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# WHY PEOPLE ENGAGE IN SUPPLEMENTAL WORK: THE ROLE OF TECHNOLOGY, RESPONSE EXPECTATIONS, AND COMMUNICATION PERSISTENCE

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# WHY PEOPLE ENGAGE IN SUPPLEMENTAL WORK: THE ROLE OF TECHNOLOGY, RESPONSE EXPECTATIONS, AND COMMUNICATION PERSISTENCE


## Abstract

Supported by various collaboration technologies that allow communication from any place or time, employees increasingly engage in technology-assisted supplemental work (TASW). Challenges associated with managing work and non-work time have been further complicated by a global pandemic that has altered traditional work patterns and locations. To date studies applying a TASW framework have focused mainly on individual uses of technology or connectivity behaviors, and not considered the potential team and social pressures underlying these processes. This study provides clarity on the differences between technology use and TASW and sheds light on the drivers of TASW in a work environment characterized by high connectivity and diverse team structures. Specifically, we demonstrate how individual, social, and material pressures concomitantly impact individual work practices in a team context. Drawing on multi-source and multi-level data provided by 443 employees nested in 122 teams, this study shows that individual collaboration technology use and team-level response expectations are independently contributing to TASW. Though the persistence of communication afforded by collaboration technologies mitigates the impact of collaboration technology use on TASW, this persistence is not found to impact the relationship between team-level response expectations and TASW. We discuss how these findings inform our understanding of TASW.



***Keywords:*** Technology-assisted supplemental work; Collaboration technologies; Team structure; Response expectations; Communication persistence.

**WHY PEOPLE ENGAGE IN SUPPLEMENTAL WORK: THE ROLE OF TECHNOLOGY, RESPONSE EXPECTATIONS, AND COMMUNICATION PERSISTENCE**

Employees around the world experienced an abrupt transition in their work roles due to the COVID-19 pandemic (Vaziri, et al., 2020). For many workers this involved a reconfiguration of the boundaries between work and nonwork (Fisher, et al., 2020) as workers began teleworking almost overnight, in some cases for the first time (Kramer & Kramer, 2020). These shifts likely increased challenges for individual workers to manage work and nonwork time (Allen, et al., 2021) while pressures to work during evenings, nights or on weekends intensified. For instance, as work time becomes more porous and individuals may attend to house chores, home schooling, or other social activities between work meetings individuals may choose to sacrifice sleep hours, nights, or early mornings to meet work demands (Xiao, et al., 2021). In addition, Chong et al. (2020) noted that the interdependency of work may generate greater task setbacks under conditions of forced telework during the pandemic, which may require workers to engage in supplemental work to maintain individual and team performance levels. Although technology-assisted supplemental work (TASW) has been steadily on the rise over the past decades and may contribute to a host of negative outcomes (Eichberger, et al., 2020) the ways individual, social, and technological factors independently or conjointly affect these work practices are largely unknown. Hence, the current study builds on the TASW framework to examine how different factors present in contemporary work environments may exert pressure to engage in TASW.

Information and communication technologies (ICTs) differ from industrial or production technologies in that they not only facilitate new work practices themselves, but in doing so produce information that can be accessed by others and acted upon (Zuboff, 1988). Over the past several decades scholars have noted that as ICTs alter the ways that information is presented and made available within organizations, they support new structures and ways of organizing (Barley, 1986; Volkoff & Strong, 2013; Zammuto et al., 2007). Specifically, the use of ICTs can facilitate a variety of organizational changes including altering advice networks (Leonardi, 2007), ways of learning (Garud & Kumaraswamy, 2005), patterns of knowledge production (Schultze & Boland, 2000) and individual work routines (Pentland & Feldman, 2008). A particularly notable and influential aspect of contemporary ICTs is that they afford workers greater forms of connectivity with individuals, teams, and organizations (e.g., Nurmi & Hinds, 2020; Wajcman & Rose, 2011). Through the use of mobile phones, personal computers, and wireless networks workers can interact with each other without the constraints of time or need for co-location. This malleability and ubiquity of ICTs also means that employees increasingly work extended time outside the office - at home beyond regular working hours, at night, or on weekends (Dery & MacCormick, 2012; Fenner & Renn, 2010; Leonardi, Treem, & Jackson, 2010; Wajcman & Rose, 2011).

For the present study we are concerned with technology-assisted supplemental work (TASW) defined as distributed work practices performed after hours, often discretionary and not covered by a formal contract or compensation, and accomplished through ICTs such as laptops or other mobile devices (Arlinghaus & Nachreine, 2014; Fenner & Renn, 2004; 2010; Ojala, 2011). Though certain work characteristics may impose demands for extending one's connectivity to work or working during non-traditional time periods, less is known about the particular mechanisms – individual, social, and material – driving how and why employees engage in productive work behavior, collaborate, and complete substantial work tasks using these technologies outside of work hours. Investigating how differing work conditions operate as pressures underlying the performance of TASW makes several contributions to organizational scholarship.

