



Creativity gain or drain: The dual association between boundary-spanning and creativity

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ABSTRACT

Boundary-spanning behavior, which involves building relationships with external entities to achieve organizational goals, has been highlighted as a key mechanism for enhancing the inflow of external knowledge. While boundary-spanning can fuel creativity by providing employees with new resources, ideas, and inspiration, it also poses challenges, potentially depleting resources and inducing stress that hinders creativity. Drawing on Conservation of Resources (COR) Theory, this paper explores the dual impact of boundary-spanning on employee creativity—serving both as a facilitator and inhibitor. Through an experimental study ($n = 299$) and a field study ($n = 331$ employees, 49 supervisors), we examine how external engagement fosters or hampers creative thinking, focusing on the mechanisms of resource gain and resource drain. Our findings contribute to the understanding of how organizations can balance the demands of boundary-spanning to harness its creative potential while mitigating its negative consequences. This research provides actionable insights for businesses seeking to thrive in competitive, innovation-driven environments.

1. Introduction

Organizations orchestrate and configure their resources to ensure maximum utility, however, R&D activities such as new product development are complex, and optimal resource configuration is less defined. An organization's key resource where innovation is concerned is its employees; thus, to optimize for innovation, organizations must create a learning culture in which employees can harness their creative potential (Sheehan et al., 2014; Tripathi & Kalia, 2024). One example of doing so is boundary-spanning behavior. Boundary-spanning behavior concerns building and maintaining relationships with people and entities outside the organization to achieve common goals (Marrone et al., 2021; Mell, Quintane, et al., 2022; Mell, van Knippenberg, et al., 2022). Boundary spanners within organizations increase the inflow of external knowledge by engaging with both external and internal parties (Zobel et al., 2023). However, boundary-spanning behavior is challenging and requires employees to be creative in assimilating and disentangling the knowledge they are exposed to, and in harnessing any innovative potential resulting

from the knowledge, internally. The result of successful boundary-spanning behavior is the capacity to generate new and useful ideas, in turn driving organizational success and innovation. The intersection of these two areas — how reaching out beyond organizational boundaries can fuel creative thinking within — is essential to understanding the cornerstones for successful organizational innovation. Existing literature has extensively documented the beneficial ramifications of boundary-spanning on aspects like employee well-being, team cohesion, and organizational learning (Song et al., 2023; Srivastava & Tang, 2014), yet the direct linkage between the consequences of boundary-spanning and the enhancement of creativity within organizations remain less understood. The present paper responds to the need for a deeper exploration of how the act of reaching beyond organizational boundaries might not only bring in fresh perspectives and resources but also spur creative thinking and problem-solving among employees, as well as result in negative consequences.

In this paper, we posit that boundary-spanning can serve both as a facilitator and an inhibitor of creativity. On one hand, according to the

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Conservation of Resources (COR) Theory, engaging with external networks can strategically accumulate valuable resources—be it knowledge, insights, or inspiration (Halbesleben et al., 2014; Hobfoll, 1989). These newly acquired resources can invigorate employees, and instill vitality and learning that is conducive to creativity. On the other hand, the demands and complexities associated with managing external relationships and the constant influx of information can strain an employee's mental and emotional bandwidth, potentially leading to resource depletion, stress, and a consequent dip in creative output. A central tenet of COR theory suggests that resource loss is more detrimental than resource gain, thus an individual may be motivated to prevent loss rather than to persist and acquire new resources (Hobfoll, 1989, 2002). In the context of boundary-spanning behavior, an employee needs to expose themselves to potential resource drain through ego depletion by engaging on the periphery (in terms of their knowledge and/or domain expertise), while attempting to gain new resources such as novel processes, knowledge, systems, etc.

Across two studies, using an experiment and a field study, we investigate the connection between boundary-spanning behavior and perceived employee creativity. Specifically, we analyze the “gain” and “drain” of boundary-spanning behavior on creativity and investigate the mechanism through which external engagement fosters or hinders creative thinking. This research offers valuable insights for businesses striving to navigate the complexities of the global market, optimize resources, and succeed in a world where innovation and adaptability are paramount.

1.1. Boundary-spanning behavior and creativity

Boundary-spanning behavior includes establishing and managing relationships with external entities to obtain essential resources and support, in turn contributing to organizational effectiveness and enhanced performance (Mell, Quintane, et al., 2022; Mell, van Knippenberg, et al., 2022; Xie et al., 2023). Such activities not only facilitate the introduction of novel ideas and methods, thereby promoting individual creativity (Salem et al., 2017) but also enable employees to strengthen ties with upper management, garnering support and expanding their influence within professional networks (Ancona & Caldwell, 1992; Marrone, 2010). According to COR theory, humans are driven to safeguard their existing resources while also seeking to obtain new ones (Hobfoll, 1989). Boundary-spanning behavior means employees proactively seek and acquire valuable information and resources originating outside the organizational confines (Ancona & Caldwell, 1992). Through this behavior, employees can search for new technologies, implement novel work methods, and investigate and acquire the necessary resources for implementing new ideas. In addition, COR theory emphasizes that the accumulation of resources creates a resource reserve that can be invested in subsequent individual activities (Hobfoll, 2002). Employees' boundary-spanning behavior can help build a continuous resource reserve allowing employees to continuously acquire new knowledge and resources, which enable them to increase creativity in the long term.

