ORIGINAL ARTICLE

WILEY

Identifying forms of after-hours information communication technology use and their role in psychological detachment: An episodic approach

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Abstract

Employees increasingly conduct work outside of traditional work hours via information communication technologies (ICTs). There is a need to understand how after-hours ICT use relates to well-being, given that such connectivity has become unavoidable. We implement an episodic, event-contingent design to evaluate the association between different ICT media (i.e., e-mail, phone call, chat app, short message service) and the within-person outcomes of psychological detachment as partially mediated by task productivity. A daily diary survey was collected over three consecutive workdays to capture after-hours ICT use. Daily surveys were completed by 498 individuals, with a total of 1494 episodes being captured of after-hours work ICT engagement. Our results indicate that while engagement with any form of ICT after hours reduces psychological detachment, email and chat apps are associated with the lowest levels of psychological detachment. Moreover, whereas the use of asynchronous ICT has positive main effects on episode-related task productivity, the use of synchronous ICT (e.g., phone) only enhances episode-related task productivity when there are high organizational expectations for employees' responsiveness after hours.

KEYWORDS
detachment, information communication technology, organizational expectations, organizational identification, productivity

1 | INTRODUCTION

Information communication technologies (ICTs) and ubiquitous connectivity have blurred the boundaries between work and nonwork life (e.g., Chen & Karahanna, 2014; Messersmith, 2007; Raghuram & Wiesenfeld, 2004; Schlachter et al., 2018). Organizations are increasingly moving operations into online remote settings (Fuchs & Reichel, 2023; Stewart & Menon, 2020) or deviating from standard working arrangements (Avgoustaki & Bessa, 2019; Kelliher et al., 2019). Such flexible work arrangements lead to work and nonwork demands existing, and conflicting, simultaneously. Weaving work-related tasks into after-work hours with ICT has become an increasingly common approach to juggling work and nonwork responsibilities.

Engagement in after-hours work activities is often driven by internal and external motivation for productivity gains. Indeed, research has identified benefits of after-hours work engagement. Attending to work during nonwork hours enables individuals to respond to work

emergencies and devote more resources to work demands, which contributes to better performance (Chen & Karahanna, 2018). This attention to work during nonwork time is often an organizational expectation. A study conducted among managers in the United States revealed that over 80% of supervisors contact their subordinates after hours, and over one third of those who reach out to subordinates expect a response within a few hours (Challenger, Gray, & Christmas Inc., 2017). Some workers (e.g., those with high work-related identification) may also be driven by internal forces to work during nonwork time.

As engagement after-hours has become insidious, being able to psychologically detach and recover from work (i.e., separating oneself from work-related thoughts and activities during nonwork time, Etzion et al., 1998; Sonnentag & Fritz, 2015) has become a challenge for employees (e.g., Barber & Jenkins, 2014; Becker et al., 2022; Maliszewski, 2013). Meta-analyses confirm a host of detrimental health outcomes that can result from a lack of psychological detachment from work during nonwork time, such as exhaustion, sleep problems, and lower life satisfaction (Headrick et al., 2023; Jimenez et al., 2022; Steed et al., 2021; Wendsche & Lohmann-Haislah, 2017). At the same time, after-hours engagement may allow individuals to bring pestering work-related thoughts to closure so they can better focus on their nonwork activities (Belkin et al., 2020; Syrek & Antoni, 2014). It may not be possible for some workers to fully avoid work-related ICT use after hours due to the nature of the work itself (Messersmith, 2007). Although shift workers and hourly paid employees are not often expected to remain available after hours, workers who rely on communication technology to complete their work may have greater expectations to respond to emails, messages, or calls after hours. For example, some employees work in multinational firms requiring communication with offices outside of the country, while others in industries like sales, real estate, and information technology must conduct business on the client or customer's schedule. Given this reality, it becomes crucial to protect employees' psychological detachment during the time when they are not engaged in after-hours ICT use, especially following their engagement in such use. Assessing employees' psychological detachment following such use and comparing the channels of various ICT media (i.e., phone call, e-mail, chat app, short message service/texting [SMS]) during after-hours work engagement with attention to the role of task productivity outcomes of engagement, can help shape human resource policies regarding after-hours ICT use. We also know from prior research that after-hours engagement driven by organizational expectations can be especially problematic for detachment (e.g., Becker et al., 2022; Belkin et al., 2020). There is a need to understand how ICT use can be simultaneously less harmful for psychological detachment and more helpful for task productivity and how the drivers of engagement (e.g., expectations and identification) may influence the effects.

In this study, we aim to provide a nuanced view of after-hours ICT use by examining within-person experiences regarding ICT use, episode task productivity, and post-episode detachment across drivers of engagement (i.e., organizational expectations and

identification). Based on media synchronicity theory (Dennis et al., 2008), we isolate the detachment outcomes of different channels of after-hours work engagement. Media synchronicity theory (Dennis et al., 2008) suggests that different mediums of technology allow for differing levels of synchronous communication (i.e., the extent to which interactions occur in real time) between two or more parties. We integrate this theory with the stressor-detachment model (Sonnentag, 2010; Sonnentag & Fritz, 2015) to explain why different mediums may relate differently to detachment. We also include perceived episode-related task productivity (hereafter, called task productivity), that is, how much the worker feels they were able to accomplish during the episode (Cameron & Webster, 2013), because research indicates that unfinished tasks can weigh on employees during nonwork time (Syrek & Antoni, 2014). Some scholars have alluded to the importance of task completion during the episode for employee well-being (Belkin et al., 2020). However, a theoretical framework incorporating this factor and testing these relationships is lacking in the literature despite the fundamental importance of task completion on detachment (Syrek & Antoni, 2014).

This study makes three primary theoretical contributions. First, we provide insights into how channels of ICT use may affect task productivity and subsequent psychological detachment differently. Our understanding of after-hours ICT use has been mainly based on studies that examine this phenomenon at an aggregate level and focus on its effects accumulated across occurrences. A recent review indicates that most studies to date on the connection between ICTs and well-being have evaluated work-related technology use fairly broadly within the work domain or the nonwork domain, with little attention to characteristics (e.g., form of technology use) of specific episodes during which the ICT use takes place (Schlachter et al., 2018). While some studies have focused on one type of ICT (e.g., smartphone use; Lanaj et al., 2012; Ohly & Latour, 2014; Rosen et al., 2019), organizations and employees communicate across a variety of platforms and devices that may have differing effects on outcomes (Chen & Casterella, 2018). By studying the specific technology used in each episode (i.e., phone call, e-mail, chat app, and SMS), our research increases understanding of how differing channels may influence outcomes. This not only provides helpful information from a theory perspective, but also provides human resource practitioners and managers with knowledge on the impacts of each form.

Second, we investigate the episode-level dynamics between task productivity and detachment. We not only juxtapose these positive and negative effects of after-hours ICT use, but also assess the influence of episode task productivity on subsequent detachment. Most of the existing domain-level studies aggregate numerous episodes of ICT use and capture their collective impact on the professional and personal spheres of life. These domain-level studies present psychological consolidation of past episodes from memory (Maertz Jr & Boyar, 2011). Although informative, they do not capture the possibility that each episode of after-hours ICT use may possess unique elements that influence employee outcomes. Our approach allows us to integrate the relationships between after-hours ICT use, episode task productivity, and post-episode detachment. This integration of the

early literature on after-hours ICT use, which focused more on productivity, with the more recent literature, which focuses more on well-being, provides a more precise picture for managers. Furthermore, the literature on after-hours technology use has pointed to expectations as the primary culprit of difficulty detaching and has also noted that task productivity is an upside to after-hours use due to its ability to put unfinished tasks to rest (Belkin et al., 2020; Syrek & Antoni, 2014). Our study proposes and tests the factors in an model using an event-contingent design. This is important given that engagement in after-hours ICT use may be unavoidable in some forms of work.

Finally, by integrating media synchronicity and stressor-detachment theories, we identify key characteristics for consideration in an episode level model of after-hours ICT use and detachment. We include in our model potential boundary conditions related to the reasons for engagement in after-hours ICT use at the between-person level. Based on prior literature, expectations for monitoring electronic communications after hours are key in the outcomes of after-hours engagement (e.g., Becker et al., 2021; Belkin et al., 2020). Yet, we do not know how these expectation effects could be altered by the medium of communication technology. Since engagement in after-hours ICT use requires some form of motivation, we explore both this previously identified external motivation (i.e., expectations) alongside a more internally driven motivation to engage (i.e., identification). Identification could be viewed as a "positive" reason for engagement, yet it is still expected to increase engagement and disrupt detachment. Our findings in this regard have the potential to push the literature on after-hours ICT use to consider multiple drives in theoretical models, and may help practitioners understand why certain policies designed to increase detachment may not be effective (e.g., high identifiers may not respond to these policies). This exploration of motivators points to the possible dark sides of organizational identification via overinvestment in work, an area where scholars have called for more clarification and development (Conroy et al., 2017).

2 | THEORETICAL FRAMEWORK AND HYPOTHESES

Psychological detachment is defined as an individual's feeling of being away or separate from their work (Etzion et al., 1998), and disengaging from thoughts and activities that are associated with their work (Sonnentag & Fritz, 2015). Detachment is one form of recovery experience that ultimately results in the reduction of psychological and physical strain stemming from work stressors and demands (Headrick et al., 2023; Jimenez et al., 2022; Sonnentag & Fritz, 2007; Steed et al., 2021; Wendsche & Lohmann-Haislah, 2017). The stressor-detachment model suggests that job stressors negatively influence psychological detachment from work during nonwork time and in turn increase long-term strain and impair well-being. We focus our efforts particularly on the part of the model where exposure to job stressors leads to less detachment.