First, this work contributes to an understanding of how the TASW framework operates in a work environment characterized by high connectivity and diverse team structures. Previous studies referencing the TASW framework typically operationalize TASW as technology use after hours (e.g., Arlinghaus & Nachreiner, 2014; Barber & Jenkins, 2014; Boswell & Olson-Buchanan, 2007; Chen & Karahanna, 2014; Day et al., 2012; Derks & Bakker, 2014; Diaz et al., 2012; Ohly & Latour, 2014; Olson-Buchanan & Boswell, 2006; Park et al., 2011; Wajcman et al., 2010; Wright et al., 2014). Notably, most of these studies implicitly reference TASW while actually capturing the *frequency* (e.g., Boswell & Olson-Buchanan, 2007; Park et al., 2011) *extent* (e.g., Diaz, et al, 2012), *duration* (e.g., Wright et al., 2014), or *timing* (Richardson & Buchanan-Fich, 2011) of ICT use after hours, failing to address the extent to which these technologies are used to actually perform work and complete work-related tasks outside regular work hours (Fenner & Renn, 2010). Another concern is that previous work mostly covers extended availability and connectivity (Dery, Kolb, & MacCormick, 2014; Mazmanian, et al., 2013; Thörel et al., 2020) rather than supplemental work practices. Though escalating connectivity to work is becoming increasingly common, contemporary work may present connectivity demands (Nurmi & Hinds, 2020) that require employees to go beyond merely signalling availability or monitoring email messages (Thörel et al., 2020) and engage in more substantial work tasks after hours (Gadeyne, et al., 2018). Hence, although there is a large body of literature referencing the TASW framework, the links are primarily implicit, placing ICT use and TASW, or TASW and extended availability or connectivity on equal footing. To provide conceptual clarity, this study makes an important distinction between these concepts that can contribute to theory regarding why individuals engage in supplemental work and how particular aspects of ICT use contribute to these behaviors.

Second, our investigation of the various mechanisms present in the relationship between ICT use and TASW seeks to extend our understanding of how organizational dynamics operate in a context of interdependent work, and without the boundaries of time and location. Hence, we examine a specific branch of ICTs – namely collaboration technologies. We use the term collaboration technology to refer to a specific set of cloud-based software platforms aimed at supporting collaboration and communication among participants as well as facilitating information processing and accessibility (Dennis, Venkatesh, & Ramesh, 2003; DeSanctis & Gallupe, 1987). Collaboration technologies differ from other organizational technologies that offer possibilities for ubiquitous connectivity among workers and teams (i.e., phones, email) in that a) use of the technology is potentially visible over time and accessible to third parties not initially relevant (Treem, Leonardi & van den Hoof, 2020); and b) use of the technology can be related to an individual task, be interdependent with the work of others, or move fluidly between these states. Scholars have recognized that the materiality of collaboration technologies that makes information visible in new ways can alter modes of working. For instance, Leonardi (2007) studied the use of a shared IT system by computer technicians and found that the ability to view the activity of others led to changes in who workers asked for task advice. Similarly, Dery, Hall, and Wailes (2006) studied the use of enterprise resource planning systems by bank managers. The authors concluded that while the material nature of the technological artefact required users to have specialized knowledge of how to enter data, other non-material factors including the time available to use and learn the system contributed to limited-use practices. Though scholars have considered ways that the materiality of collaboration technologies might facilitate new forms of work within traditional work settings and roles (e.g., Jasperson, Carter & Zmud, 2005), less attention has been paid to the extent to which interdependent work facilitated by collaboration technologies might alter the boundaries of work itself and contribute to TASW.

Third, by examining distinct aspects associated with the utilization of collaboration technologies by workers embedded in teams, this work examines the relative extent to which those differences are driven by factors that are or are not under the control of the individual worker. Scholarship on the role of collaboration technologies in organizations has demonstrated that although they provide opportunities for continuous connectivity, they are utilized by workers to manage and regulate when and how they connect to work (Gibbs, Rozaidi, & Eisenberg, 2013). When this work takes place in an interdependent team environment workers may feel obligated to respond to communication from other team members, and these obligations may erode some of the control individuals have over work behaviors (Mazmanian, et al., 2005). Because collaboration technologies make communication visible to other employees in ways that are different than other ICTs offering connectivity (i.e., email, phone) they may create different pressures regarding supplemental work (Leonardi & Vaast, 2017). By focusing on the individual, social and material aspects of work as potentially competing or complementary in their relationship to TASW this work is consistent with calls to examine the ways technology use in organizations presents possibilities for action, but is not deterministic in its effects (Cecez-Kecmanovic, et al., 2014; Leonardi & Barley, 2008).

