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Wong, George Yui-Lam; Kwok, Ron Chi-Wai; Zhang, Shanshan; Lai, Gabriel Chun-Hei; Li, Yanyan; Cheung, Jessica Choi-Fung

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**Exploring The Consequence of Information Communication
Technology-Enabled Work During Non-Working Hours: A Stress
Perspective**

George Yui-Lam Wong^a, Ron Chi-Wai Kwok^a, Shanshan Zhang^{b, *}, Gabriel
Chun-Hei Lai^a, Yanyan Li^c, Jessica Choi-Fung Cheung^a

^a *Department of Information Systems, City University of Hong Kong, Hong Kong, China*

^b *School of Management, Zhejiang University of Technology, Hangzhou, China*

^c *School of Humanities, Chang'an University, Xi'an, China*

* Corresponding author at School of Management, Zhejiang University of Technology, Boyi Building A, 204, Xihu District, Hangzhou, China; zshanshan2-c@my.cityu.edu.hk; +86 13215514801

Exploring the consequence of information communication technology-enabled work during non-working hours: A stress perspective

Abstract

Purpose—This study aims to examine the impact of information communication technology-enabled work during non-working hours (ICT-enabled WNWH), as a source of stress, on employee behavioral outcomes—in-role job performance, organizational citizenship behaviors (OCBs) that benefit organizations, and OCBs that benefit individuals, through emotional responses—work exhaustion, nonwork exhaustion, and organization-based self-esteem. As the COVID-19 lockdowns demonstrated that employees frequently engage in ICT-enabled WNWH, studying stress induced by ICT-enabled WNWH is essential for understanding employee adaptation to the work-from-home trend that emerged from COVID-19 lockdowns.

Design/methodology/approach—A quantitative survey comprising 1,178 employees in China was conducted, and the data reliability and validity were confirmed. Partial least squares structural equation modeling analysis was employed to test the hypotheses.

Findings—The study results empirically proved that, although ICT-enabled WNWH had significant effects on employee behavioral outcomes, the related emotional responses were the mediators of the stress transmission mechanism that directly affected employee behavioral outcomes. Notably, work exhaustion and organization-based self-esteem partially mediate the stress transmission mechanism, while nonwork exhaustion exerts a full mediating effect.

Originality—This study proposes the stress transmission mechanism of ICT-enabled WNWH and delineates emotional responses regarding the work environment attributes of ICT-enabled WNWH, an approach rarely seen in prior IS studies. To our best knowledge, this study is the first to identify and empirically demonstrate organization-based self-esteem as one among the emotional responses to ICT-enabled WNWH. Furthermore, it expands understanding of the holistic impacts of ICT-enabled WNWH, which is lacking in IS literature.

Keywords Information communication technology-enabled work, Job performance, Workplace stress, Organizational citizenship behavior, Organization-based Self-esteem

Article classification Empirical research

1. Introduction

Employee perceptions of information communication technology-enabled work during non-working hours (ICT-enabled WNW) evolve with technological progress (Adisa *et al.*, 2021; Dery *et al.*, 2014; Khalid *et al.*, 2021). Recently, engagement in ICT-enabled WNW has become prevalent among employees, especially following the COVID-19-induced lockdowns (Chen and Karahanna, 2018; Khalid *et al.*, 2021; Yener *et al.*, 2021). Notably, ICT-enabled WNWs differ from those supported by traditional communication technology. For instance, mobile devices such as smartphones perform many functions beyond those of non-smart devices. Thus, employees can do more with mobile devices, resulting in dynamic resource exchanges between work and nonwork domains and complicated employee perceptions (Harris *et al.*, 2022; Ragsdale and Hoover, 2016; Ragu-Nathan *et al.*, 2008).

The effects of ICT-enabled WNWs in prior studies vary, most being classified as negative or a source of stress. For instance, ICT allows for the unpredictable and frequent intrusion of work into personal life because of extended working hours and excessive job demands (e.g., Ayyagari *et al.*, 2011; Harris *et al.*, 2022; Khalid *et al.*, 2021). Contrarily, other studies commend the versatility, connectivity, and ubiquity of mobile devices and appreciate the advantages of cross-domain multitasking and a flexible workplace and schedule (e.g., Chen and Karahanna, 2018; Ragsdale and Hoover, 2016; Tennakoon *et al.*, 2013). This background explains why some economies, such as France, Germany, and Italy, establish laws or policies on employees' "right to disconnect," which is the right to refuse ICT-enabled WNW. Others consider ICT-enabled WNW to be constructive and necessary in the current digital era. Overall, there is no comprehensive and mutually agreeable conclusion on the impacts of ICT-enabled WNW (Chen and Karahanna, 2018; Khalid *et al.*, 2021; Yener *et al.*, 2021).

Many information systems (IS) scholars have examined how ICT-enabled WNW

can demand or exchange resources with the nonwork domain when it is regarded as a mere activity or behavior (e.g., Adisa *et al.*, 2021; Chen and Karahanna, 2018; Meske and Junglas, 2020; Sarker *et al.*, 2018). Indeed, ICT-enabled WNW_H has created a unique work environment for employees: employees need not be present at the office, meet colleagues or clients in person, or interact with company computer systems on-site to experience the tension or ease of work as vividly as the traditional in-person experience. However, scholars have rarely considered ICT-enabled WNW_H as a unique work environment and examined the subsequent processes in which it affects employee behavioral outcomes through their positive and negative emotional responses. Without a holistic view of the impacts of ICT-enabled WNW_H, software engineers may not develop fit-to-purpose IT solutions to optimize the costs and benefits of ICT-enabled WNW_H. Employers may face challenges in using ICT effectively to achieve better organizational outcomes without compromising employee well-being. Policymakers may also make misguided decisions. Therefore, more effort is needed to comprehend what employees appraise as ICT-enabled WNW_H and how ICT-enabled WNW_H affects employee behavioral outcomes. This knowledge is expected to contribute to the fierce debate in the relevant literature. It also applies to the work-from-home trend that emerged from COVID-19 lockdowns.

Given the growing reliance on ICT and the deficiency of extant research, this study focuses on the ICT-enabled WNW_H phenomenon. The purpose of this study is to help create a better ICT-enabled work environment by obtaining a holistic view of ICT-enabled WNW_H. In particular, this study aims to examine the impact of ICT-enabled WNW_H, as a source of stress, on employee behavioral outcomes. It applies the theory of stress (Lazarus and Folkman, 1984) to depict the stress transmission mechanism of ICT-enabled WNW_H, where ICT-enabled WNW_H, as a stressor, triggers employee emotional responses that lead to their behavioral outcomes. It designs to manifest the behavioral outcomes of ICT-enabled WNW_H

as employee in-role job performance, organizational citizenship behaviors (OCBs) that benefit organizations, and OCBs that benefit individuals. Regarding employee emotional responses to ICT-enabled WNWH, this study draws on the appraisal theory of emotion (Lazarus, 1999) and proposes three emotional responses with regard to the work environment attributes of ICT-enabled WNWH. The three emotional responses are work exhaustion, nonwork exhaustion, and organization-based self-esteem. Overall, it hypothesizes that, although ICT-enabled WNWH has significant effects on employee behavioral outcomes, the related emotional responses are the mediators that directly affect employee behavioral outcomes.

2. Theoretical foundation and hypotheses development

This section introduces the concept of stress, stress transmission mechanism, and ICT-enabled WNWH in the IS literature. It expands on the discussion of the relationship between ICT-enabled WNWH and employee behavioral outcomes and the delineation of the potential emotional responses regarding the work environment attributes of ICT-enabled WNWH. Further, it elaborates on the design of the proposed stress transmission mechanism of ICT-enabled WNWH and the rationales of hypotheses regarding the effects of ICT-enabled WNWH.

2.1. Stress and stress transmission mechanism in the ICT-enabled workplace

Stress is a major interdisciplinary concept critical for health and performance in various aspects (Lazarus, 1999). An event or a stressor triggers a person to react to it (Selye, 1978). These reactions can have significant implications for understanding human adaptation to the situational factors of that particular event, leading to various behavioral outcomes (Lazarus, 1999; Lazarus and Folkman, 1984). People's reactions to the same stressor often differ per their cognitive appraisal of the stressor. Hence, according to the theory of stress (Lazarus and Folkman, 1984), stress is not simply a variable but a transmission mechanism comprising

various variables and the interactions between personal and environmental factors. According to Lazarus and Folkman (1984), a stress transmission mechanism begins with a source of stress (may it be any environmental factors experienced by a person)—the stressor, which triggers the person's immediate reactions—emotional responses, and results in the subsequent outcomes—behavioral outcomes.