Job stressors, defined as aspects of the work environment that result in strain reactions (Kahn & Byosiere, 1992), can fall within different categories such as role stressors, task stressors, and social stressors (Sonnentag & Frese, 2012). We use media synchronicity theory (Dennis et al., 2008) to conceptualize ICT use during nonwork time as a trigger for reexperiencing or anticipating task-related job stressors. Sonnentag and Fritz (2015) noted that stressors can "remain mentally present" when they are revisited during nonwork hours. Media synchronicity theory addresses *how* the stressor is revisited. For example, asynchronous communications (e.g., email) will receive a different type of mental presence than synchronous communications (e.g., phone calls). Both bring back the stressors of work to mental awareness, and thus reduce detachment, but in different ways.

Despite this expected stressor trigger, media synchronicity theory suggests that different mediums may be more or less conducive to task productivity during the episode (Dennis et al., 2008) due to their different communication characteristics. When an episode is productive, though stressful, it may allow the individual to put the stressor to rest for the evening, and thus detach post-episode. As such, in episodes of highly productive ICT engagement, detachment may increase after the episode. Sonnentag and Fritz (2015) propose that the impact of ICT use on detachment is made worse when the individual prioritizes and focuses on work over other aspects of their life, pointing to the possibility that an individual's mindset when engaging in ICT use may be important to its outcomes. We test this proposition and evaluate organizational identification and response expectations as moderators representing the extent to which individuals prioritize their work role. The full model is presented in Figure 1.

2.1 | ICT medium and detachment

Communication technology allows work demands to intrude into people's nonwork domain. *During* such intrusion, employees' work
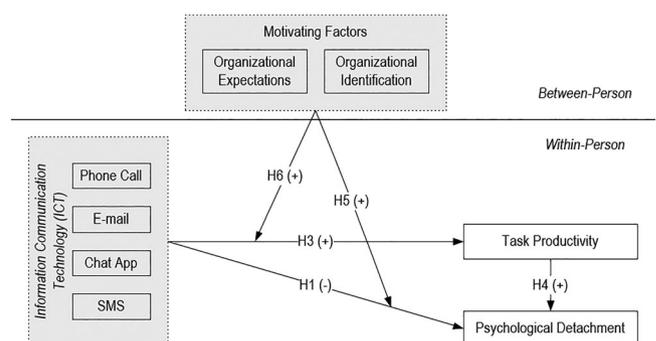
H2: On a given day after work, the negative ICT use to detachment relationship is stronger for asynchronous ICTs than for synchronous ICTs.

H7: On a given day after work, after-hours work engagement via (a) phone call, (b) e-mail, (c) chat app, and (d) SMS is related to psychological detachment through task productivity.

H8: A moderated mediation occurs, such that the mediation of after-hours work engagement via (a) phone call, (b) e-mail, (c) chat app, and (d) SMS on psychological detachment through task productivity is stronger under conditions of higher organizational expectations and organizational identification.

Controls: Age, Gender, Managerial Status, Marital status, Number of children, Segmentation preference, Workload, Duration, Other-initiated, Supervisor-involved, Complexity, Importance.

FIGURE 1 Research model.

engagement reduces their psychological detachment from work. *After* such intrusion, we expect that all forms of after-hours ICT use have lingering effects on psychological detachment though some may be greater than others for several reasons. First, when employees are finished with an episode of work-related ICT use and ready to switch back to nonwork activities, the completion of a work communication may interfere with the subsequent activities through task-set inertia. When engaged in a task, employees typically maintain a task-set, which refers to a collection of mental representations and cognitive processes associated with the task (Kiesel et al., 2010; Rogers & Monsell, 1995). The task-set enables employees to act in accordance with the goals and requirements of the current task, but may persist beyond the task duration, leading to difficulty in mentally switching away from the current task (i.e., task-set inertia) (Allport et al., 1994; Wylie & Allport, 2000). In other words, thoughts about the work communication may persist after the episode, reducing psychological detachment.

Second, after-hours work communication may bring new action items to individuals' awareness. Attending to these communications may require more than just reading the messages. For example, in response to a client's e-mail inquiry, individuals may need to compile a report or notify other team members of action items. These messages represent the means via which the action items are communicated to the responsive audience. Even if individuals do not necessarily start working on or complete the requested task right away, they nonetheless anticipate a growing list of work-related duties for the next working day and may start to worry about how to juggle all these tasks. Therefore, with the awareness that not all tasks have been finished, individuals may find it difficult to stop thinking about work. Essentially, the episode requires engagement, which negatively relates to detachment, and may even allow for more tasks in one's mind to be generated, moving a person even further away from a detached state. Given the activating nature of job stressors, task-set inertia, and present and future added workload, we predict all forms of ICT use will have a negative relationship with psychological detachment.

> **Hypothesis 1.** On a given day after work, after-hours work engagement via (a) phone call, (b) e-mail, (c) chat app, and (d) SMS is negatively related to psychological detachment.

Communication technologies differ in terms of their capabilities (e.g., immediacy of feedback, concurrent engagement, rehearsal/revision and review of messages). A key distinguishing factor across ICTs is their synchronicity as proposed by media synchronicity theory (Dennis et al., 2008). So while an overall negative relationship with detachment is expected for all ICTs, it may vary depending on the synchronicity of the medium.

Asynchronous ICTs (i.e., e-mail, chat app, and SMS), via which communications occur without all communicators engaged at the same time, have relatively high reprocessability and high rehearsability (Dennis et al., 2008). *Reprocessability* refers to the extent to which a communication medium enables a message to be reexamined either within the context of the communication or after the communication has ended. *Rehearsability* refers to the extent to which a communication medium enables a message to be revised before being sent (Dennis et al., 2008). This may influence how psychologically engaging the technologies are outside of normal work hours.

Asynchronous communications allow individuals to take smaller steps toward completing a message rather than pressuring them to mentally compose a perfect version of what they intend to convey right away. Thus, individuals can develop a draft message first and fine-tune it at different times before sending it out when engaging in asynchronous communication. Although this may help individuals interweave some work tasks at a more opportune time outside of normal work hours, it also intersperses work-related thoughts, making it difficult to completely keep work out of one's mind. Relatedly, asynchronicity enables individuals to revisit a message for reconsideration and reinterpretation even after the communication is completed, making it more challenging to psychologically disconnect.

Asynchronous communications can lead to overly frequent or unnecessarily prolonged engagement due to these opportunities for rehearsing and reprocessing (Dennis et al., 2008), specifically allowing cognitive engagement in work-related tasks to take place before the occurrence of a work-related communication and to extend beyond its duration. Such prolonged and repeated encoding (i.e., drafting and editing) or decoding (i.e., reading and interpreting) can make individuals psychologically engaged in their work-related roles longer or more frequently, increasing preoccupation with work and jeopardizing psychological detachment. In other words, asynchronous technologies may create "open windows" in the mind that decrease detachment even when the individual is not specifically engaged with the technology (Becker et al., 2021; Leroy & Glomb, 2018).

Synchronous channels (e.g., phone call) provide less opportunity for rehearsing and reprocessing. For example, when communicating over the phone, people typically engage in real-time exchange. As such, synchronous channels do not facilitate information encoding and decoding, respectively, beyond the duration of a communication episode. Although preoccupation with a phone conversation may linger past its conclusion, people generally cannot edit (encoding) or relisten to (decoding) a phone conversation (Chen & Karahanna, 2018). Communications via synchronous technologies are less likely to lead to prolonged or repeated engagement with work-related tasks than those via asynchronous technologies.

> **Hypothesis 2.** On a given day after work, the negative ICT use to detachment relationship is stronger for asynchronous ICTs than for synchronous ICTs.

2.2 | ICT medium and task productivity

There may also be benefits associated with after-hours ICT use that may ultimately aid in detachment following an episode of work engagement. Productivity gain represents one of the major reasons that people use technologies to connect to work after hours (Chen &

Karahanna, 2018). Following Cameron and Webster (2013), we focus on the task productivity of the episode, defined as how individuals feel about what they accomplished *during* the episode of after-hours work connectivity. The flexibility afforded by ICTs allows people to connect to work at any time and from anywhere. For example, people may use slack resources (e.g., while waiting to pick up their children from extracurricular activities) to get some work done. ICTs may also enable individuals to effectively meet their communication needs after hours. With asynchronous ICTs such as e-mail and chat apps, individuals can fulfill their responsibility in a communication thread without required engagement from others. Synchronous ICTs (e.g., phone call) allow for task productivity in a different way as they allow people to solicit or provide immediate attention to issues.

> **Hypothesis 3.** On a given day after work, after-hours work engagement via (a) phone call, (b) e-mail, (c) chat app, and (d) SMS is positively related to task productivity.

Engaging in after-hours ICT use may lead to task productivity at the cost of personal resources during the episode (e.g., time, energy). Yet, perceptions of task productivity may positively contribute to psychological detachment by reducing one's preoccupation with work. Unfulfilled goals and tasks tend to persist in the mind (Masicampo & Baumeister, 2011), leading to rumination and sleep disruption (Syrek & Antoni, 2014). Thus, we predict that unfinished tasks from the ICT episodes may cause intrusive thoughts that interfere with individuals' engagement in subsequent nonwork activities. Belkin et al. (2020) argued that open tasks associated with expectations to monitor email would contribute to lower detachment and reported a negative email expectations—detachment relationship. However, task productivity was not included in the model. When individuals effectively achieve the purpose of an after-hours work communication episode, they may feel relieved for discharging their responsibilities in the communication, enabling them to move on to their nonwork activities with fewer work-related thoughts on their mind.

> **Hypothesis 4.** On a given day after work, task productivity is positively related to psychological detachment.

