitality [38], this research effectively explains employees' cognitive and emotional responses when facing time pressure of different natures, advancing the literature on thriving at work.

5.2. Practical implications

This research also offers several practical implications. First, organizational managers should accurately comprehend the time pressure faced by employees and the consequent effects. Imposing time pressure indiscriminately may lead to adverse outcomes. Unreasonable scheduling, frequent reporting requirements, and constantly shifting tasks can create hindrance time pressure for employees, significantly negatively impacting their creativity, particularly radical creativity. Second, managers should judiciously and effectively leverage the positive aspects of challenge time pressure. Work design should help employees recognize the significance and value of their work. Challenge time pressure can stimulate employee vigor and proactive learning, thereby fostering creativity in the work process. Third, managers should guide employees towards a rational perspective on time pressure. Time pressure is a common phenomenon in the workplace, and challenge time pressure can be overcome through learning, improving work processes, and creative problem solving. When facing time pressure, employees should cultivate a positive mindset and learn to utilize relevant work resources to cope effectively. Additionally, organizations can encourage employees to provide feedback on the time pressure they encounter in their work. This will assist managers in better understanding the sources of time pressure in management practices and distinguishing between different types of time pressure, leading to more effective pressure management. Finally, the findings of this study indicate that higher levels of perceived organizational support can mitigate the negative impact of hindrance time pressure on thriving at work. Therefore, when managing employee pressure, organizations are encouraged to actively provide supportive initiatives to create high levels of perceived organizational support in the workplace. This can be achieved through measures such as establishing employee assistance programs and fostering a positive organizational culture, thereby enhancing employees' subjective perception of

organizational support and achieving better management outcomes.

5.3. Limitations and future research

Our study also has several limitations. First, the data were collected through self-reported questionnaires, with all data self-reported by employees. This may introduce common method bias. Although the common method bias in our study is not significant, future research is encouraged to employ multi-source data collection methods (e.g., leaders report the creativity of employees) to mitigate such bias. Second, this study primarily focuses on the impact of challenge-hindrance time pressure on individual employees' creativity. Furthermore, our study elucidates the mediating role of thriving at work and the moderating effect of perceived organizational support. However, the investigation process may be subject to interference from extraneous variables. Future research could employ daily diary for longitudinal tracking to further validate the robustness of these findings. Additionally, subsequent studies are encouraged to explore the boundary conditions of the relationship between time pressure and creativity. When individuals face pressure, factors such as personal characteristics (e.g. core self-evaluations [54]) and leadership styles (e.g., inclusive leadership [55]; transformational leadership [56]) may also influence individual behavior. Finally, our study primarily focuses on the impact of challenge-hindrance time pressure on individual creativity. With the rise of virtual teams, an increasing number of team members collaborate across different time zones and geographical locations, potentially leading to conflicts in work scheduling and ambiguity in work rhythms [57], which may exacerbate time pressure. Future research could extend investigation to the team level, examining how time pressure affects knowledge sharing and communication within teams, thereby influencing team collaboration and overall performance. Moreover, future studies could consider the role of leadership in addressing time pressure during team collaboration processes in virtual teams.

6. Conclusion

In this study, we examined the distinct effects of challenge and hindrance time pressures on employee creativity, differentiating between radical and incremental creativity. By leveraging the Conservation of Resources (COR) theory and the Job Demands-Resources (JD-R) model, we established thriving at work as a critical mediating mechanism and perceived organizational support as a moderating factor. Our findings revealed that challenge time pressure positively influences creativity through thriving at work, with a more pronounced effect on radical creativity. In contrast, hindrance time pressure negatively affects creativity via thriving at work, with a greater detrimental impact on radical creativity. Furthermore, perceived organizational support mitigates the negative effects of hindrance time pressure and amplifies the positive effects of challenge time pressure on thriving at work.

These findings contribute to the literature by providing a multidimensional perspective on time pressure and creativity, addressing the inconsistencies in previous studies. We advance the theoretical understanding of creativity by exploring its radical and incremental dimensions and highlight the importance of thriving at work as a mediating factor. Practically, our study underscores the need for organizations to cultivate supportive environments that

enable employees to thrive, particularly under time constraints. Managers should differentiate between challenge and hindrance time pressures, actively promoting challenge time pressure to stimulate creativity while minimizing hindrance time pressure to prevent resource depletion and diminished employee engagement.