However, boundary-spanning behavior is challenging. Firstly, boundary spanners are confronted with the issue of knowledge “stickiness”, whereby relevant knowledge is complex, deeply embedded, and in some cases tacit, thus it is difficult to transfer between firms (Zobel et al., 2023). Secondly, the breadth and depth of knowledge that boundary spanners are exposed to may appear disparate, unanchored, and seemingly irrelevant to their organization on the surface; yet with creative vision a boundary spanner can glean nuggets of insights from their acquired external knowledge and incorporate it into their own organization, thus sparking a raft of new innovative potential. Scanning the environment, gathering complex knowledge, identifying the organizational relevance of the knowledge, and finally harnessing, assimilating, and transferring that knowledge to the appropriate internal agents, are unique skills that require immense employee creativity at an

individual level. Furthermore, at a firm level, the benefits of boundary-spanning behavior are affected by the level of organizational support employees receive and employees' intrinsic motivation, i.e., boundary-spanning behavior is negatively associated with innovative behavior when employees' intrinsic motivation or organizational support is low and positively associated with employees' innovative behavior when motivation and support are high (Zhu et al., 2023). Essentially the support and network leverage imbued to the employee by organizational leadership in turn empowers employees to engage more deeply in creative pursuits, leading to increased creativity (Fleming & Waguespack, 2007).

Creativity in the workplace involves conceiving innovative ideas to improve or develop novel products, processes, and methods (Rodriguez et al., 2020; Zhang & Bartol, 2010; Zhou & George, 2001). It is fostered by a continuous learning process that enables individuals to spot improvement and innovation opportunities, thereby enhancing their ability to influence creative outcomes (Amabile, 1998; Pan et al., 2018). During the process of boundary-spanning, employees engage in extensive learning to adapt to cross-boundary job tasks, which underscores the importance of self-directed learning (Cross et al., 2015; Joshi et al., 2009). This form of learning not only facilitates adaptation but also forms the basis for developing workplace creativity. Creativity, by definition, necessitates viewing problems from different perspectives and integrating heterogeneous information to propose new ideas (Hennessey & Amabile, 2010; Mejia et al., 2021; Sonenshein, 2014). Employees acquiring heterogeneous resources via boundary-spanning behavior constitutes a fundamental pathway to enhancing creativity (Au & Fukuda, 2002; Marrone, 2010; Sonenshein, 2014). Therefore, a positive association between boundary-spanning activities and employee creativity is proposed.

Hypothesis 1. Employee boundary-spanning behavior is positively associated with creativity.

1.2. Thriving at work as a link between boundary-spanning behavior and creativity

Another important concept related to employee performance and creativity is thriving. Thriving in the workplace captures how employees feel and perform at their best (Porath et al., 2012). This state involves high energy levels and a strong sense of growth through learning; Meanwhile, vitality is a related and important component in this context (Paterson et al., 2013). It encompasses a dynamic sense of mental and emotional energy that fuels enthusiasm for work and drives individuals to tackle challenges with zeal. This energized state is crucial because it equips employees with the resilience to navigate obstacles and the spark to think creatively, thereby laying a foundation for innovative problem-solving. Learning, the second component of thriving, involves continuously gaining new skills and knowledge (Kleine et al., 2019). This aspect of thriving refers to building a deep sense of confidence that comes from mastering new areas and expanding one's capabilities (Beal et al., 2005; Kleine et al., 2019). As employees learn and grow, they not only enhance their own efficiency and adaptability but also contribute to a culture of continuous improvement and innovation within their teams and the broader organization. This ongoing process of learning and skill acquisition is vital for maintaining a competitive edge and fostering an environment in which creative ideas can flourish (Amabile, 1998; Pan et al., 2018; West & Farr, 1989).

Boundary-spanning activities, which involve reaching out beyond the confines of the immediate work environment to engage with external ideas, people, and resources, play a pivotal role in fostering a thriving workplace. These activities enable employees to bring in fresh perspectives and novel ideas potentially enriching the organizational culture with diverse insights and approaches. By bridging the gap between the internal and external environment, boundary-spanning facilitates the flow of new information and resources into the

organization, which, in turn, can stimulate both vitality and learning (Dimitrova, 2020). This dynamic interaction not only creates a more engaging and stimulating work atmosphere but also provides the raw material for creative thought and innovation.

In light of the beneficial effects of vitality and learning on fostering creativity, and the contribution of boundary-spanning in acquiring new resources and ideas, it stands to reason that a thriving work environment plays a crucial role in enhancing creative output (Kark & Carmeli, 2009; Kleine et al., 2019). This environment, characterized by high energy and continuous growth, acts as a fertile ground for developing innovative solutions and creative approaches to challenges (Filipowicz, 2006). Therefore, we propose that the thriving state of employees, facilitated by boundary-spanning, significantly contributes to the development of workplace creativity. We hypothesize the following:

Hypothesis 2. Thriving at work positively mediates the relationship between boundary-spanning behavior and creativity.

1.3. The role of Ego depletion

Boundary-spanning behavior, while instrumental in bridging an organization and its external environment, inherently demands significant mental and emotional resources, and may even result in a resource drain for employees. Boundary-spanners are required to invest substantial time and energy to execute boundary-spanning behaviors (Marrone, 2010), as they have to navigate complex external landscapes, process large volumes of information, and reconcile organizational objectives with external dynamics (Aldrich & Herker, 1977; Hammer et al., 1979). This multifaceted engagement not only stretches an individual's cognitive capacity but also often leads to role and information overload, where the demands of managing external interactions exceed the individual's available resources, culminating in stress and mental exhaustion (Marrone et al., 2007). This negative effect may result in diminishing boundary-spanning behaviors, which prevents employees from accessing adequate heterogeneous information and knowledge from the outside, thereby restricting cognitive thinking and making it difficult to propose creative viewpoints (Edmondson & Boyer, 2013).

