



# The Impact Mechanism of After-Hours Electronic Communication Boundary Invasion Perception on Employees' Work Withdrawal Behavior: Based on Boundary Theory and the Cognitive-Affective-Behavioral Model

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## Abstract

**Background and Aims:** As digital technology and remote work expand, after-hours electronic communication (AWC) has become common. While AWC improves efficiency, it can invade employees' psychological and temporal boundaries. Guided by Boundary Theory and the Cognitive-Affective-Behavioral (CAB) Model, this study examines how perceived boundary invasion leads to work withdrawal behavior, with relative deprivation and emotional exhaustion as mediators, and self-efficacy as a moderator.

**Method:** A survey of 465 university employees in China was analyzed using Structural Equation Modeling, mediation, and moderation techniques.

**Results:** Psychological and temporal boundary invasion significantly increased relative deprivation and emotional exhaustion, which sequentially led to work withdrawal. Self-efficacy weakened these negative effects.

**Conclusion:** The study extends Boundary Theory and the CAB Model to digital work contexts, suggesting organizations should set clear communication boundaries and build employee self-efficacy to reduce withdrawal behaviors.

**Keywords:** After-hours Electronic Communication; Boundary Invasion Perception; Relative Deprivation; Emotional Exhaustion; Self-efficacy; Work Withdrawal Behavior

## Introduction

With the rapid development of information and communication technologies, the boundaries between work and personal life have become increasingly blurred. After-hours electronic communication (AWC), such as emails, messages, and phone calls outside regular working hours, has become a widespread phenomenon in modern workplaces. While AWC facilitates organizational efficiency and responsiveness, it also imposes significant intrusions into employees' psychological and temporal boundaries, leading to heightened stress and emotional exhaustion. These boundary invasions disrupt employees' work-life balance and may trigger





negative behavioral outcomes, including work withdrawal behaviors.

Boundary Theory posits that individuals strive to maintain distinct separations between their work and personal domains to achieve psychological well-being. When these boundaries are frequently invaded by work-related demands during non-working hours, employees experience a sense of loss of control and autonomy, which can manifest as psychological distress and dissatisfaction. Furthermore, the Cognitive-Affective-Behavioral (CAB) Model suggests that cognitive evaluations (e.g., perceptions of injustice or deprivation) and emotional reactions (e.g., exhaustion or frustration) are critical mediators between environmental stimuli and individual behaviors. Applying these theoretical perspectives, it is plausible that boundary invasion perceptions arising from after-hours electronic communication may lead to relative deprivation and emotional exhaustion, ultimately prompting employees to engage in work withdrawal behaviors.

Despite the growing prevalence of AWC, empirical research exploring its impact mechanism on employees' psychological and behavioral responses remains limited. In particular, the potential chain mediating roles of relative deprivation and emotional exhaustion, and the moderating role of self-efficacy, have not been sufficiently examined. Addressing this research gap, the present study aims to investigate how employees' perceptions of boundary invasion caused by after-hours electronic communication influence their work withdrawal behaviors, through the mediating effects of relative deprivation and emotional exhaustion, and the moderating effect of self-efficacy.

By elucidating these mechanisms, this study contributes to a deeper understanding of the negative consequences of AWC and offers practical insights for organizations seeking to foster healthier communication practices and enhance employee well-being. It provides theoretical support for the application of Boundary Theory and the Cognitive-Affective-Behavioral Model in the digital work environment and highlights the importance of boundary management and psychological resource conservation strategies.

## Literature Review

### After-Hours Electronic Communication and Boundary Invasion

The proliferation of mobile technologies and remote working arrangements has significantly blurred the boundaries between work and personal life. After-hours electronic communication (AWC) refers to work-related emails, messages, or calls occurring outside of standard working hours. While AWC may improve organizational responsiveness and flexibility, it also leads to boundary invasion, where employees' psychological and temporal boundaries are disrupted (Derks, van Duin, Tims, & Bakker, 2015). According to Boundary Theory (Ashforth, Kreiner, &





Fugate, 2000), individuals establish and maintain boundaries to separate their work and non-work roles. Persistent boundary invasion through AWC can cause employees to feel a lack of autonomy and increased role conflict, leading to psychological strain and behavioral withdrawal from work-related activities.