In conclusion, our research bridges the gaps in understanding the nuanced effects of time pressure on employee creativity, offering actionable insights for enhancing organizational innovation and sustaining employee well-being. Future studies should explore these relationships in varied organizational contexts to validate and expand upon these findings.

Acknowledgements

This work was supported by the Shanghai Philosophy and Social Science Planning Project [grant number 2022EGL004]; the National Natural Science Foundation of China [grant number 72472095; grant number 72302140; grant number 72072110].

References

- [1] Hou, B. J., Hong, J., Zhu, K. J., & Zhou, Y. (2019). Paternalistic leadership and innovation: the moderating effect of environmental dynamism. *European Journal of Innovation Management*, 22(3), 562-582.
- [2] Le, P. B., & Lei, H. (2019). Determinants of innovation capability: the roles of transformational leadership, knowledge sharing and perceived organizational support. *Journal of Knowledge Management*, 23(3), 527-547.
- [3] Liu, D., Jiang, K., Shalley, C. E., Keem, S., & Zhou, J. (2016). Motivational mechanisms of employee creativity: A meta-analytic examination and theoretical extension of the creativity literature. *Organizational behavior and human decision processes*, 137, 236-263.
- [4] Lei, H., Leaungkhamma, L., & Le, P. B. (2020). How transformational leadership facilitates innovation capability: the mediating role of employees' psychological capital. *Leadership & Organization Development Journal*, 41(4), 481-499.
- [5] Yang, Z., Nguyen, V. T., & Le, P. B. (2018). Knowledge sharing serves as a mediator between collaborative culture and innovation capability: an empirical research. *Journal of Business & Industrial Marketing*, 33(7), 958-969.
- [6] Amabile, T. M. (1998). *How to kill creativity*. Harvard Business School Publishing.
- [7] Wang, L., Wang, Z., Liu, Q., Li, T., Shi, Y., & Luo, Z. (2023). Regulatory focus mediates the association between parenting behaviors and creativity among Chinese adolescents. *Current Psychology*, 42(34), 30461-30471.
- [8] Zhang, X. C., Zhu, Y., Wan, Q. C., & Tsai, F. S. (2022). Every coin has two sides: the impact of time pressure on employees' knowledge hiding. *Journal of Knowledge Management*, 26(8), 2084-2106.
- [9] Gilson, L. L., & Madjar, N. (2011). Radical and Incremental Creativity: Antecedents and Processes. *Psychology of Aesthetics Creativity and the Arts*, 5(1), 21-28.
- [10] Madjar, N., Greenberg, E., & Chen, Z. (2011). Factors for Radical Creativity, Incremental Creativity, and Routine, Noncreative Performance. *Journal of Applied Psychology*, 96(4), 730-743.
- [11] Zhang, Y., Li, J. J., Song, Y. H., & Gong, Z. X. (2021). Radical and incremental creativity: associations with work performance and well-being. *European Journal of Innovation Management*, 24(3), 968-983.
- [12] Ohly, S., & Fritz, C. (2010). Work characteristics, challenge appraisal, creativity, and proactive behavior: A multi-level study. *Journal of Organizational Behavior*, 31(4), 543-565.
- [13] Zhang, H., Li, F., & Reynolds, K. J. (2022). Creativity at work: exploring role identity, organizational climate and creative team mindset. *Current Psychology*, 41(6), 3993-4000.