The concept of ego depletion provides a framework for understanding the psychological costs associated with boundary-spanning activities. Ego depletion, as described by Baumeister and Vohs (2007), occurs when sustained mental exertion in tasks requiring intense concentration, complex decision-making, and high-level vigilance depletes an individual's finite pool of cognitive and emotional resources. This depletion impairs cognitive flexibility and reduces the capacity for innovative thinking, a crucial component of creativity (Muraven & Baumeister, 2000). The effort to maintain self-control and manage the demands of boundary-spanning roles further drains these psychological resources, leading to mental fatigue (Baumeister & Tierney, 2012; Hockey, 2013). Such fatigue severely limits an individual's ability to engage in creative tasks, negatively affecting both the process and the quality of creative outputs (Baumeister, 2014; Inzlicht & Berkman, 2015).

Considering the resource-intensive nature of boundary-spanning and its potential to divert cognitive and emotional resources from internal creative efforts, a significant depletion of an employee's internal psychological reserves can occur (Hobfoll, 2002; Sonnentag & Zijlstra, 2006). This depletion, in turn, can act as a barrier to creative engagement and output (Inzlicht & Friese, 2019), causing creative exhaustion and cognitive inflexibility, impeding the emergence of new perspectives and problem-solving strategies, which negatively affects creativity (Yuan et al., 2022). The competing demands of managing external interactions and internal creative processes suggest that boundary-spanning activities, despite their potential benefits, may inadvertently undermine creativity by inducing ego depletion. Therefore, we propose the following hypothesis:

Hypothesis 3. Ego-depletion negatively mediates the relationship

between boundary-spanning behavior and creativity.

Fig. 1 summarizes our research model.

2. Methods

We utilize a multi-study design and a multi-sample approach, consisting of an experimental study and a field study, to test the proposed hypotheses. In Study 1, we conducted a vignette experiment to test the mediating role of perceived thriving at work and ego depletion in the relationship between employees' boundary-spanning behavior and perceived creativity. In Study 2, we tested our hypotheses in an applied organizational setting to enhance the external validity of our findings. We do so via a multi-source survey. Data for both studies was collected from June 3rd, 2023 – February 4th, 2024.

2.1. Ethics statement

Ethical review and approval were not required for the study on human participants in accordance with the local legislation and institutional requirements of the Southwestern University of Finance and Economics. All participants proceeded to the online survey only after they provided written consent to participate in this study.

2.2. Study 1

2.2.1. Sample and procedure

We recruited 364 employees via the Chinese online research platform Credamo in return for a \$0.5 compensation. All participants provided consent to participate in this study. After excluding 65 participants for not passing attention checks, we maintained 299 employees in our final sample (146 women, 156 men). The average age was 32.0 years (SD = 7.4) and the average organizational tenure was 8.2 years (SD = 6.4). 39.5 % were male. A total of 95.2 % of participants in this study had completed at least a college education.

Participants were presented with the following scenario:

“Your company has established a Creative Centre to manage the design and innovation of new products. The Creative Centre has multiple R&D teams to complete the specific type of work. As a member of these R&D teams, you are engaged in fostering creativity for new products. Once the product proposal is established, your team is required to communicate and collaborate with other teams in the company (e.g., manufacturing team, sales team, financial team, etc.) to collectively promote the new product. In addition, your team must frequently report the task's progress to the company's Creative Centre, in order to obtain the necessary support for product development. Throughout the design and development of new products, you are expected to engage in external communication, seek professional consultancy, and integrate resources.”

Participants were randomly allocated to one of two groups, characterized by either high (i.e., treatment group) or low boundary-spanning behavior (i.e., control group). The high boundary-spanning behavior condition included the following description: “I am in one of the R&D teams and work on product creativity. I frequently reach out to colleagues from different teams to address problems in my product-related creative work on behalf of our team. I also sometimes contact the Creative Centre to obtain additional external resources and support for our team. By leveraging external insights and resources, I can introduce more creative ideas that differentiate our product in the market.”

The low boundary-spanning behavior condition included the following description: “I am in one of the R&D teams and work on product creativity. I frequently reach out to colleagues within my team to address problems in my product-related creative work, thereby receiving support and assistance for myself. I rarely contact the Creative Centre to obtain additional external resources and support for our team. By leveraging internal insights and resources, I can introduce more