### **Relative Deprivation and Emotional Exhaustion**

Relative deprivation refers to the perception of unfair treatment or the belief that one's outcomes are inferior compared to relevant others (Smith, Pettigrew, Pippin, & Bialosiewicz, 2012). In the context of boundary invasion, employees may perceive that their time is less respected compared to colleagues or organizational norms, triggering feelings of deprivation. The Cognitive-Affective-Behavioral (CAB) Model (Judge & Zapata, 2015) posits that such cognitive appraisals generate affective reactions, such as emotional exhaustion—a chronic state of emotional depletion caused by prolonged exposure to stressors (Maslach, Schaufeli, & Leiter, 2001). Research has demonstrated that boundary invasions can foster perceptions of relative deprivation and emotional exhaustion, which together contribute to adverse work behaviors, including absenteeism, presenteeism, and work withdrawal (Sonnentag & Fritz, 2015).

### **Work Withdrawal Behavior**

Work withdrawal behavior encompasses a range of disengagement behaviors, such as decreased effort, psychological detachment, absenteeism, and turnover intentions (Lehman & Simpson, 1992). Employees facing sustained boundary invasions often resort to withdrawal behaviors as coping mechanisms to reclaim their sense of autonomy and protect their resources. Previous studies have highlighted the negative consequences of withdrawal behaviors, including reduced organizational commitment, lower performance, and higher turnover rates (Tepper, Henle, Lambert, Giacalone, & Duffy, 2008). Understanding the antecedents of withdrawal behavior in the context of digital communication environments is critical for maintaining organizational productivity and employee well-being.

### **The Moderating Role of Self-Efficacy**

Self-efficacy, defined as an individual's belief in their ability to perform specific tasks successfully (Bandura, 1997), plays a crucial role in stress appraisal and coping processes. Employees with higher self-efficacy are more likely to perceive stressful situations as challenges rather than threats, thereby exhibiting greater psychological resilience (Luthans, 2002). In the context of boundary invasion, employees with strong self-efficacy may better manage emotional exhaustion and feelings of deprivation, reducing the likelihood of work withdrawal behaviors. Conversely, employees with low self-efficacy may be more vulnerable to the negative impacts of boundary invasions.

### **Summary of Literature and Research Framework**

[1153]

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In summary, existing research suggests that after-hours electronic communication can intrude on employees' boundaries, leading to perceptions of relative deprivation and emotional exhaustion, which ultimately result in work withdrawal behavior. However, self-efficacy may act as a buffer, moderating these relationships. Building on Boundary Theory and the CAB Model, this study constructs a research framework to explore the direct and indirect effects of boundary invasion perception on work withdrawal behavior, considering both mediating and moderating variables.

## Methodology

### Research Design

This study adopts a quantitative research design to empirically examine the relationships among after-hours electronic communication boundary invasion perception, relative deprivation, emotional exhaustion, self-efficacy, and work withdrawal behavior. A cross-sectional survey method was employed, utilizing structured questionnaires to collect primary data from employees in Chinese universities.

### Sample and Data Collection

The research sample consisted of employees from several universities in China, covering both academic and administrative staff who had experienced work-related electronic communication during non-working hours. A purposive sampling strategy was applied to ensure that the participants were familiar with after-hours communication practices. Data were collected through online and paper-based questionnaires. To ensure data quality, participants were informed about the confidentiality and anonymity of their responses.

A total of 500 questionnaires were distributed, of which 465 valid responses were obtained, resulting in a valid response rate of 93.0%. Demographic information, such as gender, age, education level, and work experience, was collected as control variables.

### Measurement Instruments

All constructs in this study were measured using previously validated scales, adapted to the context of after-hours electronic communication and Chinese organizational settings. Responses were rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

#### Boundary Invasion Perception:

Adapted from the scale developed by Park et al. (2011), covering two dimensions: psychological boundary invasion and temporal boundary invasion.

#### Relative Deprivation:

Measured using the scale adapted from Smith et al. (2012), assessing employees' subjective perceptions of unfair resource allocation and treatment.