Studying stress in the workplace is essential for understanding employee adaptation to the work environment. Stress in the workplace arises from a variety of sources within organizations, such as organizational changes, role and job changes, and even environmental conditions, such as heat, cold, and noise (Quick, 1998; Quick and Quick, 1979). Some scholars identified seven sources of stress in workplaces, namely inter-unit conflict, technical problems, efficiency problems, role frustration, staff shortages, short lead times, and too many meetings (Parasuraman and Alutto, 1981). As technology developed, the technological adoption of employees became one of the significant sources of stress (Nelson, 1990; Brod, 1984). Employees were required continually increase their interaction with ICTs, leading to ineffective coping with technology and resulting in symptoms like perceived work overload, demoralized and frustrated users, information fatigue, loss of motivation, and dissatisfaction at work (Ragu-Nathan *et al.*, 2008; Brod, 1984). Scholars call for more studies on the process of workplace stressors (LePine *et al.*, 2016), particularly the negative effects of technology-enabled work (Ayyagari *et al.*, 2011; Tarafdar *et al.*, 2015) because it triggers negative psychological responses that threaten job performance (Agogo and Hess, 2018). Especially to ICT-enabled WNW, Chen and Karahanna (2018), Jarvenpaa and Lang (2005), and Khalid *et al.* (2021) suggest both positive and negative effects on work and nonwork outcomes demand serious attention for a holistic conclusion. Thus, this research probes the holistic effects of ICT-enabled WNW on behavioral outcomes and the mediating effects in-between from the stress perspective (Lazarus and Folkman, 1984). The study is particularly applicable

to stakeholders of the global labor market in this digital era, where most employees are adapting to the work-from-home trend that emerged from COVID-19 lockdowns.

2.2. ICT-enabled WNW as a stressor in the ICT-enabled workplace

ICT-enabled WNW has gained much scholarly attention in different disciplines because it exerts a crucial effect on employee well-being and organizational outcomes (e.g., Barley *et al.*, 2011; Boswell *et al.*, 2016; Butts *et al.*, 2015; Derks *et al.*, 2016; Ferguson *et al.*, 2016). IS research on ICT-enabled WNW has focused chiefly on its dark side, largely ignoring its bright side. Even so, there is no comprehensive and mutually agreeable conclusion (Chen and Karahanna, 2018; Khalid *et al.*, 2021; Yener *et al.*, 2021). The constant connectivity of ICT-enabled WNW may extend workplace stress to homes (Adisa *et al.*, 2021; Ayyagari *et al.*, 2011; Harris *et al.*, 2022; Sarker *et al.*, 2018). Employees who perceive ICT-enabled WNW negatively regard it as even more detrimental than high job pressure regarding the long working hours and work overload (Prasopoulou *et al.*, 2006; Tarafdar *et al.*, 2010; Ter Hoeven *et al.*, 2016; Vujic, 2017; Yener *et al.*, 2021; Yin *et al.*, 2018). ICT-enabled WNW blurs the distinction between work and nonwork domains, as life is interrupted frequently and unpredictably, generating work-family conflicts (Boswell and Olson-Buchanan, 2007; Duxbury *et al.*, 1992; Khalid *et al.*, 2021; Ter Hoeven *et al.*, 2016; Wright *et al.*, 2014).

Contrarily, employees who perceive ICT-enabled WNW positively commend it for its high permeability, compressing time and distance (Chen and Karahanna, 2018; Meske and Junglas, 2020; Tennakoon *et al.*, 2013). The versatility and ease of use of mobile devices support multitasking, task coordination, and faster work (Li and Lin, 2018; Richardson and Benbunan-Fich, 2011). ICT-enabled WNW allows employees to achieve constructive outcomes, such as peace of mind, a sense of self, effective communication, and authority and status reinforcement (Dery *et al.*, 2014; Oh and Park, 2016; Ragsdale and Hoover, 2016), by maintaining effective communication and enhancing work efficiency (Chen and Karahanna,

2018; Jarvenpaa and Lang, 2005).

Indeed, ICT-enabled WNWHS entails that the workplace is no longer necessarily a discrete physical location; work time can be extended beyond official working hours. Nevertheless, it does not negate the tension or ease of work employees feel in the traditional workplace (Abelsen *et al.*, 2021; Adisa *et al.*, 2021; Dery *et al.*, 2014; Espinosa *et al.*, 2015; Khalid *et al.*, 2021). Yet, prior IS studies rarely conceptualize how the ICT-enabled WNWHS, as a source of workplace stress, shape employees' cognitive appraisal, affecting emotional responses and, ultimately, behavioral outcomes, which may explain the inconsistent conclusions on the effects of ICT-enabled WNWHS. Hence, this study proposes that ICT-enabled WNWHS can be regarded as a stressor, and the theory of stress (Lazarus and Folkman, 1984) can help illustrate its stress transmission mechanism, where ICT-enabled WNWHS with its unique work environment attributes influence employee behavioral outcomes through emotional responses. The direct relationship between ICT-enabled WNWHS and behavioral outcomes in the stress transmission mechanism is first elaborated in the next section.

2.3. Predicting behavioral outcomes of ICT-enabled WNWHS

One of the most examined work-related behavioral outcomes is employee job performance (Halbesleben and Bowler, 2007). Most IS scholars explored the impacts of ICT-enabled WNWHS on in-role job performance (Chen and Karahanna, 2018; Khalid *et al.*, 2021; Li and Lin, 2018), refers to employees' performance in fulfilling formal job tasks assigned that is monitored and recognized by employers (Halbesleben and Bowler, 2007; Tourigny *et al.*, 2013). Additionally, this study notes that studying extra-role job performance is also necessary. Extra-role job performance can be further classified into OCBs that benefit organizations, referring to the discretionary actions by employees to reciprocate organizational treatment, and OCBs that benefit individuals, referring to the behaviors that maintain interpersonal relationships and solicit social support from co-workers (Ozer, 2011).

Both OCBs can enhance organization efficiency and effectiveness (Ozer *et al.*, 2014). They are vital to the success of organizations and employment opportunities (Tourigny *et al.*, 2013). Therefore, in this study, three aspects of job performance—in-role job performance, OCBs that benefit organizations, and OCBs that benefit individuals, are investigated to manifest the various impacts of ICT-enabled WNWH on employee behavioral outcomes.

Halbesleben and Bowler (2007) indicate that employee-specific emotional responses are often the crucial factors that directly affect employee work-related behavioral outcomes. Given that ICT-enabled WNWH allows employees to feel tension or ease in their interaction with work, its environmental aspect can shape employees' cognitive appraisal and the associated emotional responses. Prior IS studies show that ICT-enabled WNWHs demanded or exchanged resources with the nonwork domain from a perspective where it was a mere activity or behavior (e.g., Adisa *et al.*, 2021; Chen and Karahanna, 2018; Meske and Junglas, 2020; Sarker *et al.*, 2018). They rarely associate employees' cognitive appraisal with the environmental factors known to influence emotional responses strongly (Lazarus, 1999). Therefore, this study suggests that approaching ICT-enabled WNWH anew, considering its unique work environment structure (Pierce *et al.*, 2004), is necessary to understand the related positive and negative emotional responses and obtain more meaningful predictions of employee behavioral outcomes of ICT-enabled WNWH. The potential positive and negative emotional responses to ICT-enabled WNWH are delineated in the following section.

2.4. Emotional responses regarding the work environment attributes of ICT-enabled WNWH

Emotional response, as per the appraisal theory of emotion (Lazarus, 1999), is a product of a person's cognitive appraisal of the environmental factors of a stressor. Whenever a person encounters a situation, they will appraise it; their appraisals shape their emotional responses that encompass their subsequent behaviors (Lazarus, 1999). As noted above, ICT-enabled

WNWH entails a different and new communication mode, redefines organizational structures, and reinterprets interpersonal interactions and employee-organization relationships (Dery *et al.*, 2014; Ragu-Nathan *et al.*, 2008). It creates a unique and novel work environment (Adisa *et al.*, 2021; Chen and Karahanna, 2018), inducing particular employee responses to specific attributes (Pierce and Gardner, 2004). The delineation of the emotional responses to ICT-enabled WNWH begins by conceptualizing the work environment attributes of ICT-enabled WNWH. According to Pierce *et al.* (2004), three aspects characterize a work environment structure: technology, autonomy, and participative decision-making. These aspects imply employees' control over work-related factors, such as job design, work plan and schedule, and staff deployment, trigger their emotional responses to the work environment (Pierce and Gardner, 2004). Overall, this study delineates the following three emotional responses regarding the work environment attributes of ICT-enabled WNWH.