- [14] Baer, M., & Oldham, G. R. (2006). The curvilinear relation between experienced creative time pressure and creativity: moderating effects of openness to experience and support for creativity. *Journal of applied psychology*, 91(4), 963.
- [15] Khedhaouria, A., Montani, F., & Thurik, R. (2017). Time pressure and team member creativity within R&D projects: The role of learning orientation and knowledge sourcing. *International Journal of Project Management*, 35(6), 942-954.
- [16] Koch, S., Holland, R. W., & van Knippenberg, A. (2008). Regulating cognitive control through approach-avoidance motor actions. *Cognition*, 109(1), 133-142.
- [17] Syrek, C. J., Apostel, E., & Antoni, C. H. (2013). Stress in Highly Demanding IT Jobs: Transformational Leadership Moderates the Impact of Time Pressure on Exhaustion and Work-Life Balance. *Journal of Occupational Health Psychology*, 18(3), 252-261.
- [18] Hsiao, S. W., Wang, M. F., & Chen, C. W. (2017). Time pressure and creativity in industrial design. *International Journal of Technology and Design Education*, 27(2), 271-289.
- [19] LePine, J. A., Podsakoff, N. P., & LePine, M. A. (2005). A meta-analytic test of the challenge stressor-hindrance stressor framework: An explanation for inconsistent relationships among stressors and performance. *Academy of management journal*, 48(5), 764-775.
- [20] Rostami, A., Gabler, C., & Agnihotri, R. (2019). Under pressure: The pros and cons of putting time pressure on your salesforce. *Journal of Business Research*, 103, 153-162.
- [21] Binnewies, C., & Wörnlein, S. C. (2011). What makes a creative day? A diary study on the interplay between affect, job stressors, and job control. *Journal of Organizational Behavior*, 32(4), 589-607.
- [22] Ohly, S., Sonnentag, S., & Pluntke, F. (2006). Routinization, work characteristics and their relationships with creative and proactive behaviors. *Journal of Organizational Behavior*, 27(3), 257-279.
- [23] Chong, D. S. F., Van Eerde, W., Chai, K. H., & Rutte, C. G. (2011). A Double-Edged Sword: The Effects of Challenge and Hindrance Time Pressure on New Product Development Teams. *Ieee Transactions on Engineering Management*, 58(1), 71-86.
- [24] Sung, S. Y., Rhee, Y. W., Lee, J. E., & Choi, J. N. (2020). Dual pathways of emotional competence towards incremental and radical creativity: resource caravans through feedback-seeking frequency and breadth. *European Journal of Work and Organizational Psychology*, 29(3), 421-433.
- [25] Hobfoll, S. E. (2011). Conservation of resource caravans and engaged settings. *Journal of occupational and organizational psychology*, 84(1), 116-122.
- [26] Halbesleben, J. R., Neveu, J. P., Paustian-Underdahl, S. C., & Westman, M. (2014). Getting to the "COR" understanding the role of resources in conservation of resources theory. *Journal of management*, 40(5), 1334-1364.
- [27] Witt, L. A., & Carlson, D. S. (2006). The work-family interface and job performance: moderating effects of conscientiousness and perceived organizational support. *Journal of occupational health psychology*, 11(4), 343.