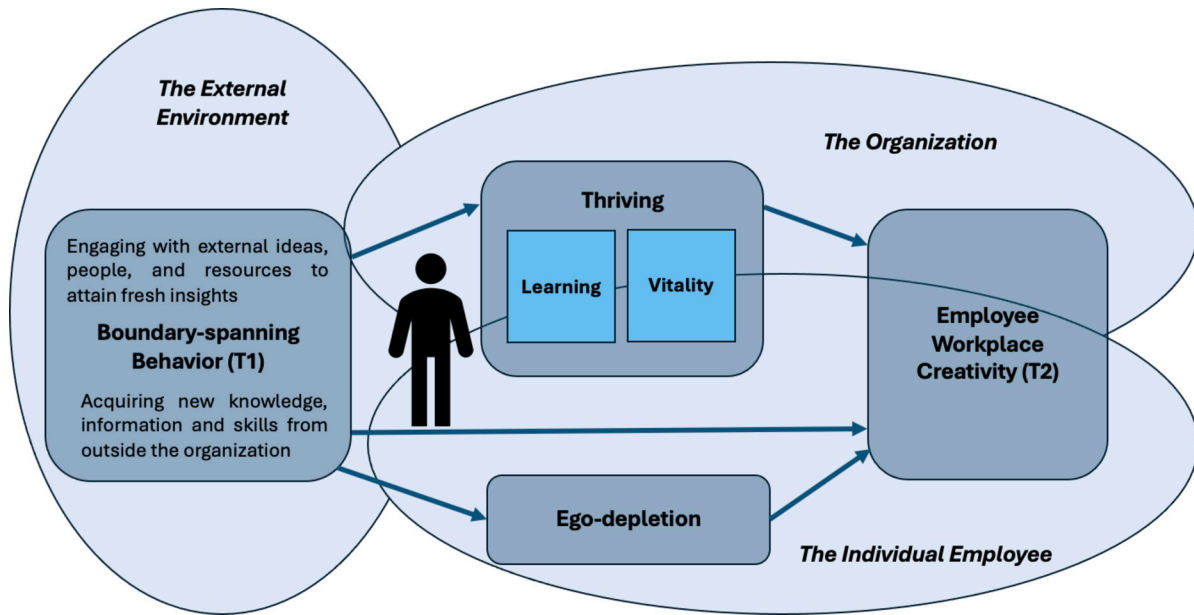


Fig. 1. Theoretical model.

creative ideas that differentiate our product in the market.”

Participants were asked to assume the role of the person description they just read and answer the following measures on perceived creativity, boundary-spanning behavior, thriving, and ego-depletion at work as if they were that person. To check the effectiveness of the

manipulation, we followed the scenario experiment approach in Xie et al. (2023) and asked participants to report perceived boundary-spanning behavior by using a 4-item scale derived from Faraj and Yan (2009).

Table 1
Reliability and convergent validity (Study 1).

Variables	Items	Loadings	Cronbach's α	CR (>0.7)	AVE (>0.5)
Boundary-spanning behavior (BSB)	1. To what extent does the team encourage you to solicit information and resources from elsewhere in and/or beyond the division?	0.92	0.91	0.94	0.80
	2. To what extent does the team encourage you to try to influence important actors elsewhere in and/or beyond the division on behalf of the team and its work?	0.81			
	3. To what extent does the team value you for making use of their relationships with others on behalf of the team?	0.91			
	4. To what extent does the work of the team depend upon information and resources actively solicited by you, that is, information and resources beyond what comes through official channels?	0.93			
Thriving at work (TW)	1. I find myself learning often.	0.87	0.93	0.94	0.61
	2. I continue to learn more as time goes by.	0.80			
	3. I see myself continually improving.	0.83			
	4. I am not learning.	0.73			
	5. I am developing a lot as a person.	0.80			
	6. I feel alive and vital.	0.76			
	7. I have energy and spirit.	0.76			
	8. I do not feel very energetic.	0.77			
	9. I feel alert and awake.	0.78			
	10. I am looking forward to each new day.	0.72			
Ego depletion (ED)	1. I feel drained.	0.75	0.89	0.92	0.69
	2. My mind feels unfocused right now.	0.89			
	3. Right now, it would take a lot of effort for me to concentrate on something.	0.85			
	4. My mental energy is running low.	0.84			
	5. I feel like my willpower is gone.	0.82			
Creativity (CR)	1. Suggests new ways to achieve goals or objectives.	0.75	0.93	0.94	0.56
	2. Comes up with new and practical ideas to improve performance.	0.73			
	3. Searches out new technologies, processes, techniques, and/or product ideas.	0.70			
	4. Suggests new ways to increase quality.	0.77			
	5. Is a good source of creative ideas.	0.78			
	6. Is not afraid to take risks.	0.74			
	7. Promotes and champions ideas to others.	0.78			
	8. Exhibits creativity on the job when given the opportunity to.	0.71			
	9. Develops adequate plans and schedules for the implementation of new ideas.	0.73			
	10. Often has new and innovative ideas.	0.75			
	11. Comes up with creative solutions to problem.	0.75			
	12. Often has a fresh approach to problems.	0.72			
	13. Suggests new ways of performing work tasks.	0.77			

2.2.2. Measures

The survey items were back-translated from English into Mandarin to ensure semantic equivalence (Brislin, 1980). Each respondent to the survey completed the items using a five-point scale.

Boundary-spanning behavior. We used a 4-item scale to assess boundary-spanning behavior (Faraj & Yan, 2009). Items included “To what extent does the team encourage you to solicit information and resources from elsewhere in and/or beyond the division.” ($\alpha = 0.91$).

Thriving at work. Porath et al. (2012) constructed a ten-item instrument to assess thriving at work. Items included “I see myself continually improving.” ($\alpha = 0.93$).

Ego depletion. Five items were utilized to evaluate ego depletion in accordance with Lin and Johnson (2015). Items included “Right now, it would take a lot of effort for me to concentrate on something” ($\alpha = 0.89$).

Creativity. Participants completed a thirteen-item creativity scale developed by Zhou and George (2001). A sample item was “Comes up with new and practical ideas to improve performance” ($\alpha = 0.93$).

Control variable. Following previous research (Mell, Quintane, et al., 2022; Mell, van Knippenberg, et al., 2022), we controlled for participants' gender, age, and organizational tenure. Our findings are robust when control variables are removed.

2.2.3. Results

We used composite reliability (CR) and average variance extracted (AVE) to test the reliability and convergent validity (Fornell & Larcker, 1981). Table 1 presents the values of Cronbach's α , CR, and AVE, indicating satisfactory reliability. Table 2 presents the descriptive statistics and correlations between the main variables.

We performed a *t*-test to verify the experimental manipulation. The results suggested scores of boundary-spanning behavior in the high group were significantly higher ($M = 4.16, SD = 0.56$) compared to those in the low group ($M = 2.45, SD = 1.11$), $t(297) = -16.85, p < .001$. Therefore, the manipulation of boundary-spanning behavior was deemed successful.