2.3 | Organizational expectations and organizational identification

It is notable that other factors may influence the extent after-hours ICT use is experienced as a stressor. Both Belkin et al. (2020) and Becker et al. (2021) argued and found support for the idea that it is not so much the time devoted to after-hours email engagement that affects well-being, but rather the expectation to monitor and respond to work email after hours (i.e., organizational expectations, or beliefs employees have that they are expected to be available after hours through ICTs; Fender, 2010). Thus, we incorporate these expectations

into our model of after-hours ICT use as a factor that may relate to detachment.

There are likely to be other reasons for after-hours ICT use. In order to provide a balanced perspective, we also incorporate a more internally driven reason for ICT use after hours—organizational identification, i.e., "perceived oneness with an organization" (Mael & Ashforth, 1992, p. 103). Although identification is often viewed as a positive individual characteristic, it may make ICT use more of a stressor as it makes the outcome of ICT use more personally relevant for the individual. Both expectations and identification can be expected to increase lingering thoughts about work. Such lingering thoughts are associated with whether a stressor will lead to a lack of detachment (Sonnentag & Fritz, 2015).

Organizational expectations impose an external demand on an employee to be available during nonwork time as the employee may believe their financial livelihood (i.e., likelihood of keeping their job, gaining raises and promotions) is tied to their responsiveness outside of work hours (Belkin et al., 2020). In fact, some scholars have shown that these expectations prevent detachment, arguing they encourage repetitive thinking about work during nonwork time (Becker et al., 2021).

Organizational identification represents the internal importance of the organization to an employee, which makes the organization more likely to be salient during one's nonwork time (Van Zoonen et al., 2020). When an employee is highly identified, they are more likely to have their work-based identity triggered and made salient even during nonwork time (van Zoonen et al., 2020). Episodes of after-hours work communications can be expected to make the identity salient, leading the employee to feel, think, and act in reference to the organization despite not being in the actual workplace. This suggests that when an episode of work communication occurs, one who is high in organizational identification will be driven to engage as a means of identity enactment.

We anticipate that the added sense of importance associated with expectations (external) and identification (internal) will strengthen the relationship between *asynchronous* ICT use and detachment. Synchronous technologies (e.g., phone call) do not provide as much opportunity to rehearse one's message before a communication or revisit the conversation afterward. With synchronous technologies, the external and internal motivators of organizational expectations and identification, respectively, tend to be bound by the communication episode time frame, rather than a lingering period of waiting for responses that is characteristic of asynchronous channels. For example, an employee is likely to answer their phone (or return a call) and respond in sync with the caller regardless of their underlying motivations. Thus, we make predictions only for the more extended engagement created by asynchronous technologies.

Both organizational expectations and identification increase the relevance of after-hours ICT use because external rewards are dependent on successful work outcomes (expectations) or because self-views are intertwined with work outcomes (identification). This heavier weighting of the importance of work means the individual will find value in extending the engagement window through rehearsal

and reprocessing. Those who view successful after-hours engagement as especially important can be expected to have more pre- and post-ICT use engagement. This is because the motivation is present for participation in work and asynchronous technologies provide the opportunity for extensive engagement in work through rehearsing and reprocessing beyond the duration of a communication.

> **Hypothesis 5.** Organizational expectations (a) and organizational identification (b) moderate the negative relationship between asynchronous after-hours ICT use (i.e., e-mail, chat app, and SMS) and detachment, such that it is stronger when organizational expectations and organizational identification, respectively, are high than when they are low.

We also expect organizational expectations and identification to influence the productivity of episodes as experienced by the focal individuals. When individuals are expected by their organizations to be responsive to work communications after hours, their engagement in these episodes of ICT use not only attempts to fulfill the intended purpose of the communication but also demonstrates their responsiveness and compliance. When individuals are highly identified with their organization, after-hours ICT use provides an opportunity to enact their valued identity as an organization member. Rather than trying to respond simply to "get it over with," individuals will engage in after-hours work communications with some sense of importance, which would lead to productive exchanges. As such, we propose that both expectations and identification will reinforce the positive effects of after-hours ICT use on task productivity because the individual will engage more actively in the communication.

> **Hypothesis 6.** Organizational expectations (a) and organizational identification (b) moderate the positive after-hours ICT use and task productivity relationship, such that it is stronger when organizational expectations and organizational identification, respectively, are high than when they are low.

In the preceding sections, we have theorized that after-hours ICT use has negative effects on detachment due to the synchronicity of ICT types and dependent on expectations and identification. These predictions are balanced by proposed effects on productivity. On one hand, ICT use after-hours brings work-related thoughts and feelings to the surface, reducing detachment. On the other hand, ICT use after-hours can increase employee productivity, closing cognitive and emotion "windows," allowing for detachment. Thus, we propose a partial mediation model with negative direct effects of ICT use on detachment and positive indirect effects of ICT use on detachment through task productivity. Additionally, given that we propose a partial mediation and the moderating effects of organizational expectations and organizational identification, we also propose that the mediated effect is stronger under conditions of high organizational expectations and organizational identification. We test this full model

to assess the ultimate outcomes of ICT after-hours use on detachment and to develop more comprehensive implications for organizational ICT use practices.

> **Hypothesis 7.** On a given day after work, after-hours work engagement via (a) phone call, (b) e-mail, (c) chat app, and (d) SMS is related to psychological detachment through task productivity.

> **Hypothesis 8.** A moderated mediation occurs, such that the mediation of after-hours work engagement via (a) phone call, (b) e-mail, (c) chat app, and (d) SMS on psychological detachment through task productivity is stronger under conditions of higher organizational expectations and organizational identification.

3 | METHODS

3.1 | Participants and procedure

We surveyed employees who use ICTs for work-related communications during after-work hours. The survey was sent to a random sample of QuestionPro[i] panel members who were at least 18 years old and worked full-time in the United States. We included two screening questions at the beginning of our survey: (1) *Are you currently employed, working 40 or more hours per week*? and (2) *Do you use communication technologies* (e.g., *phone call, e-mail, chat app, SMS, etc.*) *for work-related matters during after-work hours*? Respondents had to answer "yes" to both questions to participate in the study.

A total of 1321 eligible individuals accessed the initial survey and 498 of these completed all daily surveys with valid responses. Our sample includes a total of 1494 episodes of after-hours work engagement via ICTs. Table 1 includes the demographic information of our respondents. The majority of participants were male (63%), married or living with a partner (60%), and had some supervisory responsibilities (67%). The participants had an average age of 34.98 ($SD = 10.92$).

To best capture episode-level dynamics, we leveraged daily diary methodology to examine episode-to-episode variation in after-hours work engagement while controlling for between-person factors. Participants responded to an initial online questionnaire providing background characteristics (i.e., age, gender, marital status, number of children living in the same household, whether they held a supervisory position, workload, and segmentation preference), organizational expectations for after-hours responsiveness, and organizational identification. Following the initial survey, participants were asked to complete an online experience sampling survey in the beginning of their workday for three consecutive days.

We conducted three daily surveys based on the following considerations. First, collecting a diary survey over three (as opposed to a higher number) consecutive days allows us to better manage the burden created by the diary surveys. Green et al. (2006) have identified the burden created by the study and the degree to which participant

TABLE 1 Descriptive statistics and interitem correlations.

	Mean (SD)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Level 1 (within-person)																				
E-mail	0.52 (0.50)																			
Chat app	0.54 (0.50)	−0.02																		
SMS	0.16 (0.37)	−0.15**	−0.05																	
Phone call	0.29 (0.45)	−0.25**	−0.24**	−0.14**																
Detachment	4.31 (1.58)	−0.36**	−0.30**	0.03	−0.02															
Task productivity	4.14 (1.76)	0.04	0.18**	0.14**	−0.10**	0.10**														
Duration	0.52 (0.64)	0.11**	0.15**	0.13**	−0.01	−0.19**	0.14**													
Other-initiated	0.45 (0.50)	−0.23**	0.04	0.04	0.16**	0.05	0.05*	−0.01												
Supervisor	0.61 (0.49)	−0.05	−0.06*	−0.03	−0.03	−0.04	−0.10**	−0.04	0.01											
Importance	4.89 (1.37)	0.003	0.12**	0.04	−0.02	0.06*	0.30**	0.18**	0.12**	−0.06*										
Complexity	3.83 (1.53)	−0.001	−0.13**	−0.13**	0.07**	−0.14**	−0.58**	−0.19**	−0.06**	0.08**	−0.33**									
Level 2 (between-person)																				
Age	34.98 (10.92)	0.002	−0.05	−0.09**	0.06**	0.05	−0.13**	0.01	−0.01	−0.001	0.02	0.06*								
Gender	0.63 (0.48)	−0.05	−0.05	0.002	0.04	0.01	−0.01	0.003	0.02	−0.00	−0.01	0.03	−0.06*							
Managerial status	0.67 (0.47)	−0.01	0.04	0.05*	0.002	0.01	0.07**	0.03	0.001	0.06*	0.10**	−0.04	−0.001	−0.13**						
Marital status	0.60 (0.49)	−0.01	0.004	0.02	0.02	0.02	−0.02	−0.02	0.04	0.04	0.04	−0.02	0.12**	0.03	0.08**					
Number of children	1.09 (1.16)	−0.05*	0.02	0.01	0.02	0.03	0.06*	−0.04	0.02	0.06*	0.03	−0.04	−0.16**	0.12**	0.14**	0.24**				
Org. expectation	3.54 (1.62)	0.09**	0.03	−0.07**	0.07*	−0.24**	−0.07**	0.02	−0.08**	0.005	−0.04	0.05	−0.03	0.01	−0.07**	−0.01	0.05			
Org. identification	4.87 (1.26)	−0.02	0.07**	−0.03	0.02	−0.13**	−0.09**	0.01	0.02	−0.01	−0.11**	0.08**	−0.02	−0.03	−0.06*	−0.001	−0.01	0.03		
Segmentation preference	3.00 (1.48)	0.03	0.01	0.01	−0.03	−0.13**	0.02	−0.002	−0.04	0.02	−0.08**	0.05	−0.10**	−0.002	0.08**	0.01	0.04	0.09**	0.10**	
Workload	3.71 (1.00)	−0.05	0.05*	0.03	0.02	−0.001	0.18**	0.01	0.03	0.03	0.11**	−0.10**	−0.05	−0.001	0.17**	0.08**	0.03	−0.12**	−0.07**	−0.15**

Note: N(within-person) = 1494, N(between-person) = 498; 1-E-mail, 2-Chat app, 3-SMS, 4-Phone call, 5-Detachment, 6-Task productivity, 7-Duration, 8-Other-initiated, 9-Supervisor, 10-Importance, 11-Complexity, 12-Age, 13-Gender, 14-Managerial status, 15-Marital status, 16-Number of children, 17-Organization expectation, 18-Organizational identification, 19-Segmentation preference.