First, ICT-enabled WNWH can provide employees with *non-routine technology* to fulfill irregular and ad-hoc job demands during non-working hours (Chen and Karahanna, 2018; Dery *et al.*, 2014). This attribute is critical to accomplishing job demands, fulfilled or unsettled job demands often relate to alleviated or aggravated work exhaustion that emerges from the work domain (Maslach and Jackson, 1981). Second, ICT-enabled WNWH has a passive and dependent characteristic that implies a *low level of autonomy* for work (Ter Hoeven *et al.*, 2016; Yener *et al.*, 2021). In ICT-enabled WNWH, employees' personal and family lives are interrupted involuntarily, and personal resources are drained unavoidably for job demands. Competition for resources between work and nonwork domains primarily causes nonwork exhaustion that emerges from the nonwork domain (Duxbury *et al.*, 1992; Harris *et al.*, 2022; Khalid *et al.*, 2021). Third, ICT-enabled WNWH can imply a *high level of employees' participative decision-making capacity*, particularly when ICT-enabled WNWH is performed because an employee's comments must be sought to make an informed decision

(Dery *et al.*, 2014; Oh and Park, 2016; Ragsdale and Hoover, 2016). It is because only essential staff or members from higher tiers in the organization can usually participate in the decision-making process. Therefore, ICT-enabled WNWH can induce employees' organization-based self-esteem as employees are respected, their value to their organizations is proven.

To summarize, this study proposes that emotional responses to ICT-enabled WNWH can be represented as *work exhaustion*, *nonwork exhaustion*, and *organization-based self-esteem*. Specifically, work exhaustion is defined as “the depletion of emotional and mental energy by work demands,” and nonwork exhaustion is “the depletion of emotional and mental energy by nonwork demands” (Chen and Karahanna, 2018). Organization-based self-esteem is the extent to which employees believe they are capable, significant, and worthy in an organization (Pierce *et al.*, 1989).

2.5. Stress transmission mechanism of ICT-enabled WNWH

This study focuses on the ICT-enabled WNWH phenomenon and regards it as a workplace stressor. It identified work exhaustion, nonwork exhaustion, and organization-based self-esteem as emotional responses to ICT-enabled WNWH regarding the related work environment attributes. It also selected employee in-role job performance, OCBs that benefit organizations, and OCBs that benefit individuals to reflect the potential impacts of ICT-enabled WNWH on behavioral outcomes. Overall, grounded in the theory of stress (Lazarus and Folkman, 1984), this study proposes the stress transmission mechanism of ICT-enabled WNWH to investigate the relationship between ICT-enabled WNWH (i.e., the stressor) and behavioral outcomes and positions emotional responses as mediators in between. The proposed stress transmission mechanism is illustrated in Figure 1 and the hypothesis development is discussed in the following section.

[Figure 1]

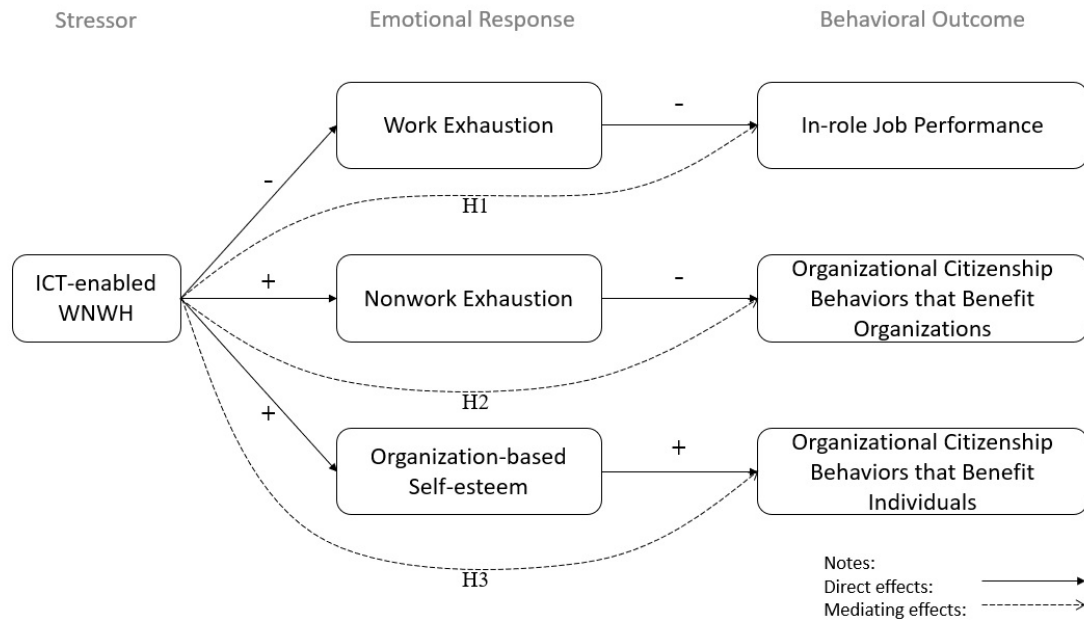


Figure 1. Stress transmission mechanism of information communication technology-enabled work during non-working hours (ICT-enabled WNWH)

2.6. Mediating effects of work exhaustion on the relationship between ICT-enabled WNWH and in-role job performance

The versatility and user-friendliness of smartphones enhance work efficiency (Chen and Karahanna, 2018; Dery *et al.*, 2014; Li and Lin, 2018; Richardson and Benbunan-Fich, 2011). Further, ICT-enabled WNWH allows employees to flexibly and effectively allocate resources to address outstanding job demands beyond working hours outside their offices at a low cost. It is especially the case in global work arrangements and situations where commuting costs are high. As outstanding job demands are fulfilled, employee in-role job performance can be improved, though at the expense of personal resources.

However, this study proposes that work exhaustion, as an emotional response to ICT-enabled WNWH, directly affects in-role job performance. When engaging in ICT-enabled WNWH, employees may initially experience alleviated work exhaustion. Therefore, they continue to invest personal resources (Hobfoll, 1989) to relieve work exhaustion, buffering

the adverse effects on in-role job performance. Thus, employees who experience higher levels of ICT-enabled WNWH are less likely to experience work exhaustion and more likely to perform well in in-role job performance. Hence, Hypothesis 1 is as follows:

H1. Work exhaustion mediates the relationship between ICT-enabled WNWH and in-role job performance.

2.7. Mediating effects of nonwork exhaustion on the relationship between ICT-enabled WNWH and OCBs that benefit organizations

Employees who have positive work-related experiences perform well in OCBs that benefit organizations and vice versa (Halbesleben and Bowler, 2007; Tourigny *et al.*, 2013). ICT-enabled WNWH can upset employees because it drains their resources to meet outstanding job demands (Ayyagari *et al.*, 2011; Duxbury *et al.*, 1992; Harris *et al.*, 2022; Khalid *et al.*, 2021; Ter Hoeven *et al.*, 2016). Thus, it can induce negative experiences and cause employees to become less motivated to work extra for their organizations, especially regarding OCBs that benefit organizations.

However, this study suggests that nonwork exhaustion, as an emotional response to ICT-enabled WNWH, directly affects OCBs that benefit organizations. ICT-enabled WNWH induces dual work-family conflicts (Edwards and Rothbard, 2000), creating a vicious cycle. First, when ICT-enabled WNWH occurs, competition for resources between work and nonwork domains aggravates nonwork exhaustion. The negative impacts of nonwork exhaustion induce employees to take corrective measures to protect their resources by refusing to engage in OCBs that benefit their organizations. Thus, employees who experience higher levels of ICT-enabled WNWH are more likely to experience nonwork exhaustion and less likely to exhibit OCBs that benefit organizations. Hence, Hypothesis 2 is as follows:

H2. Nonwork exhaustion mediates the relationship between ICT-enabled WNWH and OCBs that benefit organizations.