#### Emotional Exhaustion:

Measured using the subscale of the Maslach Burnout Inventory (Maslach & Jackson, 1981), adapted for the study context.

#### Self-Efficacy:

Measured using the scale developed by Schwarzer and Jerusalem (1995), evaluating employees' beliefs in their abilities to handle work challenges effectively.

#### Work Withdrawal Behavior:

Measured with items adapted from Lehman and Simpson (1992), focusing on psychological detachment, reduced effort, and absentee tendencies.

All scales demonstrated acceptable reliability and validity in previous research and were subjected to further reliability testing in this study.

#### Data Analysis

Data were analyzed using SPSS 26.0 and AMOS 24.0 software packages. The following steps were conducted:

Descriptive Statistics and Correlation Analysis were used to understand sample characteristics and variable relationships. Confirmatory Factor Analysis (CFA) was conducted to assess the measurement model's validity and reliability. Structural Equation Modeling (SEM) was applied to test the hypothesized relationships among the variables. Chain Mediation Analysis was performed using the PROCESS macro (Model 6) to examine the mediating effects of relative deprivation and emotional exhaustion. Moderation Analysis was conducted to assess the moderating role of self-efficacy using hierarchical regression techniques. Statistical significance was set at  $p < 0.05$  for all hypothesis tests.

#### Research Hypotheses Development

##### After-Hours Electronic Communication Boundary Invasion and Relative Deprivation

According to Boundary Theory, persistent intrusion into employees' psychological and temporal boundaries by after-hours electronic communication disrupts their expected balance between work and personal life. When employees perceive that their non-working time is consistently invaded, they may feel unfairly treated compared to organizational norms or peers, leading to a sense of relative deprivation (Smith et al., 2012). Therefore, it is hypothesized that:

**H1:** After-hours electronic communication boundary invasion perception positively influences employees' relative deprivation.

##### After-Hours Electronic Communication Boundary Invasion and Emotional Exhaustion

Boundary invasions not only affect employees' cognitive evaluations but also deplete their emotional resources. Based on the Cognitive-Affective-Behavioral Model, continuous work



interruptions during non-working hours hinder employees' psychological recovery, thereby increasing emotional exhaustion (Sonnentag & Fritz, 2015). Thus, we propose:

**H2:** After-hours electronic communication boundary invasion perception positively influences employees' emotional exhaustion.

### **Relative Deprivation and Emotional Exhaustion as Mediators**

The CAB Model posits that cognitive appraisals (e.g., relative deprivation) and affective reactions (e.g., emotional exhaustion) jointly mediate the impact of external stressors on behavioral outcomes. Employees experiencing relative deprivation may feel demotivated and emotionally drained, subsequently engaging in withdrawal behaviors to protect their remaining resources (Hobfoll, 1989). Therefore, the following hypotheses are proposed:

**H3:** Relative deprivation positively influences employees' emotional exhaustion.

**H4:** Relative deprivation mediates the relationship between boundary invasion perception and work withdrawal behavior.

**H5:** Emotional exhaustion mediates the relationship between boundary invasion perception and work withdrawal behavior.

**H6:** Relative deprivation and emotional exhaustion play a chain mediating role between boundary invasion perception and work withdrawal behavior.

### **Work Withdrawal Behavior**

Work withdrawal behavior, as a coping mechanism against stress and unfair treatment, allows employees to psychologically detach from work tasks to regain personal autonomy (Tepper et al., 2008). Given the disruptions caused by boundary invasion, emotional exhaustion, and feelings of deprivation, it is hypothesized that:

**H7:** Emotional exhaustion positively influences employees' work withdrawal behavior.

### **The Moderating Role of Self-Efficacy**

Self-efficacy affects how individuals perceive and react to stressors. High self-efficacy enables employees to view stressful situations as challenges, reducing the negative impact of emotional exhaustion and relative deprivation on behavioral outcomes (Bandura, 1997). Thus, it is hypothesized that:

**H8:** Self-efficacy moderates the relationship between emotional exhaustion and work withdrawal behavior, such that the relationship is weaker when self-efficacy is higher.

**H9:** Self-efficacy moderates the relationship between relative deprivation and work withdrawal behavior, such that the relationship is weaker when self-efficacy is higher.