$p < 0.05$.

$**p < 0.01$.

motivation is fostered as two factors that play an important role in the degree to which participants comply with diary study instructions. After-hours ICT use occurs fairly often given the popularity of mobile technologies and ubiquitous connectivity. As such, we believe that three daily surveys would provide good coverage of this phenomenon without creating much of a burden for the participants. We also expected our respondents to be reasonably motivated given that after-hours ICT use represents a regular element in their daily life. As such, we followed prior studies such as Repetti (1989) and Biron and Van Veldhoven (2012) with diary surveys for three consecutive days.

For each of the three daily surveys, an e-mail with a link for that day's online survey was sent to participants in the early morning. Following an "event contingent" sampling strategy, we instructed participants to complete the daily survey based on the last episode of work-related communication via ICTs during after-work hours on the previous night. Considering possible discrepancies in defining the normal work hours, we instructed participants to complete the survey after their next work engagement outside the normal work hours if they received the survey during their normal work hours or if they had yet to have any after-hours work engagement.

3.2 | Measures

3.2.1 | Within-person measures

In the daily surveys, we asked participants to report the type of *communication technologies* used in their after-hours work engagement by checking 0 ("no") or 1 ("yes") for phone call, e-mail, chat app, and SMS, respectively. Given that people may use multiple communication media during after-hours work engagement (e.g., phone call and e-mail), participants were instructed to select all the technologies used in an episode.

Following Cameron and Webster (2013), we focused on an individual's perception of task productivity *during* the episode of after-hours ICT use and adapted four items to measure task productivity in the daily surveys. A sample item is "I accomplished a lot during this episode." The response scale was 1 ("strongly disagree") to 7 ("strongly agree"). The reliability of the productivity scale was 0.91 at the within-person level and 0.98 at the between-person level. We used all four items developed by Sonnentag and Fritz (2007) to assess the psychological detachment that individuals experienced *following* the episode of after-hours ICT use reported in the daily surveys. A sample item is "After this episode, I didn't think about work at all." The response scale was 1 ("strongly disagree") to 7 ("strongly agree") and the reliability was 0.83 at the within-person level and 0.98 at the between-person level.

We also included episodic control variables to address possible variations in the nature of the ICT use beyond the medium. Depending on the characteristics of the task that individuals attend to during the episode of after-hours ICT use, they may invest different amounts of personal resources (e.g., time, attention, energy). The amount of personal resources used in work engagement

influences how well individuals can subsequently leverage executive control to keep work out of their mind. Given that people tend to invest more cognitive resources in important and/or complex tasks, we controlled for importance and complexity of the work-related matter that they handled during each episode. In the daily surveys, we adapted two items from Cameron and Webster's (2013) complexity scale to measure the complexity of the task which participants attended to during ICT use. A sample item is "The work-related matter that I addressed during this episode was complex." By modifying the items to reflect importance rather than complexity, we adapted two items from Cameron and Webster's (2013) complexity scale to measure task importance. A sample item is "The work-related matter that I handled during this episode was important." The response scale was 1 ("strongly disagree") to 7 ("strongly agree"). The reliability of the complexity scale was 0.91, and the reliability of the importance scale was 0.89.

We also controlled for other- or self-initiation, duration and supervisor involvement of the ICT use, given that these factors could influence the association between the ICT use and work and nonwork consequences such as psychological detachment (Chen & Karahanna, 2014). *Episode initiation* was coded 1 if the episode was other-initiated and 0 if it was self-initiated. To assess the duration of a reported episode of after-hours ICT use, we asked participants to record the *duration* of the episode. We coded the responses in hours and fractions of hours. Participants also reported whom they communicated with during the episode of after-hours work engagement. The *supervisor involvement* was coded as 1 if the ICT-enabled work engagement involved a supervisor and 0 if it did not (i.e., the work engagement involved other communication partners such as a subordinate, coworker, client, or supplier). Among all the episodes of after-hours work engagement, 61% involved supervisors, 14% involved subordinates, 41% involved coworkers, 22% involved clients, and 6% involved suppliers.[ii]

3.2.2 | Between-person measures

For our between-person moderators, we used established scales. We used all six items from the scale developed by Mael and Ashforth (1992) to assess between-person *organizational identification*. A sample item is "When someone criticizes this organization, it feels like a personal insult." We used four items[iii] from the 6-item scale developed by Fender (2010) to assess between-person *organizational expectations*, which represents a specific form of organizational expectations for after-hours accessibility and responsiveness. A sample item is "I am expected to be available for the organization to contact me in off hours." Both variables were measured in the initial survey (prior to the daily surveys). The response scale was 1 ("strongly disagree") to 7 ("strongly agree") and the reliability was 0.92 for organizational expectations and 0.92 for organizational identification.

To be consistent with previous studies on work-nonwork experiences (e.g., Butts et al., 2015), we included between-person factors such as age, gender (0 = "female," 1 = "male"), marital status

(0 = "not married," 1 = "married or living with partner"), number of children living in the same household, and segmentation preference.

Segmentation preference, which captures individuals' variation in their preferences for segmenting work and nonwork domains (Powell & Greenhaus, 2010), has been found to affect the influence of after-hours technology use (Butts et al., 2015). We thus controlled for individual preference for segmentation and measured it with Kreiner's (2006) four-item scale. The response scale was 1 ("strongly disagree") to 7 ("strongly agree") and the reliability was 0.88. A sample item is "I don't like work issues creeping into my home life." We also controlled for the work-related factors such as supervisory position (0 = "not in a supervisory position", 1 = "in a supervisory position") and workload. We assessed workload with Spector and Jex's (1998) five-item scale. A sample item is "How often does your job leave you with little time to get things done?" The response scale was 1 ("less than once per month or never") to 5 ("several times per day") and the reliability was 0.85.

4 | RESULTS

Our data had a hierarchical structure in which episodes were nested within individuals. Given these dependencies among our within-person and between-person observations, we used the multilevel structural equation modeling approach to test our hypotheses. Our analyses were conducted with the lavaan package in the R statistical computing environment (Rosseel, 2012).

4.1 | Measurement model

We assessed the measurement model through multilevel confirmatory factor analysis (CFA). Ranging from 0.18 to 0.31, the intraclass correlation coefficient values suggest that all items capture variance at both the within- and between-person levels and thus support the need to use a multilevel modeling approach. The model exhibited satisfactory fit, χ^2 ($df = 407$) = 1689.70, $p < 0.001$, RMSEA = 0.046, 90% CI [0.044, 0.048], CFI = 0.94, TLI = 0.93, SRMRw = 0.035, SRMRb = 0.043. We assessed reliability with a CFA-based Cronbach's alpha to control for the multilevel structure of the data (Geldhof et al., 2014). The means, standard deviations, and correlations among all study variables are presented in Table 1.

4.2 | Structural models

Following Hofmann and Gavin's (1998) suggestion, we centered Level 1 (the within-person level) predictors by person means and Level 2 (the between-person level) predictors by grand means in order to remove between-person variance and separate Level 1 and Level 2 effects when estimating within-person relationships. Table 2 presents the standardized estimates and standard errors of the structural models.

4.2.1 | Psychological detachment

Hypothesis 1a–d predicted that the use of communication technologies results in lower levels of psychological detachment. We constructed a random-intercept mixed model regressing psychological detachment on dummy-coded communication technologies (1 = use of a certain technology during an episode of after-hours work engagement; 0 = not used), controlling for task complexity, task importance, organizational expectation, organization identification, supervisory position, age, gender, marital status, and number of children. The model exhibited excellent fit, χ^2 ($df = 458$) = 1118.71, $p < 0.001$, RMSEA = 0.032, 90% CI [0.030, 0.035], CFI = 0.96, TLI = 0.95, SRMRw = 0.055, SRMRb = 0.043. Table 2 shows the significant and negative main effects of e-mail (estimate = −0.46, 95% CI [−0.51, −0.41]), chat app (estimate = −0.34, 95% CI [−0.39, −0.29]), and phone call (estimate = −0.13, 95% CI [−0.19, −0.08]), supporting H1a–c. H1d was not supported due to the nonsignificant effect of SMS (estimate = −0.01, 95% CI [−0.06, 0.04]). Moreover, we expanded the model by adding productivity as a predictor of psychological detachment and found support for the positive effect of within-person task productivity on psychological detachment (estimate = 0.17, 95% CI [0.09, 0.25]), supporting H4.

Comparing the effects of different communication technologies on psychological detachment provides partial support for H2 that asynchronous technologies have a stronger negative association with psychological detachment than synchronous technologies. To compare the effects, we calculated the t-statistic using the formula, $t = (\beta 1 - \beta 2) / \sqrt{s_1^2 + s_2^2}$, where the denominator is the pooled standard error of the path coefficients $\beta 1$ and $\beta 2$. The significant t-statistic suggested that both e-mail ($t = 9.15$, $p < 0.001$) and chat app ($t = 4.95$, $p < 0.001$) have a stronger negative association with psychological detachment than phone call.