2.8. Mediating effects of organization-based self-esteem on the relationship between ICT-enabled WNWH and OCBs that benefit individuals

If employees have positive experiences interacting with their co-workers, they perform well in OCBs that benefit individuals (Halbesleben and Bowler, 2007; Tourigny *et al.*, 2013). ICT-enabled WNWH can convey messages of trust, compliments, and appreciation from others (Dery *et al.*, 2014; Oh and Park, 2016; Ragsdale and Hoover, 2016). This positive feedback can make employees feel excited and see ICT-enabled WNWH as an opportunity to exert their abilities and show their commitment, enhancing their OCBs that benefit individuals.

Nevertheless, this study posits that organization-based self-esteem—an emotional response to ICT-enabled WNWH—directly affects OCBs that benefit individuals. ICT-enabled WNWH enhances organization-based self-esteem, and employees' self-efficacy becomes stronger, enhancing their confidence to help other employees and be supported (Bandura, 1977). The positive effects of organization-based self-esteem are then extended, motivating employees to exhibit OCBs that benefit individuals. Thus, employees who experience higher levels of ICT-enabled WNWH are more likely to experience organization-based self-esteem and accomplish OCBs that benefit individuals. Hence, Hypothesis 3 is as follows:

H3. Organization-based self-esteem mediates the relationship between ICT-enabled WNWH and OCBs that benefit individuals.

3. Methodology

3.1. Sample and procedures

The study involved data collection using a quantitative survey to test the research model and hypotheses. The collection period lasted for a month, targeting a broad spectrum of employees with or without management duties in any occupation across mainland China,

Hong Kong, Macau, and Taiwan. The smart device penetration rates in these regions are among those highly rated worldwide (newzoo, 2020). Despite their different economic systems, their transition from labor- to knowledge-intensive system is reflected in how people work. Significantly, the rapid ICT development is changing many lifestyles (Siu *et al.*, 2002). The empirical results of this study can, thus, reflect the behaviors and perceptions of employees who play vital roles in these transitioning economies.

Invitations were sent to trade unions, associate unions, and various private companies to obtain an adequate number of employees from diverse backgrounds. The invitation email included the URL to access the questionnaire through the Qualtrics platform, which did not have any identifiers that could reveal participant information. Participation was voluntary and anonymous, and participants provided written informed consent. A gift coupon was offered as an incentive at the end of data collection. All data were used solely for analysis and were treated confidentially. The participants' email addresses were gathered only to distribute the gift coupons. They were handled separately and erased after use. The research methodology was approved by the university, further assuring that there would be no ethical issues.

The study captured 1,178 records, of which 751 were valid, as some failed the system screening, lacked consent for participation, dropped out, or had incorrect answers to the trap question. Of the 751 valid responses, 70% (30%) were females (males). Furthermore, 53% were Hong Kong residents, residents of mainland China and Taiwan each comprised 22%, and Macau residents comprised 3%. More than 70% were aged between 21 and 35 years, with 1 to 15 years of full-time work experience. They were mainly frontline employees (68%) in the import-export, wholesale, and retail trades. Only 22% were middle management staff, whereas senior executives and professionals comprised less than 10% of the sample.

3.2. Measures

The current study adopted all measures from previous studies (See Appendix A). Seven-point Likert-type scales ranging from “strongly disagree” to “strongly agree” were used for most constructs. Given that this study was conducted primarily among Chinese employees, the measurement items were back-translated from the original English to Chinese by bilingual individuals in Hong Kong.

The ICT-enabled WNWH measure was adopted from the measure of the extent of work-related cross-domain interruptions by Chen and Karahanna (2018). Moreover, the current study adopted work and nonwork exhaustion from Chen and Karahanna (2018); organization-based self-esteem from Pierce *et al.* (1989); and in-role job performance, OCBs that benefit organizations, and OCBs that benefit individuals from Williams and Anderson (1991).

Various control variables were adopted, reflecting known predictors in the literature. Demographic data on gender, age, and education level were controlled (Crum *et al.*, 2013; Doran *et al.*, 1991; Talaga and Beehr, 1995). Considering the diverse backgrounds of the participants, this study also controlled for their industries, residence locations (i.e., mainland China, Hong Kong, Macau, and Taiwan), occupational rank, job type, tenure, marital status, number of dependents, financial burden, and health condition (Brand *et al.*, 2007; Chen and Karahanna, 2018; Chi *et al.*, 2015; Doby and Caplan, 1995) for hypothesis tests. The number of dependents is the number of people who relied on the respondent for financial support, not necessarily their children (George and Brief, 1990). The financial burdens and health condition of participants were measured on seven-point Likert-type scales, respectively ranging from “little or no burden” to “extremely severe burden” and “terrible” to “excellent.”

3.3. Reliability and validity tests

Common method variance was tested using the Harman one-factor test (Harman, 1976).

Table I shows that the first unrotated factor captured was under 50% of the variance of the

data (16.7%), suggesting that common method variance was not an issue (Fuller *et al.*, 2016).

[Table I]

The survey in this study included a trap question to screen out suboptimal samples in the analysis (Liu and Wronski, 2018). Thus, more than 200 samples were eliminated because of incorrect answers to the trap question.

All multi-item scales with reflective indicators had adequate reliability, with Cronbach's alphas and composite reliabilities greater than 0.70. The factor loadings for all items exceeded 0.60, higher than the cross-loadings in all sets of confirmatory factor analyses (Afthanorhan *et al.*, 2014). Regarding discriminant validity, while the correlations between variables were smaller than the AVE square root of either construct, the AVE for most constructs was greater than 0.50 (Fornell and Larcker, 1981; Huang *et al.*, 2013), except for OCBs that benefit organizations. Regarding OCBs that benefit organizations, considering that the AVE remained greater than 0.4, and the composite reliabilities remained sufficiently high, the current results were acceptable (Afthanorhan *et al.*, 2014), supporting the reliability and validity of the scale. Table II lists the reliabilities and AVEs, while Tables IIIa and IIIb summarize the means, standard deviations, and correlations for all the study variables.

[Tables II, IIIa, and IIIb]

4. Results

4.1. Descriptive statistics and correlations of variables

The study employed partial least squares structural equation modeling analysis to test the hypotheses via SmartPLS 3.0 (Avkiran and Ringle, 2018; Hair, 2017). The procedures outlined by Zhao *et al.* (2010) were adopted to test the significance of the mediation relationships. First, the paths of an independent variable predicting mediators (Models 1 and 2) and mediators predicting dependent variables (Models 3 and 4) were tested. If both paths are significant, mediation is possible. Second, all paths of the independent variable predicting

the dependent variable via mediator (i.e., Models 5 and 6) were tested to confirm the mediation relationship. These results were utilized to classify the types of mediating effects.

4.2. Mediating effect of work exhaustion

Table IV presents results on the models predicting work exhaustion (Models 1 and 2) and its mediating effect (Models 5 and 6) and in-role job performance (Models 3 and 4). Controlling for the known predictors, ICT-enabled WNWH exerts a significant positive effect ($\beta = 0.179$, $p < 0.01$) on work exhaustion, while work exhaustion exerts a significant negative effect ($\beta = -0.094$, $p < 0.05$) on in-role job performance. Moreover, the direct positive effect of ICT-enabled WNWH on in-role job performance remains statistically significant ($\beta = 0.103$, $p < 0.01$) after including work exhaustion as a mediator. That is, work exhaustion partially and negatively mediates ($\beta = -0.112$, $p < 0.01$) the positive relationship between ICT-enabled WNWH and in-role job performance. The negative mediating effect of work exhaustion competes with the positive effects of ICT-enabled WNWH, supporting H1.

[Table IV]

4.3. Mediating effect of nonwork exhaustion

Table V presents results on the models predicting nonwork exhaustion (Models 1 and 2) and its mediation effect (Models 5 and 6) and OCBs that benefit organizations (Models 3 and 4).

Controlling for the known predictors, ICT-enabled WNWH exerts a significant positive effect ($\beta = 0.093$, $p < 0.05$) on nonwork exhaustion, while nonwork exhaustion exerts a significant negative effect ($\beta = -0.289$, $p < 0.01$) on OCBs that benefit organizations. Moreover, the direct effect of ICT-enabled WNWH is statistically insignificant after including nonwork exhaustion as a mediator. That is, nonwork exhaustion fully and negatively mediates ($\beta = -0.287$, $p < 0.01$) the relationship between ICT-enabled WNWH and OCBs that benefit organizations, supporting H2.

[Table V]

4.4. Mediating effect of organization-based self-esteem

Table VI presents results on the models predicting organization-based self-esteem (Models 1 and 2), OCBs that benefit individuals (Models 3 and 4), and the mediating effect of organization-based self-esteem (Models 5 and 6).