## Theoretical Model

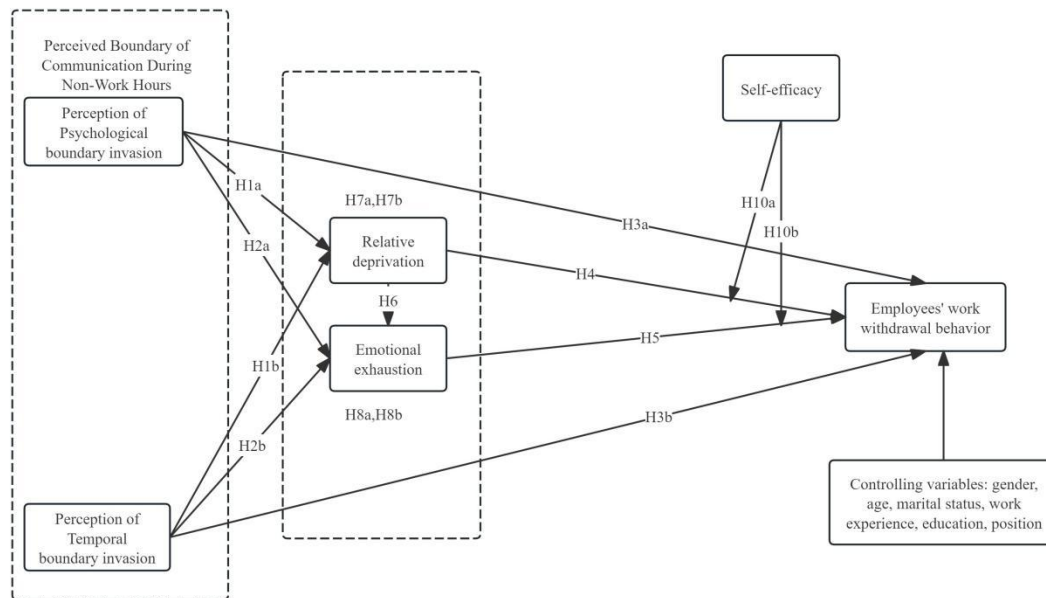


Figure 1 Theoretical Model

Table 1 Basic Information Analysis

Variable	Category	Frequency	Percentage (%)
Gender	Male	214	46
	Female	251	54
Age	25 years and below	117	25.2
	26–35 years	145	31.2
	36–45 years	98	21.1
	46–55 years	66	14.2
	56 years and above	39	8.4
Education Level	Bachelor's degree	69	14.8
	Master's degree	247	53.1
	Doctoral degree	149	32
Work Experience	1 year and below	94	20.2
	1–3 years	107	23
	4–6 years	131	28.2
	7–10 years	84	18.1
	Over 10 years	49	10.5
Marital Status	Married	256	55.1



Variable	Category	Frequency	Percentage (%)
Position	Unmarried	209	44.9
	Full-time Teacher	227	48.8
	Administrative Staff and Others	159	34.1
	Non-full-time Counselor	79	17
Total		465	100

According to the Table, regarding gender distribution, males accounted for 46% (214 participants), while females accounted for 54% (251 participants), indicating that the sample included slightly more female participants than male participants.

In terms of age distribution, employees aged 25 years and below constituted 25.2% (117 participants), reflecting a significant proportion of young employees. The largest age group was 26–35 years, accounting for 31.2% (145 participants), suggesting a high concentration of individuals in the early to mid-stages of their careers. Employees aged 36–45 years accounted for 21.1% (98 participants), representing the middle-aged segment. Those aged 46–55 years constituted 14.2% (66 participants), while employees aged 56 years and above accounted for 8.4% (39 participants), indicating a relatively small proportion of older employees.

Regarding education level, 14.8% (69 participants) held a bachelor's degree, a relatively small proportion. The majority held a master's degree, comprising 53.1% (247 participants), followed by 32% (149 participants) holding a doctoral degree. This demonstrates that the sample had a generally high educational background, consistent with the occupational characteristics of university employees.