To test the hypotheses of Study 1, we adopted Model 4 of Hayes's (2022) PROCESS macro (ver. 4.3) with SPSS 23.0. Hypothesis 1 stated that employee boundary-spanning behavior is positively associated with creativity. We found support for this hypothesis ($b = 0.31, SE = 0.08, p < .01$), results are shown in Table 3.

Findings indicated boundary-spanning behavior was positively linked to creativity ($b = 0.12, SE = 0.07, p > .05$), with thriving at work also positively influencing creativity ($b = 0.35, SE = 0.05, p < .01$). After introducing the mediating variable (thriving at work), the direct effect of the independent variable (boundary-spanning behavior), on the dependent variable (creativity), was no longer significant, indicating that the influence of the independent variable on the dependent variable was fully mediated by thriving at work (MacKinnon et al., 2007; Preacher & Hayes, 2004). The bootstrapped procedure results showed that the indirect effect of thriving at work was statistically significant (95 % confidence level), resulting in a value of 0.20 (CI = [0.12, 0.28]), supporting hypothesis 2.

Results indicated boundary-spanning behavior was positively linked

Table 2
Means, standard deviations, and correlations of main variables (Study 1).

Variable	M	SD	1	2	3	4	5	6	7
1. Boundary-spanning behavior	0.50	0.50							
2. Thriving at work	4.01	0.80	0.35**						
3. Ego delegation	2.56	0.99	0.31**	0.26**					
4. Creativity	3.98	0.68	0.22**	0.43**	-0.27**				
5. Age	31.99	7.35	-0.03	0.08	0.01	0.20**			
6. Gender	1.39	0.49	0.03	0.07	-0.02	0.03	0.11		
7. Education	4.00	0.72	0.02	0.12*	0.19**	-0.11	-0.16**	-0.09	
8. Organizational tenure	8.21	6.35	0.00	0.02	-0.05	0.18**	0.90**	0.15*	-0.26**

Note: ** $p < .01$; * $p < .05$; $n = 299$.

Table 3

Unstandardized coefficients of path analysis for hypotheses testing (Study 1).

Variables	Direct effect		Mediation effect via Thriving at work		Mediation effect via Ego depletion	
	Model 1		Model 2		Model 3	
	Creativity		Creativity		Creativity	
	EST.	SE	EST.	SE	EST.	SE
Age	0.02	0.01	0.01	0.01	0.03	0.01
Gender	0.00	0.08	-0.04	0.07	0.00	0.07
Education	-0.08	0.06	-0.12	0.05	-0.02	0.05
Organizational tenure	0.00	0.01	0.01	0.13	-0.01	0.01
Boundary-spanning behavior	0.31**	0.08	0.12	0.07	0.48**	0.07
Thriving at work			0.35**	0.05		
Ego depletion					-0.26**	0.04

Note: ** $p < .01$; * $p < .05$; $n = 299$.

to creativity ($b = 0.48, SE = 0.07, p < .01$), with ego depletion negatively affecting creativity ($b = -0.26, SE = 0.04, p < .01$). The bootstrapped procedure suggested that the indirect effect of ego depletion was statistically significant (95 % confidence level), resulting in a value of -0.16 (CI = [-0.25, -0.10]). Hence, hypothesis 3 was supported.

2.2.4. Brief discussion

These first research findings showed that boundary-spanning behavior can be both beneficial and detrimental to creativity. Thriving in the workplace positively mediates this linkage, while ego depletion served as a negative mediator. To verify the obtained results in Study 1, we conducted a field study (Study 2).

2.3. Study 2

2.3.1. Sample and procedure

We collected survey data from companies located in Shenzhen and Chengdu. According to the China City Creativity Index Report (2023), these two cities are ranked as the most creative cities in China. By adopting a two-wave, multi-source survey approach, we effectively minimized the common method bias (Podsakoff et al., 2012). At the start of the survey, an orientation session was conducted to explain the study's objectives and methodology to the participants. An orientation session was held to give participants an overview of the research purpose and methodology at the start of the survey. At Time 1, self-assessments were conducted to evaluate employees' boundary-spanning tendency, work thriving, and ego depletion since self-assessment is thought to be highly accurate for variables that assess employees' internal states. Eight weeks later (Time 2), supervisors were tasked with evaluating each employee's creativity.

At Time 1570 employees were assigned to rate the independent variable (boundary-spanning behavior) and provide demographic information. We received 459 completed questionnaires throughout this phase, achieving an 80.5 % response rate. At Time 2, we distributed surveys to the initial participants and evaluated the mediator variables:

thriving at work and ego depletion. We received responses from 338 employees for the second phase of the survey (Time 2). During Time 2, 77 respective supervisors of participants assessed at Time 1 completed distinct questionnaires, assessing the dependent variable (employee's creativity). In total, 52 supervisors took part in the survey. All participants provided consent to participate in this study, and we ensured participants' confidentiality and anonymity throughout.

After excluding any missing data (i.e., 3 supervisors and 7 employees), we obtained 49 valid questionnaires from supervisors and 331 valid questionnaires from employees, resulting in a 63.6 % response rate for supervisors and 58.1 % for employees. Concerning the employees, 51.9 % were male, with 71.6 % holding a college degree or above, with an average age of 38.08 years ($SD = 8.33$). Average organizational tenure was 8.26 years ($SD = 3.32$).