However, support for a stronger effect of SMS than phone call was not found given the non-significant effect of SMS on psychological detachment.

Hypothesis 5a,b predicted that the effects of asynchronous ICTs on psychological detachment are moderated by the two between-person predictors of expectations and identification. To assess these moderated relationships, we specified a multilevel path model including the interaction terms associated with both moderators. The model exhibited excellent fit, χ^2 ($df = 2133$) = 7979.47, $p < 0.001$, RMSEA = 0.044, 90% CI [0.043, 0.045], CFI = 0.91, TLI = 0.90, SRMRw = 0.036, SRMRb = 0.040. We calculated simple slopes following Preacher et al.'s (2006) approach and plotted the interaction effects at one standard deviation above and below the mean of the moderator. H5a predicted that the within-person relationships between asynchronous ICTs and psychological detachment are strongest when the employee perceives that organizations have higher (vs. lower) expectations for their employees to engage in work outside the normal work hours. As shown in Table 2 and Figure 2a–c, results indicated a significant interaction of organizational expectations with e-mail (estimate = −0.19, 95% CI [−0.26, −0.12]), with chat app

TABLE 2 Results of multilevel modeling.

	Psychological detachment			Task productivity	
Level 1 (within-person)					
E-mail	−0.46 (0.02)***	−0.48 (0.02)***	−0.43 (0.02)***	0.05 (0.03)*	0.06 (0.03)*
Chat	−0.34 (0.03) ***	−0.38 (0.02) ***	−0.31 (0.02) ***	0.16 (0.03) ***	0.17 (0.03) ***
Phone call	−0.13 (0.03) ***	−0.14 (0.03) ***	−0.08 (0.03) **	−0.07 (0.03) **	−0.06 (0.03) *
SMS	−0.01 (0.03) NS	−0.04 (0.03) NS	−0.02 (0.02) NS	0.15 (0.03) ***	0.15 (0.03) ***
Duration	−0.11 (0.03)***	−0.12 (0.03)***	−0.10 (0.02)***	0.05 (0.03)*	0.05 (0.03)*
Other-initiated	−0.17 (0.03)***	−0.17 (0.03)***	−0.20 (0.02)***	0.05 (0.03)*	0.06 (0.03)*
Supervisor-involved	−0.18 (0.03)***	−0.17 (0.02)***	−0.19 (0.02)***	−0.06 (0.02)*	−0.06 (0.02)*
Complexity	−0.17 (0.03)***	−0.09 (0.04)*	−0.15 (0.04)***	−0.46 (0.03)***	−0.47 (0.03)***
Importance	0.03 (0.03) NS	0.01 (0.03) NS	0.03 (0.03) NS	0.08 (0.03)**	0.09 (0.03)**
Task productivity		0.17 (0.04)***	0.06 (0.04) NS		
Level 2 (between-person)					
Age	0.11 (0.05)*	0.11 (0.05)*	0.09 (0.05) NS	−0.24 (0.05)***	−0.02 (0.01)***
Gender	0.04 (0.05) NS	0.04 (0.05) NS	0.04 (0.05) NS	−0.02 (0.05) NS	−0.04 (0.11) NS
Managerial status	0.03 (0.05) NS	0.03 (0.05) NS	0.02 (0.05) NS	0.16 (0.05)**	0.33 (0.11)**
Marital status	−0.03 (0.05) NS	−0.03 (0.05) NS	−0.03 (0.05) NS	−0.02 (0.05) NS	−0.04 (0.11) NS
Number of children	0.05 (0.05) NS	0.05 (0.05) NS	0.05 (0.05) NS	0.04 (0.05) NS	0.04 (0.05) NS
Organizational expectation	−0.43 (0.05)***	−0.42 (0.05)***	−0.41 (0.05)***	−0.07 (0.05) NS	−0.04 (0.03) NS
Organizational identification	−0.21 (0.05)***	−0.20 (0.05)***	−0.19 (0.05)***	−0.14 (0.05)**	−0.12 (0.05)**
Segmentation preference	−0.18 (0.06)**	−0.18 (0.06)**	−0.17 (0.05)**	0.15 (0.06)**	0.11 (0.04)**
Workload	−0.12 (0.06)*	−0.12 (0.06)*	−0.11 (0.06)*	0.35 (0.06)***	0.36 (0.06)***
Org. Expectation × E-mail			−0.19 (0.04)***		−0.11 (0.03)***
Org. Expectation × Chat			−0.20 (0.04)***		0.01 (0.03) NS
Org. Expectation × Phone Call			−0.01 (0.03) NS		0.02 (0.03) NS
Org. Expectation × SMS			−0.13 (0.03)***		0.03 (0.03) NS
Org. Identification × E-mail			−0.21 (0.04)***		0.03 (0.03) NS
Org. Identification × Chat			0.02 (0.04) NS		−0.10 (0.04)**
Org. Identification × Phone Call			−0.04 (0.03) NS		−0.07 (0.03)**
Org. Identification × SMS			0.01 (0.03) NS		−0.02 (0.03) NS
R^2 between	28.8%	28.2%	25.7%	25.4%	24.3%
R^2 within	36.9%	40.9%	56.3%	32.6%	35.9%

Note: N(within-person) = 1494, N(between-person) = 498; NS—nonsignificant.
*$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

(estimate = −0.20, 95% CI [−0.27, −0.12]), and with SMS (estimate = −0.13, 95% CI [−0.18, −0.08]), supporting H5a. H5b predicted that the within-person relationships between asynchronous ICTs and psychological detachment are strongest when employees have higher (vs. lower) identification with their employers. Our results shown in Table 2 revealed a significant interaction of organizational identification with e-mail (estimate = −0.21, 95% CI [−0.28, −0.14]), supporting H5b. As depicted in Figure 2d, the negative relationship between e-mail and psychological detachment was stronger for employees with higher levels of organizational identification than for those with lower levels of organizational identification. However, support for H5b was not found with chat app (estimate = 0.02, 95% CI [−0.06, 0.09]) or SMS (estimate = 0.01, 95% CI [−0.05, 0.06]).

4.2.2 | Task productivity

Hypothesis 3a–d predicted that the use of communication technologies leads to higher levels of task productivity. We constructed a random-intercept mixed model regressing task productivity on dummy-coded communication technologies (1 = use of a certain technology during an episode of after-hours work connectivity; 0 = not used), controlling for task complexity, task importance, organizational expectation, organization identification, supervisory position, age, gender, marital status, and number of children. The model revealed significant and positive main effects of e-mail (estimate = 0.05, 95% CI [0.003, 0.10]), chat app (estimate = 0.16, 95% CI [0.11, 0.21]), and SMS (estimate = 0.15, 95% CI [0.10, 0.20])
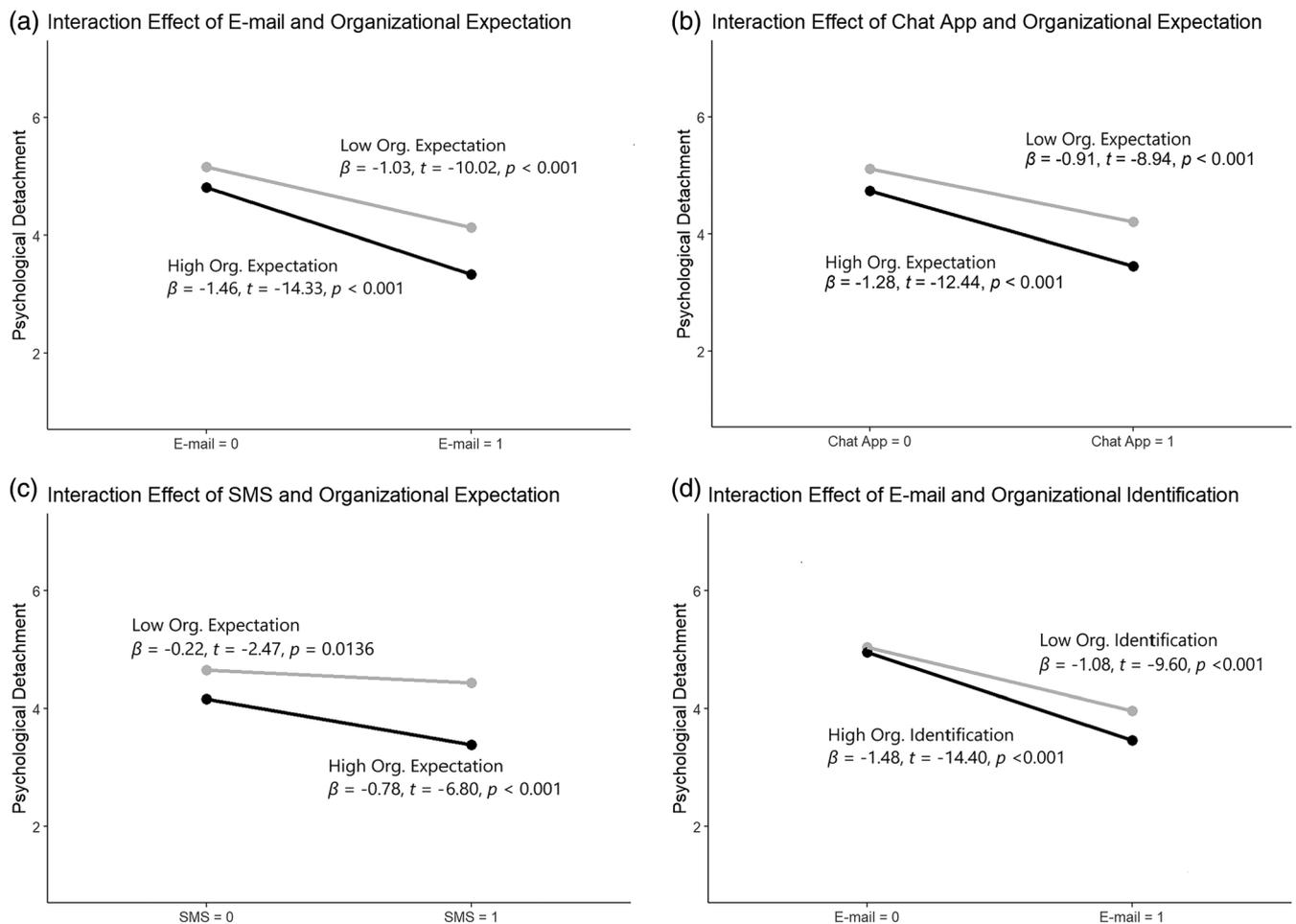
FIGURE 2 Interaction effects on psychological detachment.

on task productivity, supporting H3b–d. Support for H3a (phone call) was not found (estimate = −0.07, 95% CI [−0.12, −0.02]).