Controlling for the known predictors, ICT-enabled WNWH exerts a significant positive effect ($\beta = 0.092, p < 0.05$) on organization-based self-esteem, while organization-based self-esteem exerts a significant positive effect ($\beta = 0.572, p < 0.01$) on OCBs that benefit individuals. Moreover, the direct positive effect of ICT-enabled WNWH on OCBs that benefit individuals remains significant ($\beta = 0.090, p < 0.01$) after including organization-based self-esteem as a mediator. That is, organization-based self-esteem partially and positively mediates ($\beta = 0.562, p < 0.01$) the relationship between ICT-enabled WNWH and OCBs that benefit individuals and is complementary to the direct positive effect of ICT-enabled WNWH, thereby supporting H3.

[Table VI]

5. Discussion

This study aims to offer insights into creating a better ICT-enabled work environment and closing the gaps in IS literature, where the environment characteristics of ICT-enabled WNWH have not been clarified and a holistic view of its impact has not been obtained. Grounded in the theory of stress (Lazarus and Folkman, 1984), it examined the impact of ICT-enabled WNWH by proposing the stress transmission mechanism of ICT-enabled WNWH. The results illuminated the impact of ICT-enabled WNWH on employee behavioral outcomes and the mediating effects in between. All three hypotheses were supported. Nevertheless, the direct relationship between ICT-enabled WNWH and work exhaustion—one of the testing paths (see Model 2 in Table IV, H1)—was contrary to expectation.

Work exhaustion had a partial and negative mediating effect—a competitive

mediation—on the positive relationship between ICT-enabled WNWH and in-role job performance (H1). That is, ICT-enabled WNWH exerted a positive effect that improved in-role job performance, but work exhaustion hindered it. Examining the results of the direct effect of ICT-enabled WNWH on work exhaustion further, ICT-enabled WNWH only intensified work exhaustion, contradicting expectations (Chen and Karahanna, 2018; Li and Lin, 2019; Richardson and Benbunan-Fich, 2011) that it can alleviate work exhaustion. It may imply the positive potential of ICT-enabled WNWH to somewhat yield good results in in-role job performance. However, this positive potential is limited and cannot offset its negative impacts, such as the excessive stress from the extended tension of work, failing to prevent employees from experiencing work exhaustion (Ayyagari *et al.*, 2011; Chen and Karahanna, 2018; Harris *et al.*, 2022; Khalid *et al.*, 2021). Employees who suffer from work exhaustion generated by ICT-enabled WNWH would rather conserve personal resources instead of taking advantage of ICT-enabled WNWH for in-role job performance, thereby decreasing in-role job performance. Therefore, preventive actions should be taken to manage employee ICT-enabled WNWHs and avoid adverse effects.

Interestingly, nonwork exhaustion fully and negatively mediated the relationship between ICT-enabled WNWH and OCBs that benefit organizations (H2), likely because employees no longer perceive ICT-enabled WNWH as unfair treatment. Some recent studies report that employees “accepted” ICT-enabled WNWH as a normal state of work or even “appreciated” the flexibility of ICT-enabled WNWH (Chen and Karahanna, 2018; Dery *et al.*, 2014; Meske and Junglas, 2020; Tennakoon *et al.*, 2013). Accordingly, the present study confirmed that only if ICT-enabled WNWH intrudes into the nonwork domain and induces a negative emotional response—nonwork exhaustion—will employees refuse to exhibit OCBs that benefit organizations. This result may imply that an optimal level of ICT-enabled WNWH or adequate compensation for personal resources, which can minimize nonwork

exhaustion, may help improve OCBs that benefit organizations.

Further, organization-based self-esteem partially and positively mediates—a complementary mediation—the relationship between ICT-enabled WNWH and OCBs that benefit individuals (H3). That is, organization-based self-esteem amplified the positive effect of ICT-enabled WNWH on OCBs that benefit individuals. It aligned with the ICT feature of ICT-enabled WNWH, where the interactions of employees with their co-workers play a crucial role in employee appraisal of ICT-enabled WNWH (Abelsen *et al.*, 2021; Jarvenpaa and Lang, 2005; Ragsdale and Hoover, 2016). ICT-enabled WNWH may help facilitate work requiring high levels of cooperation among team members.

6. Conclusion

6.1. Theoretical contributions

This study proposes the stress transmission mechanism of ICT-enabled WNWH and delineates emotional responses regarding its work environment attributes to obtain nuanced predictions on employee work-related behavioral outcomes. The findings demonstrate that work exhaustion and organization-based self-esteem partially mediate the stress transmission mechanism, resulting in hindered in-role job performance and enhanced OCBs that benefit individuals, respectively; while nonwork exhaustion exerts a full mediating effect that hinders OCBs that benefit organizations. The study results contribute to IS research in several ways.

First, IS studies have laid the ground for research on the antecedents and (primarily negative) consequences of ICT-enabled WNWH, though without a comprehensive and mutually agreeable conclusion. Unlike prior studies that assume ICT-enabled WNWH as a mere activity or behavior that demands and drains nonwork domain resources, this study employs the theory of stress (Lazarus and Folkman, 1984) to propose a stress transmission mechanism of ICT-enabled WNWH and holistically probes how it triggers employee emotional responses that directly affect behavioral outcomes. This study sheds light on

employees' adaptation to the technology-enabled work environment amid the work-from-home trend. It also paves the way for future research on ICT-enabled WNWH to obtain more meaningful predictions of employee behavioral outcomes.

Second, this study draws on the appraisal theory of emotion (Lazarus, 1999) to delineate three emotional responses (i.e., work exhaustion, nonwork exhaustion, and organization-based self-esteem) by recognizing employees' appraisal of the identified work environment attributes of ICT-enabled WNWH. This new approach to obtaining emotional responses regarding the unique work environment structure of ICT-enabled WNWH is rarely seen in the literature. This study enriches the IS literature by conceptualizing the ICT-enabled WNWH quality that shapes employees' appraisal and emotional responses.

Third, considering the work environment attributes of ICT-enabled WNWH anew, to our knowledge, this study is the first to identify and empirically demonstrate organization-based self-esteem as the mediator of the relationship between ICT-enabled WNWH and OCBs that benefit individuals. This finding offers a new study perspective for IS researchers who primarily assumed the negative effects of ICT-enabled WNWH on employee emotional responses and work-related behavioral outcomes.

Finally, the supported hypotheses illuminate the nuances of the emergence of the positive and negative aspects of ICT-enabled WNWH, which remains lacking in the IS literature. This study demonstrates that ICT-enabled WNWH can help employees improve their in-role job performance and OCBs that benefit individuals. ICT-enabled WNWH generates organization-based self-esteem, thereby further promoting OCBs that benefit individuals. Furthermore, ICT-enabled WNWH did not fundamentally hinder in-role job performance or OCBs that benefit organizations. The decrease in in-role job performance and OCBs that benefit organizations occurred only when ICT-enabled WNWH aggravated work and nonwork exhaustion. Considering that more than 70% of the study samples aged between

21 and 35 years, these results can provide new insights into the perception of younger employees who have grown up with technology and will dominate the labor market in transitioning economies.

6.2. Practical implications

This study has practical implications to help software engineers, employers, employees, and policymakers create decent technology-enabled work environments. First, regarding technology development, fit-for-purpose IT solutions are essential to balance and protect workers' rights in the current digital world. The findings can enable software engineers to understand the bright and dark sides of ICT-enabled WNWH and develop IT solutions to improve the lockdown-induced technology-enabled work environment. Practically, software engineers can develop applications to facilitate and monitor ICT-enabled WNWHs, enhance flexibility and user-friendliness, and reduce operating costs. Applications can also record and analyze big data on employees' ICT-enabled WNWHs and habits to allow employers to manage ICT-enabled WNWHs proactively.

Employers who may have underestimated the adverse effects of ICT-enabled WNWH can consider preventive measures to protect employees from a vicious cycle that may threaten organizational outcomes. They can monitor and manage ICT-enabled WNWH to avoid overuse, establish mechanisms for feedback, improve ICT-enabled WNWH practices, and compensate for tangible and intangible resources on ICT-enabled WNWH. They can offer assistance and services to help employees fulfill their household duties disturbed by ICT-enabled WNWH. They can also establish closer bonds with their employees and subordinates, motivating them to exhibit OCBs that benefit individuals more effectively.