2.3.2. Measures

As in Study 1, the survey items were created in English and back-translated into Mandarin to ensure semantic equivalence (Brislin, 1980). We kept all the scales to measure mediating and dependent variables used in Study 1 except for the independent variable - boundary-spanning behavior. This variable was measured by a 4-item scale in Study 1, however, we adopted a 6-item scale to measure it in Study 2. The reason for this change to the scale is that the 6-item scale focuses on real business settings and is more suitable for collecting field data in organizations (Yao et al., 2022), whereas the 4-item scale adopted by Faraj and Yan (2009) mainly has been used to collect experimental data (Xie et al., 2023). Using different scales in a paper for collecting field data and experimental data has existed in literature (Xie et al., 2023). As in Study 1, we used the same scales to measure thriving at work ($\alpha = 0.94$), ego depletion ($\alpha = 0.88$), and creativity ($\alpha = 0.96$).

Boundary-spanning behavior. We measured employees' boundary-spanning behavior (BSB) with 6 items following Marrone et al.'s (2007) approach. A sample item is "I make efforts to convince outsiders (suppliers, customers, etc.) to support the decision of my organization". ($\alpha = 0.92$).

Control variables. Following prior investigations (Mell, Quintane, et al., 2022; Mell, van Knippenberg, et al., 2022; Salem et al., 2017), we accounted for control variables including employee gender, age, educational attainment, and organizational tenure.

2.3.3. Results

The descriptive statistics and correlations of the study variables are shown in Table 4.

To ascertain the discriminant validity of the study variables, we conducted confirmatory factor analyses (CFA) using Mplus 8.3 (Muthèn and Muthèn, 1998–2017) with maximum likelihood estimation. The results indicated that the proposed four-factor baseline model fit the data better than alternative models: (1) ($\chi^2 = 826.08$, $df = 521$, $p < .001$; CFI = 0.96, RMSEA = 0.04, SRMR = 0.04); (2) boundary-spanning behavior and creativity ($\chi^2 = 2171.61$, $df = 524$, $p < .001$; CFI = 0.81, RMSEA = 0.10, SRMR = 0.13); (3) all variables measured at Time 1 ($\chi^2 = 2648.80$, $df = 526$, $p < .001$; CFI = 0.75, RMSEA = 0.11, SRMR = 0.13); (4) boundary-spanning behavior, thriving at work and creativity

Table 4 Means, standard deviations, and correlations of main variables (Study 2).

Variable	M	SD	1	2	3	4	5	6	7
1. Boundary-spanning behavior	3.34	0.97							
2. Thriving at work	3.51	1	0.45**						
3. Ego delegation	3.63	0.87	0.50**	0.31**					
4. Creativity	3.43	0.94	0.35**	0.46**	-0.13*				
5. Age	38.08	8.33	-0.06	0.06	-0.20	0.03			
6. Gender	1.52	0.5	-0.05	-0.01	0.05	-0.03	-0.04		
7. Education	3.01	1.03	0.05	0.29**	0.13*	0.15**	-0.08	0.00	
8. Organizational tenure	8.26	3.32	-0.01	0.08	-0.08	0.01	0.29**	-0.06	0.09

Note: ** $p < .01$; * $p < .05$; $n = 331$.

($\chi^2 = 3919.63$, $df = 526$, $p < .001$; CFI = 0.60, RMSEA = 0.14, SRMR = 0.17); (5) all variables ($\chi^2 = 4696.63$, $df = 527$, $p < .001$; CFI = 0.51, RMSEA = 0.16, SRMR = 0.19). Thus, we concluded that the variables exhibited good reliability and discriminant validity (see Table 5).

As recommended by Preacher and Hayes (2008), we utilized Mplus 8.3 and PROCESS macro for SPSS (ver. 4.3) to test our proposed hypotheses. The SEM model outcomes are presented in Table 6; results indicate that boundary-spanning behavior was positively related to creativity ($b = 0.34$, $SE = 0.05$, $p < .01$), providing support for Hypothesis 1.

As postulated in Hypothesis 2, the link of boundary-spanning behavior to creativity was positively mediated by thriving at work. Such behavior was positively linked to creativity ($b = 0.18$, $SE = 0.06$, $p < .01$) while thriving at work was positively correlated with creativity ($b = 0.34$, $SE = 0.05$, $p < .01$). Results indicated that the influence of the independent variable on the dependent variable is partially mediated by thriving at work (MacKinnon et al., 2007; Preacher & Hayes, 2004). We applied the same bootstrapping procedure as in Study 1 to examine the mediation effect. The indirect effect of thriving at work was statistically significant (95 % confidence level), yielding a value of 0.16 (CI = [0.10, 0.22]). Therefore, we found support for hypothesis 2.

Hypothesis 3 posited that the link of boundary-spanning behavior to creativity was negatively mediated by ego depletion. The outcomes indicated that boundary-spanning behavior was positively linked to creativity ($b = 0.55$, $SE = 0.05$, $p < .01$), while ego depletion was negatively related to creativity ($b = -0.48$, $SE = 0.06$, $p < .01$). The bootstrapped procedure results showed that the indirect effect of ego depletion was statistically significant (95 % confidence level), resulting in a value of -0.21 (CI = [-0.29, -0.15]), providing support for Hypothesis 3. Moreover, the outcomes remain unaffected by the omission of controls.

2.3.4. Robustness checks

While many regard creativity as trait-like (i.e., a stable personality

Table 5 Comparison of measurement models (Study 2).