Hypothesis 6a,b predicted that the effects of asynchronous ICTs on task productivity are moderated by the two between-person predictors of expectations and identification. To assess these moderated relationships, we specified a multilevel path model including the interaction terms associated with both moderators. The model exhibited satisfactory fit, χ^2 ($df = 1906$) = 9404.05, $p < 0.001$, RMSEA = 0.053, 90% CI [0.052, 0.054], CFI = 0.88, TLI = 0.87, SRMRw = 0.034, SRMRb = 0.042. H6a predicted that the within-person relationships between communication technologies and productivity are strongest when employee perceive that organizations have higher (vs. lower) expectations for their employees to engage in work outside the normal work hours. Contrary to the hypothesis, results (Table 2 and Figure 3a) indicated a significant but negative interaction of organizational expectations with e-mail, an asynchronous ICT (estimate = −0.11, 95% CI [−0.18, −0.05]). No interaction was found with phone call (estimate = 0.02, 95% CI [−0.03, 0.07]); chat app (estimate = 0.01, 95% CI [−0.05, 0.08]); or SMS (estimate = 0.03, 95% CI [−0.02, 0.08]). Thus, our results do not support H6a.

H6b predicted that the within-person relationships between communication technologies and task productivity are strongest when employees have higher (vs. lower) identification with their employers.

Contrary to the hypothesis, our results shown in Table 2 and Figure 3b,c reveal significant but negative interaction of organizational identification with phone call (estimate = − 0.07, 95% CI [−0.13, −0.02]) and chat app (estimate = −0.10, 95% CI [−0.17, −0.03]). No interaction was found with e-mail (estimate = 0.03, 95% CI [−0.03, 0.10]) or SMS (estimate = −0.02, 95% CI [−0.07, 0.04]). As such, our results do not support H6b.

4.2.3 | Mediation and moderated mediation

We hypothesized the mediating role of productivity in the ICT-detachment relationship and assessed the mediating effects at the within-person level using the lavaan package in R (Rosseel, 2012) to test the full model. Given the hypothesized moderating effects of organizational expectations and organization identification, we also conducted a multilevel moderated mediation analysis according to the logic specified by Preacher et al. (2007). Table 3 shows the results of the multilevel mediation and moderated mediation analyses. The standardized indirect effect was not significant for e-mail (estimate = 0.01, SE = 0.01, p = 0.23), not in support of H7b, but the indirect path from e-mail via productivity on psychological detachment was significantly moderated by organizational expectations (estimate = −0.01,
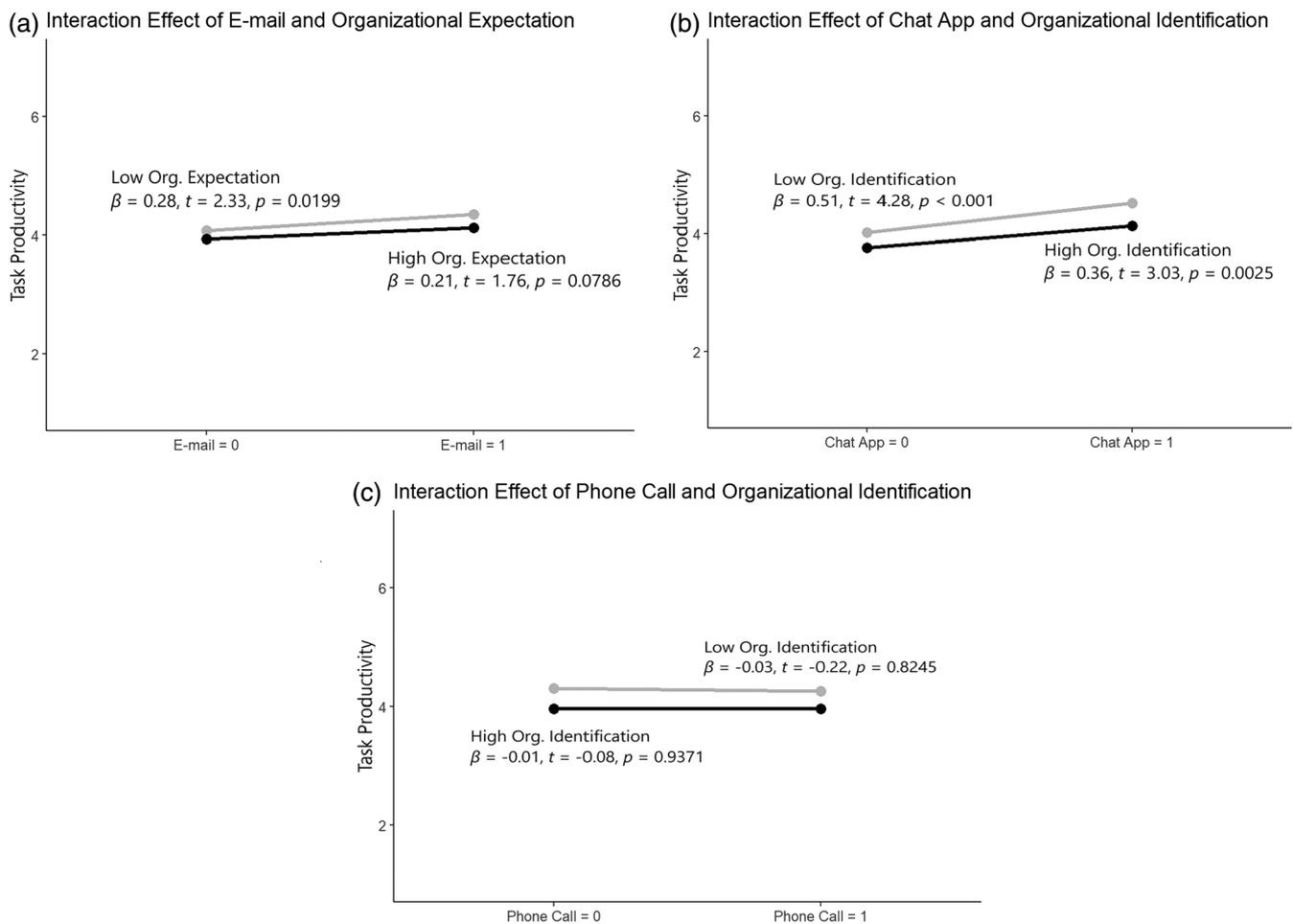
(a) Interaction Effect of E-mail and Organizational Expectation

(b) Interaction Effect of Chat App and Organizational Identification

(c) Interaction Effect of Phone Call and Organizational Identification

FIGURE 3 Interaction effect on task productivity.

$SE = 0.01$, $p = 0.04$). Taken together, this suggests that productivity mediates the effect of e-mail on psychological detachment differently depending on organizational expectation, yet in the opposite direction as hypothesized, thereby not in support of H8b. The results reveal that productivity significantly mediates the effects of chat app (*estimate* $= 0.02$, $SE = 0.01$, $p < 0.01$); SMS (*estimate* $= 0.02$, $SE = 0.01$, $p < 0.01$); and phone call (*estimate* $= -0.02$, $SE = 0.01$, $p < 0.01$) on detachment, in support of H7a, H7c, and H7d. Moreover, organizational identification significantly moderates the indirect path from chat app (*estimate* $= -0.02$, $SE = 0.01$, $p = 0.03$) and phone call (*estimate* $= -0.01$, $SE = 0.01$, $p = 0.03$) via productivity on psychological detachment, yet in the opposite direction as anticipated, thereby not providing support for H8a and H8c. Support for H8b and H8d was not found due to the nonsignificant effects for e-mail and SMS. Table 4 provides a summary of our results. We also plot the conditional indirect effects of email, chat app, and phone call on psychological detachment through task productivity in Figure 4.

5 | DISCUSSION

Most forms of ICTs (i.e., phone call, e-mail, chat app) except SMS used during after-hours communication episodes were related to decreased psychological detachment, and as predicted, the asynchronous technologies of e-mail and chat app had a stronger negative relationship with detachment compared to synchronous technologies (i.e., phone call), likely due to the employee rehearsing or reprocessing the content through drafting and editing before the message is sent and/or interpreting and re-considering the message after it is received. Although SMS is also considered an asynchronous ICT, our results suggest that the negative ICT−detachment association is stronger only in the cases of e-mail and chat app. Unlike e-mail, which is typically considered formal workplace communication, and chat app, which has gained growing popularity as a workplace collaboration tool, SMS tends to be used predominantly for informal communications, especially a brief and quick exchange, and is not suitable for transmission of large volumes of information or accommodation of a group discussion thread. As such, SMS may not stimulate rehearsing or reprocessing the content as much as e-mail and chat app. This would explain why the SMS-detachment association is not significantly stronger than the association between phone call and psychological detachment, and provides additional consideration for those applying media synchronicity theory to forms of after-hours ICT use.