**Collaboration Technology Use and Technology-Assisted Supplemental Work**

The notion that increased ICT use can escalate one's commitment or connectivity to work is well documented in the literature (Dery & MacCormick, 2012; Kolb, Caza, & Collins, 2012; Matusik & Mickel, 2011; Richardson & Benbunan-Fich, 2011; Wacjman & Rose, 2011; Wright, et al., 2014). Research suggests that workers whose activities require continual coordination with colleagues, clients, or supervisors, take a predominantly positive attitude toward technology use, while acknowledging that technologies may be accompanied by work activities encroaching upon the private sphere (Cavazotte, et al., 2014). Employees seek to use technologies that will facilitate more efficient collaboration and information flows across spatial and temporal boundaries, but are wary of the communication that invariably accompanies this level of connectivity.

Organizations are increasingly operating across geographical borders (and time-zones) and are implementing new collaboration technologies creating demands for TASW (Golden & Raghuram, 2010; Piszczek, 2017; Nurmi & Hinds, 2020, Thörel, et al., 2020). Employees have been found to reciprocate the distribution of mobile technology by using these technologies to extend their connectivity (Richardson & Buchanan-Fich, 2011). Conversely, when these technologies are used frequently and intensely, employees will have more possibilities to engage in supplemental work as there are no technological barriers preventing these practices (Venkatesh & Vitalari, 1992). The use of ICTs is sometimes refered to as the *electronic leash*, tethering employees to work (Büchler, et al., 2020; Richardson & Thompson, 2012; Schlachter, et al., 2018) and encroaching into individuals' personal lives and non-work time (Schlachter, et al., 2018).

Employees may feel the obligation to utilize the available options technologies offer and engage in more substantive supplemental work behaviors when collaboration technologies are used across spatial and temporal boundaries. Collaboration technologies, such as Google Workspace or Microsoft 365, include various applications that enable distributed co-workers to share files, edit documents individually or collectively, and collaborate synchronously through video and conference calls. These technologies are typically aimed at collaboration and productivity and as such require more attention or effort from their users (Robey, Boudreau, & Rose, 2000) than technologies that are more focused on facilitating connectivity (Gadeyne et al., 2018). Focusing on collaboration technologies foregrounds the potential interdependence among organizational members when completing tasks. In work contexts mere connectivity may prove to be inadequate as collaboration technologies use may – implicitly or explicitly – require more commitment, contributions, or engagement from users, leading to TASW. Hence, we hypothesize:

H1: Collaboration technology use is positively related to TASW

**Response Expectations and Technology-Assisted Supplemental Work**

Many studies have argued that employers and employees may develop responsiveness expectations that shape how technologies are used and may escalate employees' connectivity to work (Derks, et al., 2015; Leonardi, et al., 2010; Mazmanian et al., 2013). The shared expectations about responsiveness within a team may mold a social norm regarding connectivity after hours (Derks, et al., 2015). Hence, at a team level response expectations may normalize into a social pressure to remain available and accountable to others after hours. More broadly, questions of if, when, and how to connect to work are situated in the age-old antinomy of individual and technical agency versus normative social pressures (Leonardi & Barley, 2010; Orlikowski, 1992). Thus, it can be argued that both the material features (*casu quo;* technical systems; Leung & Wang, 2015) as well as the social practices and expectations (*casu quo*; social systems; Leung & Wang, 2015) in workplaces play a role in employees' decisions to engage in TASW. These team-level response expectations, such as whether other team members or supervisors expect a response to work-related messages during non-work hours could be an important driver in TASW (Fenner & Renn, 2010). Specifically, workers will look at the behaviors and communication of influential peers and organizational members to gain insights into appropriate ways that ICTs should be used within a context (Fulk, 1993; Schmitz & Fulk, 1991). Important referents that influence employees' behaviors and choices tend to be 1) people with whom employees frequently communicate, 2) those in similar roles, and 3) those who occupy a high(er)-status position

(Friedkin, 1993; Shah, Dirks, & Chervany, 2006; Boh & Wong, 2014). Prior research showed that managers and team members are two dominant social relationships that influence how employees perceive their work environment (Tierney, 1999). Hence, supervisors and team members are two key referent groups that can potentially influence expectations about responsiveness.