In terms of work experience, employees with 1 year or less accounted for 20.2% (94 participants), 1–3 years accounted for 23% (107 participants), and 4–6 years accounted for 28.2% (131 participants), indicating that employees with 1–6 years of experience made up the majority. Those with 7–10 years of experience accounted for 18.1% (84 participants), and employees with more than 10 years of experience accounted for 10.5% (49 participants).

Regarding marital status, married employees accounted for 55.1% (256 participants), representing a slightly higher proportion compared to unmarried employees, who accounted for 44.9% (209 participants). This reflects a balanced distribution between married and unmarried groups, with a slight dominance of those with family responsibilities.

In terms of position, full-time teachers constituted the largest occupational group, accounting for 48.8% (227 participants). Administrative staff and others accounted for 34.1% (159 participants), while non-full-time counselors represented 17.0% (79 participants).





Table 2 Correlation Analysis

Variables	PPBV	PTBV	RD	EE	WWB	SE
PPBV	1					
PTBV	.439**	1				
RD	.459**	.462**	1			
EE	.400**	.506**	.452**	1		
WWB	.511**	.461**	.522**	.462**	1	
SE	.212**	.269**	.186**	.192**	.252**	1

The correlation coefficients among the main variables, including Psychological Boundary Invasion Perception (PPBV), Temporal Boundary Invasion Perception (PTBV), Relative Deprivation (RD), Emotional Exhaustion (EE), Work Withdrawal Behavior (WWB), and Self-Efficacy (SE), are presented below.

Psychological Boundary Invasion Perception (PPBV) showed the strongest positive correlation with Work Withdrawal Behavior (WWB) ( $r = 0.511$ ,  $p < 0.01$ ). It was moderately correlated with Temporal Boundary Invasion Perception (PTBV) ( $r = 0.439$ ,  $p < 0.01$ ), Relative Deprivation (RD) ( $r = 0.459$ ,  $p < 0.01$ ), and Emotional Exhaustion (EE) ( $r = 0.400$ ,  $p < 0.01$ ). Temporal Boundary Invasion Perception (PTBV) demonstrated a moderate positive correlation with Relative Deprivation (RD) ( $r = 0.462$ ,  $p < 0.01$ ) and a relatively higher correlation with Emotional Exhaustion (EE) ( $r = 0.506$ ,  $p < 0.01$ ). PTBV also showed a moderate positive correlation with Work Withdrawal Behavior (WWB) ( $r = 0.461$ ,  $p < 0.01$ ).

Relative Deprivation (RD) had the strongest positive correlation with Work Withdrawal Behavior (WWB) ( $r = 0.522$ ,  $p < 0.01$ ), and a moderate positive correlation with Emotional Exhaustion (EE) ( $r = 0.452$ ,  $p < 0.01$ ).

Emotional Exhaustion (EE) exhibited a relatively high positive correlation with Work Withdrawal Behavior (WWB) ( $r = 0.462$ ,  $p < 0.01$ ).

Self-Efficacy (SE) showed relatively low correlations with all other variables, with correlation coefficients ranging from  $r = 0.186$  to  $r = 0.269$ . This suggests that Self-Efficacy may serve more as a moderating variable rather than a direct influencing factor in this study.

## Conclusion

### Major Findings

This study, based on Boundary Theory and the Cognitive-Affective-Behavioral Model, explored the impact mechanism of after-hours electronic communication boundary invasion perception on employees' work withdrawal behavior. Through empirical analysis of data



collected from 465 university employees, several key findings emerged:

First, both psychological and temporal boundary invasion perceptions significantly and positively influenced employees' relative deprivation and emotional exhaustion. Second, relative deprivation and emotional exhaustion mediated the relationship between boundary invasion perception and work withdrawal behavior, with a significant chain mediation effect. Third, emotional exhaustion was found to positively predict work withdrawal behavior. Finally, self-efficacy played a significant moderating role, attenuating the negative impacts of relative deprivation and emotional exhaustion on work withdrawal behavior. These findings highlight the complex cognitive and emotional pathways through which boundary invasion affects employees' disengagement behaviors.

### Theoretical Contributions

This research contributes to the literature in several ways.