This study offers insights into the circumstances in which the positive impacts of ICT-enabled WNWH can motivate employees and enhance specific aspects of their job performance. Employees who may have perceived ICT-enabled WNWH negatively can

appreciate that is not necessarily an evil to avoid. Instead, it can be considered an opportunity to achieve a higher level of organization-based self-esteem, in-role job performance, and OCBs that benefit individuals.

At the public policy level, the results may help governments recognize the pressing need to revisit existing laws and regulations. The COVID-19 lockdowns have demonstrated that ICT makes remote working possible and necessary. Employers can continue developing their businesses without increasing their expenses on maintaining the physical workplace and transportation of employees. This situation can inspire technology giants to extend remote working indefinitely. Thus, the frequency and intensity of ICT-enabled WNWH more likely increases, increasing the adverse effects of ICT-enabled WNWH. Hence, governments may consider formalizing and recognizing employee efforts during non-working hours to prevent employee rights and benefit abuse. For example, ICT-enabled WNWH time can be included in regulations on maximum working hours and minimum wages.

6.3. Limitations and future research directions

This study has limitations that warrant further research. First, the findings suggest that ICT-enabled WNWH cannot alleviate work exhaustion. It does not imply that the positive impact of ICT-enabled WNWH on work exhaustion should be discounted. Instead, the potential curvilinear relation between ICT-enabled WNWH and work exhaustion and a broader range of mediators to elucidate the nuances of these relationships should be explored.

Second, from the theoretical foundation, the scope of this study model is confined to the mediating effects of the three emotional responses to specific aspects of behavioral outcomes. These emotional responses may also affect additional behavioral outcomes, which warrants exploration. Potential interactions among mediators can also be examined.

Third, the work environment attributes of ICT-enabled WNWH that inspired the emotional responses provide a new perspective for future research. A longitudinal and

matched-pair research design can help examine the relationship between employees and their families, colleagues, and organizations. The factors may be crucial to the cognitive appraisal of work environment attributes of ICT-enabled WNWH and mental and behavioral outcomes.

Finally, future research may further enlarge the sample size, access employees in economies at different stages of development, and perform cluster analysis to obtain more insights into the effects of ICT-enabled WNWH and enhance research generalizability. Future studies can also carefully consider balancing the voluntary participation principle and self-selection bias risk.

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Appendix A QUESTIONNAIRE ITEMS AND MAPPINGS OF CATEGORICAL VARIABLES

| Item no | Variables | Measurements |
|---------|--|---|
| 1 | Gender | 1/ Male; 2/ Female |
| 2 | Age | 1/ Under 21; 2/ 21 – 25; 3/ 26 – 30; 4/ 31 – 35; 5/ 36 – 40; 6/ 41 – 45; 7/ 46 – 50; 8/ 51 – 55; 9/ 56 – 60; 10/ Above 60 |
| 3 | Residence | 1/ Hong Kong; 2/ Macau; 3/ Mainland China; 4/ Taiwan |
| 4 | Education | 1/ Below High / Secondary School; 2/ High School / Secondary School; 3/ Associate Degree / Higher Diploma; 4/ Bachelor's Degree; 5/ Master's degree; 6/ Doctorate / Ph.D. |
| 5 | Industry (HKSAR, 2009) | 1/ Accommodation and food service activities; 2/ Activities of extra territorial organizations and bodies; 3/ Administrative and support service activities; 4/ Agriculture, forestry and fishing; 5/ Arts, entertainment and recreation; 6/ Construction; 7/ Education; 8/ Electricity and gas supply; 9/ Financial and insurance activities; 10/ Human health and social work activities; 11/ Import/export, wholesale and retail trades; 12/ Information and communications; 13/ Manufacturing; 14/ Mining and quarrying; 15/ Professional, scientific and technical activities; 16/ Public administration; 17/ Real estate activities; 18/ Transportation, storage, postal and courier services; 19/ Water supply; Sewerage, waste management and remediation activities; 20/ Work activities within domestic households; 21/ Other, please specify: 22/ Property/Service Industry 23/ Advertising, Marketing, PR |
| 6 | Occupation – Ranking | 1/ Employee; 2/ Middle Management; 3/ Senior Executive; 4/ Professionals |
| 7 | Occupation – Job Nature (Zomerdijk and de Vries, 2007) | 1/ Back Office (Need not directly contact with customers) 2/ Frontline (Need to directly contact with customers) |
| 8 | Total Working Years | Include all full-time job experience 1/ Less than 1 year; 2/ 1-5 years; 3/ 6-10 years; 4/ 11-15 years; 5/ 16-20 years; 6/ 21-25 years; 7/ 26-30 years; 8/ 31-40 years; 9/ More than 40 years |
| 9-11 | <i>Economic</i> | Marital Status: 1/ Single; 2/ Separated; 3/ Married |

| | | |
|--|---|---|
| 10 | <i>Choice (Doran et al., 1991)</i> | Number of Dependents: None (0); 1; 2; 9; 10 or above (Persons who rely on your financial support) |
| 11 | | Financial Burden of Family: Little or no burden (1) Extremely severe burden (7) |
| 12 | Your Health Condition | Terrible (1) Excellent (7) |
| Please indicate your responses with the following statements on a 7-point scale (1 = Strongly Disagree, 7 = Strongly Agree). | | |
| 13 | <i>Cyber-life-interruption (Chen and Karahanna, 2018)</i> <u>During my time off,</u> 1. I frequently get interrupted about work related matters through technology (phone call, email, and messaging, QQ, WeChat, WhatsApp). 2. I frequently stop what I am doing during my time off to initiate work related activities through technologies (phone call, email, and messaging, QQ, WeChat, WhatsApp). 3. Dealing with work-related interruptions initiated by others (via phone call, email, and messaging, QQ, WeChat, WhatsApp) is time-consuming. Dealing with work interruptions I initiate during my time off (via phone call, email, and messaging, QQ, WeChat, WhatsApp) is time-consuming. | |
| 14 | <i>Trap question (Liu and Wronski, 2018)</i> Please answer “Strongly Agree” for this question (This is a data quality check). | |
| 15 | <i>Organization-based self-esteem (Pierce et al., 1989)</i> 1. I am taken seriously around here. 2. I count around here. 3. I am important around here. 4. I am trusted around here. 5. There is faith in me around here. 6. I can make a difference around here. 7. I am valuable around here. 8. I am helpful around here. 9. I am efficient around here. 10. I am cooperative around here. | |
| 16 | <i>In-role job performance (Williams and Anderson, 1991)</i> 1. I adequately complete assigned duties. 2. I fulfil responsibilities specified in job description. 3. I perform tasks that are expected of me. 4. I meet formal performance requirements of the job. 5. I engage in activities that will directly affect my performance evaluation. 6. I neglect aspects of the job I am obligated to perform. (Reverse question) 7. I fail to perform essential duties. (Reverse question) | |
| 17 | <i>OCBs that benefit individuals (Williams and Anderson, 1991)</i> 1. I help others who have been absent. 2. I help others who have heavy workload. 3. I assist my supervisor with his/her work (when not asked). 4. I take time to listen to the problems and worries of my co-workers. 5. I go out of my way to help new employees. 6. I take a personal interest in other employees. 7. I pass along information to co-workers. | |

| | |
|----|---|
| 18 | <p><i>OCBs that benefit the organizations (Williams and Anderson, 1991)</i></p> <ol style="list-style-type: none"> 1. My attendance at work is above the norm. 2. I adhere to informal rules devised to maintain order. 3. I give advance notice when unable to come to work. 4. I take undeserved work breaks. (Reverse question) 5. I spend a great deal of time with personal phone conversations. (Reverse question) 6. I complain about insignificant things at work. (Reverse question) 7. I conserve and protect organizational property. |
| 19 | <p>About my feeling,</p> <p><i>Work exhaustion (Chen and Karahanna, 2018)</i></p> <ol style="list-style-type: none"> 1. I feel emotionally drained from my work. 2. I feel emotionally fatigued because of the demands of my job. 3. I feel burned out from my work. <p><i>Nonwork exhaustion (Chen and Karahanna, 2018)</i></p> <ol style="list-style-type: none"> 4. I feel emotionally drained from my personal life. 5. I feel emotionally fatigued from the demands of my personal life. 6. I feel burned out from my personal life. |

Note: Texts in Italic are the name of constructs, which were not shown in the questionnaire.