Interestingly, different forms of ICTs (i.e., e-mail, chat app, and SMS) were positively related to perceptions of task productivity, with the exception of phone calls. It seems to be the case that

TABLE 3 Results of mediation tests.

		Estimate (SE)	95% CI
Mediation effects			
E-mail	Indirect effect	0.01 (0.01) NS	[−0.004, 0.02]
	Total effect	−0.48 (0.02)***	[−0.52, −0.43]
Chat	Indirect effect	0.02 (0.01)**	[0.01, 0.04]
	Total effect	−0.36 (0.03)***	[−0.40, −0.31]
Phone call	Indirect effect	−0.02 (0.01)**	[−0.03, −0.01]
	Total effect	−0.15 (0.03)***	[−0.21, −0.10]
SMS	Indirect effect	0.02 (0.01)**	[0.01, 0.04]
	Total effect	−0.02 (0.03) NS	[−0.07, 0.03]
Moderated mediation effects			
Org. Expectation × E-mail	Indirect effect	−0.01 (0.01)*	[−0.02, −0.001]
	Total effect	−0.19 (0.04)***	[−0.26, −0.12]
Org. Expectation × Chat	Indirect effect	0.003 (0.004) NS	[−0.01, 0.01]
	Total effect	−0.20 (0.04)***	[−0.28, −0.13]
Org. Expectation × Phone Call	Indirect effect	0.003 (0.003) NS	[−0.003, 0.01]
	Total effect	−0.01 (0.03) NS	[−0.06, 0.05]
Org. Expectation × SMS	Indirect effect	0.004 (0.003) NS	[−0.002, 0.01]
	Total effect	−0.13 (0.03)***	[−0.18, −0.07]
Org. Identification × E-mail	Indirect effect	0.01 (0.01) NS	[−0.004, 0.02]
	Total effect	−0.23 (0.04)***	[−0.30, −0.16]
Org. Identification × Chat	Indirect effect	−0.02 (0.01)*	[−0.03, −0.002]
	Total effect	0.01 (0.04) NS	[−0.06, 0.09]
Org. Identification × Phone Call	Indirect effect	−0.01 (0.01)*	[−0.02, −0.001]
	Total effect	−0.02 (0.03) NS	[−0.08, 0.03]
Org. Identification × SMS	Indirect effect	−0.003 (0.004) NS	[−0.01, 0.004]
	Total effect	0.02 (0.03) NS	[−0.04, 0.07]

Note: N(within-person) = 1494, N(between-person) = 498; NS—nonsignificant.
*$p < 0.05$.**$p < 0.01$.***$p < 0.001$.

asynchronous forms of ICTs used after-hours, such as these, allow the employee to cross off a to-do list item or gain momentum on a larger work task by sending communications, and generally just allow for the completion of unfinished tasks. As predicted, perceptions of task productivity were positively associated with episodes of psychological detachment, indicating that ICTs can have differing effects on different aspects of employee well-being. Ultimately, although some channels of ICT engagement after-hours can increase perceptions of short-term task productivity, overall poorer psychological detachment still results from their use.

These results extend prior work that focuses more generally on ICT use (e.g., smartphone or expectations in general), and disentangle the behavior from the type of ICTs through which communication occurs. In this way, we add to the existing literature on ICT use and detachment which tends to either aggregate all forms of ICT use or focus on just one type (e.g., Schlachter et al., 2018). Our results indicate that the type of ICT used has implications, even at the episode level, for detachment and task productivity, and thus could be measured distinctly in future research. It may also be helpful for theory development to distinguish the technology's synchronicity when

studying ICT use after-hours. Moreover, additional characteristics of the episode matter as shown by our control variables, such as duration and other individuals involved besides the employee, indicating that future research may benefit from capturing not just ICT use and forms, but also other aspects of the interaction.

Furthermore, we found that organizational expectations strengthened the negative relationship between episodes with asynchronous ICTs (i.e., e-mail, chat app, and SMS) and the outcome of psychological detachment, and weakened the positive relationship between episodes with e-mail and the episodic productivity. These interaction effects suggest that high organizational expectations around technology use during nonwork time act as an external motivator and obstacle to detachment, particularly when asynchronous technologies are being used that lend themselves to content rehearsal and reprocessing outside of the duration of an ICT episode. This lends support to prior work theorizing the importance of expectations over time when understanding ICT use and detachment (Becker et al., 2021; Belkin et al., 2020).

We found that organizational identification strengthened the negative relationship between episodes with e-mail and psychological

TABLE 4 Summary of research findings.

Hypothesis	Empirical support
1a) Phone call → Detachment	Supported
1b) E-mail → Detachment	Supported
1c) Chat App → Detachment	Supported
1d) SMS → Detachment	Not Supported
2) Asynchronous → Detachment > Synchronous → Detachment	Supported for E-mail and Chat App > Phone Call Not Supported for SMS > Phone Call
3a) Phone call → Task Productivity	Not Supported
3b) E-mail → Task Productivity	Supported
3c) Chat App → Task Productivity	Supported
3d) SMS → Task Productivity	Supported
4) Task Productivity → Detachment	Supported
5a) OE × E-mail → Detachment; OE × Chat App → Detachment; OE × SMS → Detachment	Supported
5b) OI × E-mail → Detachment; OI × Chat App → Detachment; OI × SMS → Detachment	Supported for E-mail Not Supported for Chat App or SMS
6a) OE × E-mail → Task Productivity; OE × Chat App → Task Productivity; OE × SMS → Task Productivity; OE × Phone Call → Task Productivity	Not Supported
6b) OI × E-mail → Task Productivity; OI × Chat App → Task Productivity; OI × SMS → Task Productivity; OI × Phone Call → Task Productivity	Not Supported
7a) Phone call → Task Productivity → Detachment	Supported
7b) E-mail → Task Productivity → Detachment	Not Supported
7c) Chat App → Task Productivity → Detachment	Supported
7d) SMS → Task Productivity → Detachment	Supported
8a) Phone call × OE → Task Productivity → Detachment Phone call × OI → Task Productivity → Detachment	Not Supported
8b) E-mail × OE → Task Productivity → Detachment E-mail × OI → Task Productivity → Detachment	Not Supported
8c) Chat App × OE → Task Productivity → Detachment Chat App × OI → Task Productivity → Detachment	Not Supported
8d) SMS × OE → Task Productivity → Detachment SMS × OI → Task Productivity → Detachment	Not Supported

detachment, weakened the positive relationship between episodes with chat app and the episodic productivity. Individuals who highly identify with their work are more internally motivated to cognitively and/or physically engage with work (i.e., have less ability to detach) following communication episodes of e-mail, an asynchronous technology. These results are not surprising given that e-mail processing (drafting or reading an e-mail) is largely solitary and does not require synchronous or near-synchronous exchange with a communication partner. With e-mail, people usually tolerate longer gaps of silence than with other ICTs (i.e., chat app, SMS, phone call). As such, individuals who highly identify with their organizations can leverage email for work-related communication and can continue to engage regardless of the interaction partners availability.

With phone calls, people typically engage in synchronous exchange with a communication partner. Individuals who highly identify with their organizations may consider the use of phone call (and to a lesser extent chat apps which are considered asynchronous but a communication partner is expected to engage) less productive due to the reliance on the availability of their communication partner. Instead of having full discretion to manage the episode of work engagement, individuals need to negotiate various aspects of the episode (e.g., duration, timing) with their communication partner. In sum, our findings identify ICT use within an after-hours communication episode as a task-related job stressor that (a) impairs well-being, and (b) has more detrimental effects when individuals prioritize their work as a result of either feeling pressure from the organization or highly identifying with their work.

5.1 | Implications for research

We make several contributions to the research on after-hours ICT use, a reality in knowledge workers' life today. First, we highlight the importance of treating after-hours ICT use as unique, within-person occurrences comprised of technology-related and task-related elements that influence employees' task productivity and subsequent detachment. The events of after-hours ICT use each have their own properties and implications for employees. Examining such within-person variation allows us to better understand the effects of different ICTs and exactly which aspects of ICT use are associated with these effects. By showing how fluctuations in specific elements of an after-hours ICT use episode serve as driving factors of episodic productivity and detachment, our study complements the aggregate view of after-hours ICT use and its effects often taken by prior studies.