Models	χ^2	df	$\Delta\chi^2$	CFI	RMSEA	SRMR
Hypothesized model (four-factor model)	826.08	521		0.96	0.04	0.04
Model 2: combine BSB and CR	2171.61	524	1345.53**	0.81	0.10	0.13
Model 3: combine BSB, TW and ED (variables measured at time1)	2648.80	526	1822.72**	0.75	0.11	0.13
Model 4: combine BSB, TW and CR	3919.63	526	3093.55**	0.60	0.14	0.17
Model 5: combine all variables	4696.63	527	3870.55**	0.51	0.16	0.19

Note. BSB = Boundary-spanning behavior; CR = Creativity; TW = Thriving at work; ED = Ego depletion; ** $p < .01$; * $p < .05$.

Table 6
Unstandardized coefficients of path analysis for hypotheses testing (Study 2).

Variables	Direct effect		Mediation effect via Thriving at work		Mediation effect via Ego depletion	
	Model 1		Model 2		Model 3	
	Creativity		Creativity		Creativity	
	EST.	SE	EST.	SE	EST.	SE
Age	0.01	0.01	0.00	0.01	0.01	0.01
Gender	-0.02	0.10	-0.04	0.09	0.03	0.09
Education	0.13**	0.05	0.04	0.05	0.17**	0.04
Organizational tenure	-0.01	0.02	-0.01	0.02	-0.02	0.01
Boundary-spanning behavior	0.34**	0.05	0.18**	0.06	0.55**	0.05
Thriving at work			0.34**	0.05		
Ego depletion					-0.48**	0.06

Note: ** $p < .01$; * $p < .05$; $n = 331$.

trait) and does not undergo significant changes over time, others have argued that creativity is influenced by daily factors (Weinberger et al., 2018), moods driven by personal and contextual factors (Amabile et al., 2005), and changeable work-related characteristics (Binnewies & Wörnlein, 2010). In this study, we theorized that creativity is malleable, rather than being solely regarded as an inherent trait. To test this assumption, we conducted *t*-tests to compare creativity among employees at the initial stage of joining the organization to those after engaging in boundary-spanning behavior. Results suggested that perceived creativity after engaging in boundary-spanning behavior was higher ($M = 3.43, SD = 0.94$) than in the initial stage ($M = 2.87, SD = 0.92$), $t(660) = 7.66, p < .001$. We also examined the moderating effects of demographic variables such as age, gender, tenure, and education in study 1 and study 2, but the analysis results indicated that these variables did not significantly moderate the influence of boundary-spanning behavior on creativity via thriving at work or ego depletion.

We also recognize that creative employees (i.e., employees who were creative when they joined the organization) could be more likely to engage in boundary-spanning behaviors, which constitutes a case of reverse causality. To account for this possibility, we reran our analyses controlling for employee creativity at the time they joined the organization. We refer to this measure as baseline creativity. We used the same scales to measure the baseline employee creativity as described in Study 2 (Cronbach's $\alpha = 0.95$). Indeed, creativity after engaging in boundary-spanning behavior was not influenced by baseline creativity ($r = -0.07, p > .005$). The results of the SEM model analyses supported the proposed hypotheses (see Table 7). The mediation test suggested that the indirect effects of thriving at work and ego depletion were

Table 7
Unstandardized coefficients of path analysis for hypotheses testing (Robustness check).

Variables	Direct effect		Mediation effect via Thriving at work		Mediation effect via Ego depletion	
	Model 1		Model 2		Model 3	
	Creativity		Creativity		Creativity	
	EST.	SE	EST.	SE	EST.	SE
Age	0.01	0.01	0.00	0.01	0.01	0.01
Gender	-0.04	0.10	-0.05	0.09	0.02	0.09
Education	0.12**	0.05	0.03	0.05	0.17**	0.04
Organizational tenure	-0.01	0.02	-0.01	0.02	-0.02	0.01
Baseline creativity	-0.09	0.05	-0.07	0.05	-0.08	0.05
Boundary-spanning behavior	0.34**	0.05	0.19**	0.05	0.55**	0.05
Thriving at work			0.33**	0.05		
Ego depletion					-0.47**	0.06

Note: ** $p < .01$; * $p < .05$; $n = 331$.

statistically significant at the 95 % confidence level, with a value of 0.16 (CI = [0.10, 0.22]) and - 0.22 (CI = [-0.29,0.15]), respectively.

3. Discussion

Boundary-spanning behavior is enacted at an individual level, yet it can have far-reaching implications in terms of stimulating organizational innovation (Fleming & Waguespack, 2007; Zhang & Li, 2020) and performance (Ancona & Caldwell, 1992; Korschun, 2015), and ensuring organizations maintain competitiveness and adaptability in a globally interconnected economy (Pedersen et al., 2019). We set out to investigate the complex relationship between boundary-spanning and employee creativity. We found boundary-spanning to have a dual influence on creativity, characterized by its capacity to both enhance and diminish creative output through the mechanisms of thriving at work and ego depletion, respectively.

3.1. Theoretical implications

In today's boundaryless workplace, boundary-spanning behavior can enhance employees' creativity and professional capabilities (Salem et al., 2017; Yao et al., 2022; Zhang & Li, 2020). Employees can leverage resources in their work to facilitate cross-organizational boundary-spanning abilities (Au & Fukuda, 2002; Dimitrova, 2020). Recent studies suggest that boundary-spanning behavior has a positive impact on creativity through intra-group collaboration (Salem et al., 2017) and information sharing (Yao et al., 2022). However, some scholars have argued that boundary-spanning behavior also can trigger negative outcomes, such as abusive behavior, undermining, work-to-family conflict, and family incivility (Mell, Quintane, et al., 2022; Mell, van Knippenberg, et al., 2022; Song et al., 2023; Xie et al., 2023). When engaging in boundary-spanning behavior, employees tackle more complex tasks, demanding significant time and effort to address this challenge (Marrone et al., 2007), potentially resulting in a decline in employees' creative abilities. Across two studies, we found that boundary-spanning behavior not only has a beneficial effect on creativity but also can exert a negative effect. Our research contributes to the literature by suggesting the need for a more nuanced perspective on the impact of boundary-spanning behavior and creativity in workplace settings.