Table I
Total Variance Explained.

| Component | Initial eigenvalues | | | Extracted sums of squared loadings | | |
|-----------|---------------------|------------|--------------|------------------------------------|------------|--------------|
| | Total | % Variance | Cumulative % | Total | % Variance | Cumulative % |
| 1 | 3.172 | 16.695 | 16.695 | 3.172 | 16.695 | 16.695 |
| 2 | 3.010 | 15.842 | 32.537 | | | |
| 3 | 1.815 | 9.554 | 42.092 | | | |
| 4 | 1.599 | 8.417 | 50.508 | | | |
| 5 | 1.172 | 6.167 | 56.675 | | | |
| 6 | 1.041 | 5.480 | 62.155 | | | |
| 7 | 0.941 | 4.951 | 67.106 | | | |
| 8 | 0.924 | 4.862 | 71.968 | | | |
| 9 | 0.845 | 4.445 | 76.413 | | | |
| 10 | 0.721 | 3.795 | 80.208 | | | |
| 11 | 0.679 | 3.572 | 83.780 | | | |
| 12 | 0.581 | 3.056 | 86.836 | | | |
| 13 | 0.535 | 2.814 | 89.650 | | | |
| 14 | 0.454 | 2.388 | 92.038 | | | |
| 15 | 0.416 | 2.190 | 94.228 | | | |
| 16 | 0.353 | 1.856 | 96.084 | | | |
| 17 | 0.297 | 1.563 | 97.647 | | | |
| 18 | 0.236 | 1.241 | 98.888 | | | |
| 19 | 0.211 | 1.112 | 100.000 | | | |

Note. Extraction method: Principal component analysis.

Table II
Reliabilities and AVEs of Items Under Each Construct.

| Variable | CFA item loading | AVE | Cronbach's alpha | CR |
|---------------------------------|------------------|-------|------------------|-------|
| ICT-enabled WNWH | 0.761–0.905 | 0.751 | 0.890 | 0.923 |
| Work exhaustion | 0.951–0.966 | 0.918 | 0.955 | 0.971 |
| Nonwork exhaustion | 0.951–0.965 | 0.914 | 0.953 | 0.969 |
| Organization-based self-esteem | 0.692–0.848 | 0.641 | 0.938 | 0.947 |
| In-role job performance | 0.890–0.954 | 0.873 | 0.952 | 0.965 |
| OCBs that benefit organizations | 0.610–0.750 | 0.479 | 0.730 | 0.820 |
| OCBs that benefit individuals | 0.798–0.864 | 0.689 | 0.909 | 0.930 |

Table IIIa
Means and Standard Deviations of All Study Variables.

| Variables | <i>M</i> | <i>SD</i> | <i>CA</i> | <i>CR</i> |
|------------------------------------|----------|-----------|-----------|-----------|
| 1 Gender | 0.300 | 0.457 | N/A | N/A |
| 2 Age | 3.680 | 1.739 | N/A | N/A |
| 3 Residence | 2.120 | 1.264 | N/A | N/A |
| 4 Education | 2.920 | 1.241 | N/A | N/A |
| 5 Industry | 10.780 | 3.630 | N/A | N/A |
| 6 Occupation – ranking | 1.450 | 0.778 | N/A | N/A |
| 7 Occupation – job nature | 1.740 | 0.440 | N/A | N/A |
| 8 Years of experience | 3.160 | 1.607 | N/A | N/A |
| 9 Marital status | 1.780 | 0.961 | N/A | N/A |
| 10 Number of dependents | 1.300 | 1.387 | N/A | N/A |
| 11 Financial burden | 3.160 | 1.708 | N/A | N/A |
| 12 Health condition | 4.780 | 1.416 | N/A | N/A |
| 13 ICT-enabled WNW | 4.115 | 1.705 | 0.890 | 0.923 |
| 14 Work exhaustion | 3.325 | 1.819 | 0.955 | 0.971 |
| 15 Nonwork exhaustion | 2.978 | 1.710 | 0.953 | 0.969 |
| 16 Organization-based self-esteem | 5.142 | 1.256 | 0.938 | 0.947 |
| 17 In-role job performance | 5.677 | 1.177 | 0.952 | 0.965 |
| 18 OCBs that benefit organizations | 5.902 | 1.046 | 0.730 | 0.820 |
| 19 OCBs that benefit individuals | 5.325 | 1.241 | 0.909 | 0.930 |

Table IIIb
Correlations for All Study Variables.

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | |
|------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|------|--|
| 1 Gender | 1 | | | | | | | | | | | | | | | | | | | |
| 2 Age | 0.06 | 1 | | | | | | | | | | | | | | | | | | |
| 3 Residence | -0.08 | 0.03 | 1 | | | | | | | | | | | | | | | | | |
| 4 Education | 0.18 | 0.08 | 0.02 | 1 | | | | | | | | | | | | | | | | |
| 5 Industry | -0.08 | -0.03 | 0.05 | -0.01 | 1 | | | | | | | | | | | | | | | |
| 6 Occupation – ranking | 0.18 | 0.46 | -0.17 | 0.30 | -0.03 | 1 | | | | | | | | | | | | | | |
| 7 Occupation – job nature | -0.05 | -0.20 | -0.06 | -0.28 | 0.08 | -0.15 | 1 | | | | | | | | | | | | | |
| 8 Years of experience | 0.08 | 0.77 | 0.04 | 0.01 | -0.03 | 0.42 | -0.17 | 1 | | | | | | | | | | | | |
| 9 Marital status | -0.07 | 0.53 | -0.04 | -0.06 | -0.04 | 0.27 | -0.08 | 0.45 | 1 | | | | | | | | | | | |
| 10 Number of dependents | -0.01 | 0.28 | -0.03 | -0.08 | -0.07 | 0.21 | -0.04 | 0.28 | 0.37 | 1 | | | | | | | | | | |
| 11 Financial burden | 0.04 | 0.15 | -0.09 | -0.12 | -0.05 | 0.10 | 0.04 | 0.19 | 0.24 | 0.52 | 1 | | | | | | | | | |
| 12 Health condition | -0.00 | -0.16 | -0.05 | 0.15 | 0.04 | -0.03 | 0.06 | -0.15 | -0.08 | -0.19 | -0.24 | 1 | | | | | | | | |
| 13 ICT-enabled WNWH | 0.12 | 0.09 | -0.06 | 0.17 | -0.06 | 0.16 | 0.03 | 0.10 | 0.08 | 0.08 | 0.15 | -0.04 | 0.87 | | | | | | | |
| 14 Work exhaustion | 0.11 | 0.05 | -0.10 | 0.06 | -0.09 | 0.14 | -0.02 | 0.07 | 0.03 | 0.07 | 0.20 | -0.31 | 0.23 | 0.96 | | | | | | |
| 15 Nonwork exhaustion | 0.14 | 0.01 | -0.09 | 0.05 | -0.05 | 0.06 | 0.00 | 0.02 | -0.02 | 0.09 | 0.23 | -0.28 | 0.14 | 0.71 | 0.96 | | | | | |
| 16 Organization-based self-esteem | -0.09 | 0.05 | -0.02 | 0.02 | 0.06 | 0.13 | 0.02 | 0.06 | 0.13 | 0.08 | -0.03 | 0.28 | 0.08 | -0.28 | -0.27 | 0.80 | | | | |
| 17 In-role job performance | -0.16 | 0.04 | 0.08 | -0.00 | 0.02 | 0.07 | -0.04 | 0.08 | 0.07 | 0.05 | 0.00 | 0.23 | 0.06 | -0.16 | -0.23 | 0.68 | 0.93 | | | |
| 18 OCBs that benefit organizations | -0.20 | -0.06 | 0.09 | -0.16 | 0.00 | -0.10 | 0.15 | -0.03 | 0.06 | 0.06 | 0.04 | 0.12 | -0.08 | -0.27 | -0.31 | 0.34 | 0.46 | 0.69 | | |
| 19 OCBs that benefit individuals | -0.12 | 0.02 | 0.12 | -0.15 | 0.05 | 0.04 | 0.12 | 0.05 | 0.06 | 0.09 | 0.08 | 0.12 | 0.11 | -0.08 | -0.08 | 0.55 | 0.64 | 0.43 | 0.83 | |

Note. Items with $p < 0.05$ are in bold.