- [28] Schaefer, J. (2024). How the association of time pressure with work engagement and affect depends on workers' sensation seeking: a daily diary study. *European Journal of Work and Organizational Psychology*, 33(4), 417-429.
- [29] Young, D. L., Goodie, A. S., Hall, D. B., & Wu, E. (2012). Decision making under time pressure, modeled in a prospect theory framework. *Organizational Behavior and Human Decision Processes*, 118(2), 179-188.
- [30] Rice, S., & Trafimow, D. (2012). Time Pressure Heuristics Can Improve Performance Due to Increased Consistency. *Journal of General Psychology*, 139(4), 273-288.
- [31] Prem, R., Ohly, S., Kubicek, B., & Korunka, C. (2017). Thriving on challenge stressors? Exploring time pressure and learning demands as antecedents of thriving at work. *Journal of Organizational Behavior*, 38(1), 108-123.
- [32] Chong, D. S. F., van Eerde, W., Rutte, C. G., & Chai, K. H. (2012). Bringing Employees Closer: The Effect of Proximity on Communication When Teams Function under Time Pressure. *Journal of Product Innovation Management*, 29(2), 205-215.
- [33] Podsakoff, N. P., LePine, J. A., & LePine, M. A. (2007). Differential challenge stressor-hindrance stressor relationships with job attitudes, turnover intentions, turnover, and withdrawal behavior: A meta-analysis. *Journal of Applied Psychology*, 92(2), 438-454.
- [34] Hobfoll, S. E. (1989). Conservation of resources. A new attempt at conceptualizing stress. *The American psychologist*, 44(3), 513-524.
- [35] Montani, F., Vandenberghe, C., Khedhaouria, A., & Courcy, F. (2020). Examining the inverted U-shaped relationship between workload and innovative work behavior: The role of work engagement and mindfulness. *Human Relations*, 73(1), 59-93.
- [36] Halinski, M., Boekhorst, J. A., Allen, D., & Good, J. R. (2024). Creativity During Threat to Organizational Survival: The Influence of Employee Creativity on Downsizing Survival Selection. *Journal of Management*, 01492063231216691.
- [37] Halbesleben, J. R. B., Neveu, J. P., Paustian-Underdahl, S. C., & Westman, M. (2014). Getting to the "COR": Understanding the Role of Resources in Conservation of Resources Theory. *Journal of Management*, 40(5), 1334-1364.
- [38] Han, X., Li, Y. H., & Li, J. (2024). Having fun and thriving: The impact of fun human resource practices on employees' autonomous motivation and thriving at work. *Human Resource Management*, 63(5), 813-828.
- [39] Porath, C., Spreitzer, G., Gibson, C., & Garnett, F. G. (2012). Thriving at work: Toward its measurement, construct validation, and theoretical refinement. *Journal of Organizational Behavior*, 33(2), 250-275.
- [40] Paterson, T. A., Luthans, F., & Jeung, W. (2014). Thriving at work: Impact of psychological capital and supervisor support. *Journal of Organizational Behavior*, 35(3), 434-446.
- [41] Wallace, J. C., Butts, M. M., Johnson, P. D., Stevens, F. G., & Smith, M. B. (2016). A Multilevel Model of Employee Innovation: Understanding the Effects of Regulatory Focus, Thriving, and Employee Involvement Climate. *Journal of Management*, 42(4), 982-1004.
- [42] Chen, W. Y., Liu, X. M., & Zhang, X. J. (2021). When and why does a "poker face" facilitate workplace creativity?. *Management Decision*, 59(10), 2309-2328.
- [43] Chen, W. L., Zhang, J., Xiao, Y. C., Wang, B. H., Gu, X., & Bai, Z. X. (2024). Bene fi t or cost? The " double-edged sword " effect of multiple team membership on creativity. *Journal of Innovation & Knowledge*, 9(2), 9, 100485.
- [44] Wang, T., Wang, D. D., & Liu, Z. R. (2022). Feedback-seeking from team members increases employee creativity: the roles of thriving at work and mindfulness. *Asia Pacific Journal of Management*, 39(4), 1321-1340.
- [45] Yang, Y., Li, Z. Q., Liang, L., & Zhang, X. (2021). Why and when paradoxical leader behavior impact employee creativity: Thriving at work and psychological safety. *Current Psychology*, 40(4), 1911-1922.
- [46] Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied psychology*, 86(3), 499-512.
- [47] Eisenberger, R., Armeli, S., Rexwinkel, B., Lynch, P. D., & Rhoades, L. (2001). Reciprocation of perceived organizational support. *Journal of Applied Psychology*, 86(1), 42-51.
- [48] Dai, Y. D., Hou, Y. H., Chen, K. Y., & Zhuang, W. L. (2018). To help or not to help: antecedents of hotel employees' organizational citizenship behavior. *International Journal of Contemporary Hospitality Management*, 30(3), 1293-1313.
- [49] Liang, X., Guo, G., Shu, L., Gong, Q., & Luo, P. (2022). Investigating the double-edged sword effect of AI awareness on employee's service innovative behavior. *Tourism Management*, 92, 104564.
- [50] Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of cross-cultural psychology*, 1(3), 185-216.
- [51] Amabile, T. M., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the work environment for creativity. *Academy of management journal*, 39(5), 1154-1184.
- [52] Tierney, P., & Farmer, S. M. (2002). Creative self-efficacy: Its potential antecedents and relationship to creative performance. *Academy of Management Journal*, 45(6), 1137-1148.
- [53] Bunjak, A., Bruch, H., & Černe, M. (2022). Context is key: The joint roles of transformational and shared leadership and management innovation in predicting employee IT innovation adoption. *International Journal of Information Management*, 66, 102516.
- [54] Cristofaro, M., Giardino, P. L., & Leoni, L. (2020). The influence of core self-evaluations on group decision making processes: A laboratory experiment. *Administrative Sciences*, 10(2), 29.
- [55] Guo, Y., Jin, J., & Yim, S. H. (2022). Impact of inclusive leadership on innovative work behavior: The mediating role of job crafting. *Administrative Sciences*, 13(1), 4.
- [56] Caza, A., Caza, B. B., & Posner, B. Z. (2021). Transformational leadership across cultures: Follower perception and satisfaction. *Administrative Sciences*, 11(1), 32.
- [57] Ajzen, M., & Taskin, L. (2021). The re-regulation of working communities and relationships in the context of flexwork: A spacing identity approach. *Information and Organization*, 31(4), 100364.