Second, our research applies the COR theory in the boundary-spanning behavior research field to provide greater insights into both the phenomena of boundary spanning. The central tenet of COR posits that individuals may be more motivated to prevent resource loss than to acquire new resources. Within boundary-spanning behavior, we explore the intrinsic mechanism through dual aspects: resource accumulation and resource depletion. On the one hand, in boundary-spanning behavior, employees are engaged with external ideas, work partners, and resources to attain fresh insights, which increases their inner vitality (Spreitzer et al., 2012). At the same time, they acquire new knowledge, information, and skills from outside of the organization, which promotes individual learning (Faraj & Yan, 2009; Mell, Quintane, et al., 2022; Mell, van Knippenberg, et al., 2022). Vitality and learning experiences tend to lead to increased feelings of work thriving. Through thriving at work, boundary-spanning can increase individual resources and contribute to creativity (Dimitrova, 2020; Filipowicz, 2006). On the other hand, boundary-spanning behavior consumes the energy, attention, and time of the employees and results in ego depletion, which would lead to a decrease in employee creativity. Utilizing the COR theory, we constructed a useful framework (see Fig. 1) through which to explore boundary-spanning gain (learning and vitality) and drain (ego-depletion) to further our understanding of employee workplace creativity.

Third, we extend the study of antecedent variables of creativity (Hennessey & Amabile, 2010; Mejia et al., 2021). Recent studies indicate that artificial intelligence, the interaction of personal traits and situational factors, as well as workplace events, can influence employees'

creativity (Jia et al., 2023; Chen et al., 2020). Our research suggests that boundary-spanning behavior plays a crucial role in driving creativity in the workplace. The present paper expands our knowledge of the precursors of employee creativity.

3.2. Implications

From a practical standpoint, our findings offer actionable insights for organizational leaders and managers aiming to leverage boundary-spanning behavior for enhanced creativity. First, organizations should foster a supportive culture that emphasizes boundary-spanning activities. Employees should take a proactive role in boundary-spanning behavior to obtain information and reach out to external affiliates. Effective boundary-spanning activities facilitate the establishment of sustained and stable partnerships with external stakeholders, which help to obtain important information and resources such as opportunities, and financial support (Aldrich & Herker, 1977; Hammer et al., 1979; Marrone et al., 2007). Moreover, boundary-spanning behaviors can result in mental flourishing that benefits employees thriving in the workplace. This can transform boundary-spanning activities into opportunities to enhance creativity and achieve the organization's success.

Second, managers must also be aware of the risks associated with resource depletion due to boundary-spanning activities. Encouraging employees to engage in regular detachment activities (Chawla et al., 2020), even outside of vacation periods, can help mitigate these risks. These activities are intended to provide employees with temporary respite from the daily pressures of work and the work environment (Kilroy et al., 2020), thereby sustaining employees' involvement in boundary-spanning activities and their contribution to creative processes.

3.3. Limitations and future research

This study is not without limitations. Notably, environmental context factors such as task complexity and environmental turbulence, which have been identified as influential in previous research (Marrone, 2010; Richter et al., 2006), were not addressed in our analysis. Chen et al. (2018) highlight that teams operating in technologically turbulent environments are more inclined to seek external knowledge, and supervisors in dynamic settings prioritize boundary-spanning activities. Future studies should delve into how these environmental conditions—dynamism and task intricacy—affect individuals' engagement with boundary-spanning behavior and their creative responses.

Moreover, we acknowledge that there likely are additional mechanisms linking boundary-spanning behavior to creativity that were not explored in this paper. For instance, applying stress transaction theory could provide valuable insights into how different types of pressures—both challenging and hindering—affect the relationship between boundary-spanning behavior and creativity. Investigating stress-related dynamics could enrich our understanding of the conditions under which boundary-spanning behavior either fosters or impedes creative output.

Another potential avenue for future research involves examining the possible non-linear relationships between boundary-spanning behavior, resource allocation, and creativity. Given that individuals and teams have finite resources, understanding how these resources are optimized or depleted in the context of boundary-spanning activities could offer nuanced perspectives on managing creativity and innovation in organizational settings.

4. Conclusion

In the context of today's ever-evolving and complex work environment, boundary-spanning behavior stands out as a crucial catalyst for creativity. This study's findings highlight the multifaceted impact of boundary-spanning on creativity, showing that it can foster a thriving work environment conducive to creative outcomes. Nevertheless,

engaging in boundary-spanning also can result in ego depletion. A balance needs to be struck between externally seeking and/or sourcing new knowledge without depleting one's mental resources. These insights underline the nuanced nature of boundary-spanning behavior's effect on creativity and offer important considerations for both future academic inquiry and practical application in organizational settings.

CRedit authorship contribution statement

Mingfeng Tang: Writing – review & editing, Supervision, Resources, Project administration, Conceptualization. **Xiaomeng Liu:** Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Grace Sheila Walsh:** Writing – review & editing, Validation. **Dritjon Gruda:** Writing – review & editing, Conceptualization.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGPT 4o in order to clarify some of the writing throughout the manuscript. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Declaration of competing interest

The authors declare that they have no conflicts of interest regarding the publication of this manuscript. All research was conducted in an unbiased manner, and there are no financial or personal relationships with other individuals or organizations that could inappropriately influence the work or its interpretation.

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Data availability

Data will be made available on request.

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