Firstly, it expands the application of Boundary Theory by introducing after-hours electronic communication as a salient boundary invasion factor in the digital era. Secondly, it enriches the Cognitive-Affective-Behavioral Model by empirically verifying the sequential mediation role of relative deprivation and emotional exhaustion. Thirdly, by identifying self-efficacy as a moderating factor, the study sheds light on the boundary conditions under which boundary invasion exerts its influence, offering a more nuanced understanding of employee coping mechanisms.

### Practical Implications

The study offers valuable insights for organizational management practices. Enterprises should establish clear boundaries for after-hours communication to protect employees' psychological and temporal recovery needs. Leaders should be mindful of employees' perceptions of fairness and emotional well-being, providing timely support to mitigate feelings of deprivation and exhaustion. Additionally, organizations are encouraged to implement training programs to enhance employees' self-efficacy, thereby strengthening their resilience against work-related stressors and promoting sustained engagement and performance.

### Limitations and Future Research Directions

Despite its contributions, this study has certain limitations. Firstly, the cross-sectional design limits causal inference; future studies could adopt longitudinal designs to verify the dynamic evolution of boundary invasion effects. Secondly, the sample was drawn from university employees in China, which may restrict the generalizability of the findings. Future research should include diverse industries and cultural contexts. Finally, other potential moderators, such as organizational support, work centrality, or personality traits (e.g., neuroticism), could be incorporated to further explore the boundary conditions affecting the





impact of after-hours electronic communication.

## References

- Ashforth, B. E., Kreiner, G. E., & Fugate, M. (2000). All in a day's work: Boundaries and micro role transitions. *Academy of Management Review*, 25(3), 472–491.  
<https://doi.org/10.5465/amr.2000.3363315>
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman.
- Derks, D., van Duin, D., Tims, M., & Bakker, A. B. (2015). Smartphone use and work–home interference: The moderating role of social norms and employee work engagement. *Journal of Occupational and Organizational Psychology*, 88(1), 155–177.  
<https://doi.org/10.1111/joop.12083>
- Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist*, 44(3), 513–524. <https://doi.org/10.1037/0003-066X.44.3.513>
- Judge, T. A., & Zapata, C. P. (2015). The person–situation debate revisited: Effect of situation strength and trait activation on the validity of the Big Five personality traits in predicting job performance. *Academy of Management Journal*, 58(4), 1149–1179.  
<https://doi.org/10.5465/amj.2010.0837>
- Lehman, W. E. K., & Simpson, D. D. (1992). Employee substance use and on-the-job behaviors. *Journal of Applied Psychology*, 77(3), 309–321. <https://doi.org/10.1037/0021-9010.77.3.309>
- Luthans, F. (2002). Positive organizational behavior: Developing and managing psychological strengths. *Academy of Management Executive*, 16(1), 57–72.  
<https://doi.org/10.5465/ame.2002.6640181>
- Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology*, 52, 397–422. <https://doi.org/10.1146/annurev.psych.52.1.397>
- Park, Y., Fritz, C., & Jex, S. M. (2011). Relationships between work–home segmentation and psychological detachment from work: The role of communication technology use at home. *Journal of Occupational Health Psychology*, 16(4), 457–467.  
<https://doi.org/10.1037/a0023594>
- Schwarzer, R., & Jerusalem, M. (1995). Generalized self-efficacy scale. In J. Weinman, S. Wright, & M. Johnston (Eds.), *Measures in health psychology: A user's portfolio. Causal and control beliefs* (pp. 35–37). NFER-Nelson.
- Smith, H. J., Pettigrew, T. F., Pippin, G. M., & Bialosiewicz, S. (2012). Relative deprivation: A theoretical and meta-analytic review. *Personality and Social Psychology Review*, 16(3), 203–232. <https://doi.org/10.1177/1088868311430825>
- Sonnentag, S., & Fritz, C. (2015). Recovery from job stress: The stressor–detachment model as an





integrative framework. *Journal of Organizational Behavior*, 36(S1), S72–S103.

<https://doi.org/10.1002/job.1924>

Tepper, B. J., Henle, C. A., Lambert, L. S., Giacalone, R. A., & Duffy, M. K. (2008). Abusive supervision and subordinates' organization deviance. *Journal of Applied Psychology*, 93(4), 721–732. <https://doi.org/10.1037/0021-9010.93.4.721>