Table IV

Predicting In-Role Job Performance with Work-Related Exhaustion as Mediator.

| Variable | Testing Path | | | | | |
|-------------------------|---------------------------------------|-----------|--|-----------|--|-----------|
| | ICT-enabled WNWH → Work exhaustion | | Work exhaustion → In-role job performance | | Mediating effect of work exhaustion (Hypothesis 1) | |
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
| ICT-enabled WNWH | | 0.179*** | | | 0.094* | 0.103*** |
| Work exhaustion | | | | -0.094** | | -0.112*** |
| Gender | 0.058 | 0.045 | -0.163*** | -0.158*** | -0.169*** | -0.164*** |
| Age | -0.079 | -0.077 | -0.055 | -0.063 | -0.054 | -0.063 |
| Residence | -0.073* | -0.070* | 0.105*** | 0.098*** | 0.109*** | 0.098*** |
| Education | 0.086** | 0.049 | -0.05 | -0.042 | -0.07 | -0.062 |
| Industry | -0.063* | -0.052 | -0.003 | -0.009 | 0.002 | -0.004 |
| Occupation – ranking | 0.103** | 0.092** | 0.108*** | 0.117*** | 0.103** | 0.113*** |
| Occupation – job nature | 0.023 | 0.004 | -0.045 | -0.043 | -0.054 | -0.053 |
| Years of experience | 0.032 | 0.024 | 0.097 | 0.1 | 0.092 | 0.096 |
| Marital status | -0.006 | -0.014 | 0.014 | 0.014 | 0.011 | 0.009 |
| Number of dependents | -0.074 | -0.071 | 0.032 | 0.025 | 0.033 | 0.026 |
| Financial burden | 0.158*** | 0.134*** | 0.097 | 0.054 | 0.026 | 0.043 |
| Health condition | -0.304*** | -0.296*** | 0.273*** | 0.244*** | 0.275*** | 0.243*** |
| | | | | | | |
| R^2 | 0.154 | 0.183 | 0.115 | 0.122 | 0.123 | 0.131 |
| ΔR^2 | | 0.029*** | | 0.008*** | | 0.008*** |

Note. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table V

Predicting OCBs that Benefit Organizations with Nonwork-Related Exhaustion as Mediator.

| Variable | Testing path | | | | | |
|----------------------------|--|-----------|--|-----------|---|-----------|
| | ICT-enabled WNWH → Nonwork exhaustion | | Nonwork exhaustion → OCBs that benefit organizations | | Mediating effect of nonwork exhaustion (Hypothesis 2) | |
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
| ICT-enabled WNWH | | 0.093** | | | -0.074 | -0.04 |
| Nonwork Exhaustion | | | | -0.289*** | | -0.287*** |
| Gender | 0.103*** | 0.097*** | -0.185*** | -0.137*** | -0.176*** | -0.134*** |
| Age | -0.044 | -0.043 | -0.061 | -0.076 | -0.06 | -0.076 |
| Residence | -0.068** | -0.066* | 0.107*** | 0.069* | 0.105*** | 0.067* |
| Education | 0.090** | 0.070* | -0.121*** | -0.074* | -0.1** | -0.064 |
| Industry | -0.029 | -0.023 | -0.019 | -0.031 | -0.027 | -0.034 |
| Occupation – ranking | 0.024 | 0.018 | 0.04 | -0.014 | -0.001 | -0.013 |
| Occupation – job nature | 0.027 | 0.018 | 0 | 0.112*** | 0.115*** | 0.117*** |
| Years of experience | -0.009 | -0.014 | 0.103** | 0.035 | 0.042 | 0.036 |
| Marital status | -0.043 | -0.047 | 0.058 | 0.042 | 0.06 | 0.043 |
| Number of dependents | -0.038 | -0.037 | 0.045 | 0.039 | 0.046 | 0.039 |
| Financial burden | 0.199*** | 0.187*** | 0.037 | 0.089** | 0.042 | 0.093** |
| Health condition | -0.263*** | -0.259*** | 0.153*** | 0.076* | 0.143*** | 0.072* |
| | | | | | | |
| R^2 | 0.142 | 0.150 | 0.115 | 0.173 | 0.118 | 0.174 |
| ΔR^2 | | 0.008*** | | 0.058*** | | 0.056*** |

Note. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table VI

Predicting OCBs that Benefit Individuals with Organization-Based Self-Esteem as Mediator.

| Variable | Testing Path | | | | | |
|--------------------------------|---|-----------|--|-----------|--|-----------|
| | ICT-enabled WNW _H → Organization-based self-esteem | | Organization-based self-esteem → OCBs that benefit individuals | | Mediating effect of organization-based self-esteem (Hypothesis 3) | |
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
| ICT-enabled WNW _H | | 0.092** | | | 0.144*** | 0.090*** |
| Organization-based self-esteem | | | | 0.572*** | | 0.562*** |
| Gender | -0.108*** | -0.112*** | -0.094** | -0.044 | -0.104*** | -0.050 |
| Age | -0.016 | -0.017 | -0.046 | -0.031 | -0.045 | -0.031 |
| Residence | 0.003 | 0.014 | 0.166*** | 0.140*** | 0.169*** | 0.144*** |
| Education | -0.002 | -0.018 | -0.172*** | -0.137*** | -0.199*** | -0.155*** |
| Industry | 0.052 | 0.057 | 0.028 | -0.003 | 0.035 | 0.002 |
| Occupation – ranking | 0.161*** | 0.155*** | 0.142*** | 0.060* | 0.134*** | 0.056 |
| Occupation – job nature | 0.035 | 0.024 | 0.090** | 0.082** | 0.074** | 0.073** |
| Years of experience | 0.019 | 0.015 | 0.040 | 0.029 | 0.035 | 0.026 |
| Marital status | | | 0.004 | -0.049 | -0.002 | -0.052 |
| Number of dependents | | | 0.057 | 0.006 | 0.058 | 0.007 |
| Financial burden | | | 0.073* | 0.086** | 0.052 | 0.073** |
| Health condition | | | 0.181*** | 0.009 | 0.185*** | 0.014 |
| | | | | | | |
| R^2 | 0.035 | 0.042 | 0.112 | 0.391 | 0.129 | 0.398 |
| ΔR^2 | | 0.007*** | | 0.279*** | | 0.269*** |

Note. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

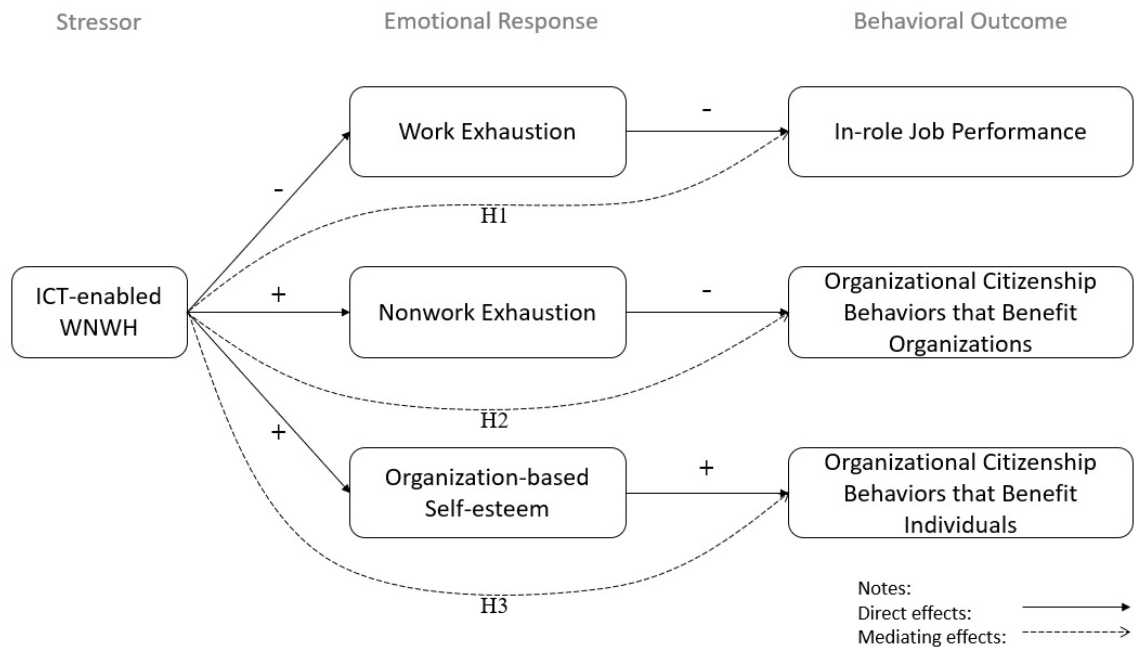


Figure 1. Stress transmission mechanism of information communication technology-enabled work during non-working hours (ICT-enabled WNWH)