Second, our study also reveals the within-person dynamics between productivity and detachment. Practically speaking, if some level of technology use outside of work is normal and necessary in some environments, balancing the intended task productivity and unavoidable detachment loss represents an inherent dilemma of after-hours ICT use. Although scholars have recently argued for the "business case" behind the long-term organizational gains in productivity
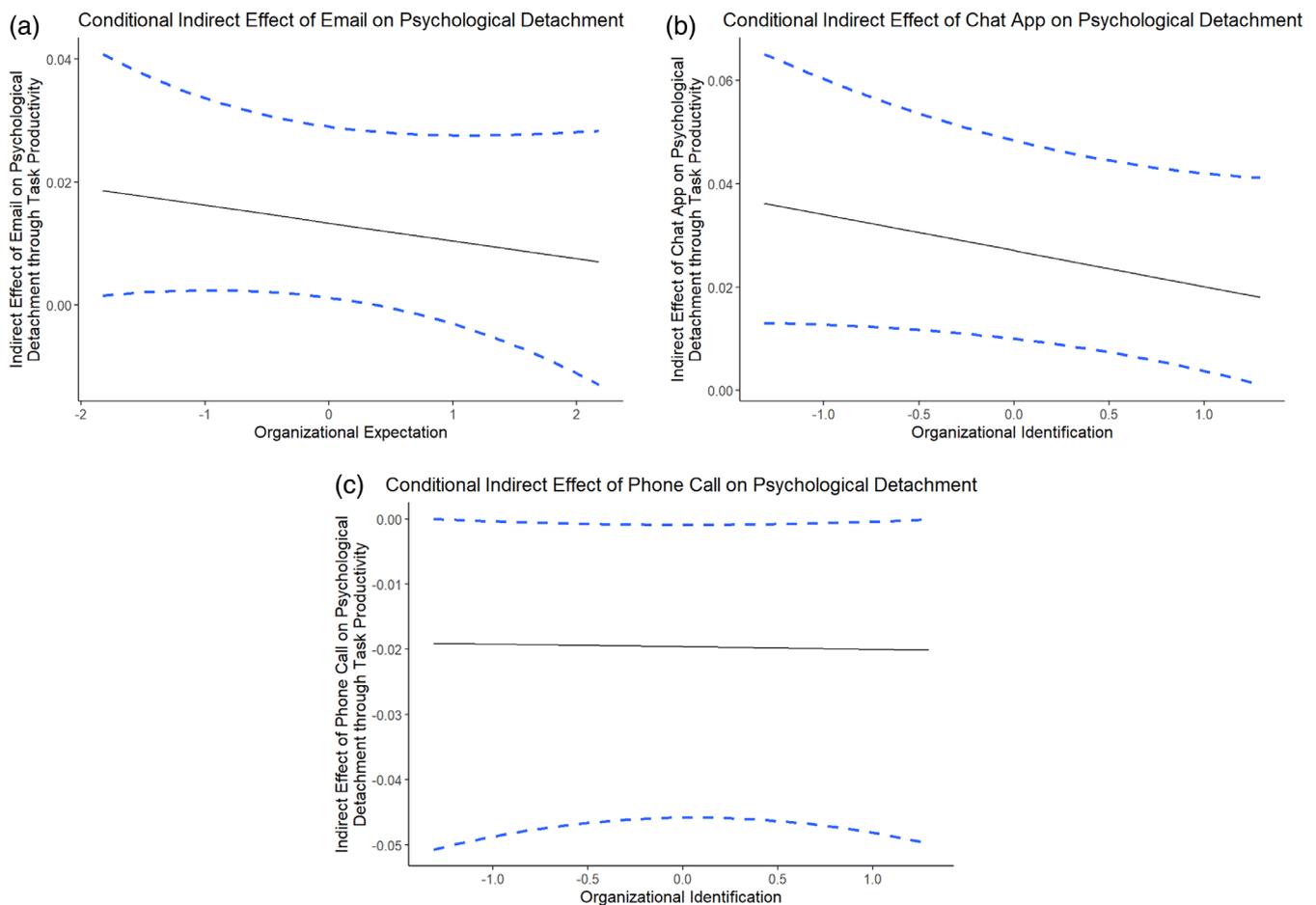
FIGURE 4 Conditional indirect effects on psychological detachment through task productivity. Solid line: point estimate and dashed line: 95% confidence bands.

that result from investing in employee well-being (e.g., Miller, 2016), less attention has been paid to productivity experiences at the employee level and the possible relationship between detachment and productivity in current work contexts.

Moreover, the majority of research focusing on psychological detachment has evaluated job stressors as detrimental predictors of psychological detachment and/or mental and physical health strain-reaction outcomes of psychological detachment (e.g., exhaustion, mood; Sonnentag & Fritz, 2015), but task productivity has yet to be conceptualized and considered as a well-being indicator and influencer alongside psychological detachment.

Prior research has established a negative relationship between ICT use and psychological detachment (Santuzzi & Barber, 2018). Although our episodic study replicates this finding, our results also offer a complimentary nuanced understanding of the role of task productivity as a mechanism. While detachment and task productivity could be thought of as competing (i.e., a trade-off), the flexibility afforded by after-hours ICT use in more recent workplace settings could result in increased task productivity and detachment (i.e., a productivity gain). Our study demonstrates that perceptions of task productivity gained act as a mechanism through which after-hours ICT use may actually boost detachment, at the episode level. This

suggests that multiple pathways exist and future research should explore additional mechanisms to best capture the complexity of after-hours ICT use on well-being, but also that different designs (i.e., within-person episodic versus within-person daily versus between-person) may capture different positive or negative effects of ICT use.

Third, our findings show that organization expectations interact with the direct relationship between ICT use and detachment for all three asynchronous technologies, while identification only interacts with email. This pattern of findings is consistent with prior literature on expectations showing direct relationships between email expectations and detachment (Belkin et al., 2020), and extends these findings to the episode level for additional technology forms of SMS and Chat app. Organization expectations interact with the direct relationship between email use and task productivity, while identification interacts with the direct effects of chat app and phone call on task productivity. We echo the work of Belkin et al. (2020) and Becker et al. (2021) that expectations are key in understanding after-hours email and broaden the scope of their findings to other forms of ICTs. Furthermore, our findings on identification reiterate recent research on identification pointing to its dark sides (Conroy et al., 2017).

5.2 | Limitations and future research

In their review of the ICT literature, Hu et al. (2021) distinguish between *behavioral* indicators of technology use, like we use in this study, and *psychological* indicators of technology use, which have often been evaluated in isolation from each other. Thus, we recommend that future studies examine the form of ICTs, in combination with, for example, an appraisal of how stressful an episode was or the individual's reactivity to the episode, whether interpersonal conflict occurred, or if the episode resulted in an overload of work. This type of more nuanced investigation will allow for a better understanding of both when and how ICT use results in detriments to well-being. It may also be the case that different channels of ICTs are chosen intentionally by employees to address different types of tasks. For example, perhaps emails are often used for the most complex and stressful of after-hours tasks. While we tried to incorporate these issues through control variables, there is room for more work that addresses the alignment between task needs and ICT form. Future research should better determine the extent to which the mode of technology is a stressor versus the nature of the tasks. Additional episode-level investigations have potential to address these types of issues. For example, it would be ideal to assess productivity immediately after the ICT episode and detachment before bedtime.

We used an online sample to conduct this study, which was helpful in capturing diverse experiences with technology use after hours. However, this data collection method did not allow us to understand ICT use after hours and well-being within specific work climates. Further investigation within organizations could shed further light into the episodic dynamics of technology use after hours and its impact on well-being.

5.3 | Practical implications

This work has practical implications for human resource practitioners and managers. First, our results indicate that ICT use in general has a negative relationship with psychological detachment, suggesting that organizations valuing employee well-being should aim to minimize after-hours ICT use whenever possible. Moreover, many countries have laws that protect employees from having to work after hours, including France, Portugal, and Kenya, in order to prevent burnout and poor health outcomes (e.g., Masih, 2023). Yet, because some level of after-hours communication may still be expected in many occupations (e.g., sales, healthcare on-call work), especially within the United States, organizations should be more cognizant of the multifaceted effects of ICT use.

Our results suggest that SMS should be encouraged above other forms of ICTs for psychological detachment and chat apps and e-mail should be last resorts, based on their varying levels of interference. According to our results, e-mail is the most insidious ICT for psychological detachment from work, given that work to rehearse and draft a message, and additionally to interpret and reprocess the message, is not time bound and has the most potential to engender psychological conflict (i.e., psychological preoccupation with work while one is physically in the nonwork domain, Greenhaus, 1988). These results and the corresponding recommendations are insightful, given the proliferation of technological "solutions" (e.g., chat apps and other communication platforms) that are being deployed in industry to facilitate communication, but that are likely increasing workload for employees through communication media that require and allow for a high degree of rehearsing and reprocessing of messages.

Additionally, given our findings that organizational expectations for being available after hours strengthens the relationship between most forms of ICTs and detachment, with the exception of phone calls, we encourage both organizations and supervisors to determine whether these expectations are necessary to carry out a reasonable workload, and subsequently reorient employees to their actual expectations if employees are currently being misled. We suggest that organizations and supervisors make clear up front during hiring, for the purposes of procedural justice, the extent to which after-hours communication and job tasks will be required. This should also allow for individuals with stronger integration preferences rather than segmentation preferences, to select into the jobs that will require such work. Whenever possible, these expectations and policies around after-hours communication should also be explicitly stated for applicants, new hires, and existing employees. We argue that this will be even more important moving forward as the COVID-19 Pandemic resulted in increasing numbers of employees working from home. These workers are removed from physical work settings, and experience more ambiguity around what is expected of them. Finally, it is important to note that psychological detachment interventions have shown effectiveness, especially when they tap into primary appraisals (i.e., diverting attention away from stressors or reappraising the stressor) (Karabinski et al., 2021). This suggests that organizations should also provide opportunities for employees to learn psychological detachment tactics, in combination with removing expectations for after-hours ICT use and minimizing job stressors.

6 | CONCLUSION

In summary, our results indicate that separate forms of ICTs have a differential relationship with psychological detachment, including partial mediation through productivity, and that external and internal motivators such as organizational expectations and identification can impact experiences of psychological detachment following episodes of after-hours ICT use. These results allow for recommendations for organizational leaders hoping to improve the well-being of their employees and the overall functioning of their organizations.

CONFLICT OF INTEREST STATEMENT

The authors declare no known conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ENDNOTES

[i] QuestionPro is an online data collection platform. Please visit http://www.questionpro.com for more information.

[ii] These percentages do not add up to 100% because an individual may communicate with multiple people in an episode of ICT use (e.g., a chat with their supervisor and coworkers together).

[iii] We did not include the other two items due to their focus on accessibility and responsiveness on vacation (e.g., "I am supposed to be able to be contacted when I go on vacation").

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