Team level response expectations refer to the shared beliefs regarding appropriate levels of responsiveness within the team. Such shared expectations or norms may exert a powerful form of social control and direct individual behavior within social groups (Barker, 1993; Eby & Dobbins, 1997; Taggar & Ellis, 2007). Several scholars have directed attention to how individual level cognitions about response expectations may contribute to an environment that expects workers to be constantly connected to work (e.g., Derks & Bakker, 2014; Dery & MacCormick, 2012; Mazmanian et al., 2013). Others have noted that social norms and expectations serve as important predictors of higher levels of connectivity behaviors after hours (e.g. Adkins & Premeaux, 2014; Gadeyne, et al., 2018; Mazmanian, et al., 2013; Thörel et al., 2020). This previous work demonstrates the need to distinguish between social norms that contribute to states of connectivity and availability, and social norms around ICT use that results in substantive work practices that constitute TASW. We argue that shared expectations at a team level are particularly influential in predicting individuals' work behaviors within the team. This means that employees in teams with high shared response expectations may signal their proficiency within the team by responding to these expectations (Paczkowski & Kuruzovich, 2016) through tehnology-assisted supplemental work practices.

In addition, response expectations are particularly acute at the team-level, where employees often have a shorter response cycle to other team members, and the pace of responsiveness is reciprocal (Tyler & Tang, 2003). Employees may strategically manage a certain type of image of being responsive, as this can enhance one's reputation as a caring and sensitive colleague (Barley, Meyerson, & Grodal, 2011) and proficient co-worker (Paczkowski & Kuruzovich, 2016). Conversely, non-responsiveness is often interpreted with negative attributes, such as incompetence and lack of commitment (Sarker & Sahay, 2004). Team-level response expectations may be so strong that team member's unavailability outside office hours is accepted only when it is collectively agreed on (Perlow & Porter, 2009). Indeed, Fenner and Renn (2004; 2010) suggested that organizations that promote quick responses may coerce employees to remain connected and engage in supplemental work after work hours. Hence, we hypothesize that team-level response expectations are associated with TASW.

H2: Team-level response expectations are positively related to TASW.

**Interplay between Collaboration Technology Use and Response Expectations**

In line with recent theorizing on connectivity demands, we acknowledge that workers have some agency in when and how to connect to work (Nurmi & Hinds, 2020). These choices are highly interwoven with the social (organizational) context (Schlachter, et al., 2018) – here team-level response expectations. Studies have articulated that being responsive to others is a social practice that may escalate to a norm among co-workers in a team, leading to escalating engagement and cycles of increased responsiveness (Mazmanian, et al., 2013). Hence, the interplay between individual technology use and response expectations lead to a redefinition of work practices and work roles. Building on these findings one might argue that the individual use of collaboration technologies may escalate into technology-assisted supplemental work practices, especially when these uses are embedded in social contexts characterized by high shared response expectations.

Nurmi and Hinds (2020) argued that workers may face connectivity-related demands (i.e. pressures) but also retain some agency in their decisions about how to respond – e.g., engage in more frequent communication, after-hour communication, and/or site visits to dispersed colleagues. Derks and colleagues (2015) found that smartphone use increases work-life interferences especially for employees who felt strong responsiveness norms. They articulate that employees not only learn from the behaviors of their colleagues that are reflected in these norms, but they also mimic their colleagues' behaviors regarding smartphone use after work. In the context of collaborative tools these norms may excacerbate the extent to which these collaboration technologies are used to engage in supplemental work. Gadeyne and colleagues (2018) demonstrated that laptop and PC use led to more time and strain-based work-to-life conflict than smartphone use because connecting through these technologies required a higher level of attention and focus than connecting through a smartphone. In light of the discussion above, collaboration technology use may increase TASW, especially when such usage is embedded in a social context characterized by high shared response expectations among coworkers and supervisors. Hence, we hypothesize:

H3: Team-level response expectations moderate the positive relationship between collaboration technology use and TASW such that the relationship becomes stronger as response expectations increase.

**Perceived Persistence of Communication and Technology-Assisted Supplemental Work**

Collaboration technology may facilitate work in dispersed teams, where team members work across disparate locations and times (Ellison, Gibbs, & Weber, 2015; Martins, Gilson, & Maynard, 2004). These technologies often have distinct features that present opportunities for employees to take action, communicate, and access information in ways that would be difficult or impossible with other technologies. As such we recognize that not only do team members act by using these collaboration technologies, these technologies also play an active role in keeping communication available to users. Specifically, organizational realities may be shaped by the interplay of human agency and the materiality of technical artifacts, as technologies may constrain or afford – but not determine – the possibility of achieving new goals and routines (Leonardi, 2011; Orlikowski, 2000). For instance, collaboration technologies can materially support the persistence of communication across time and space, allowing workers to interact with that communication in myriad ways. In turn workers can then make decisions as to how, if at all, to take action in an environment where technology makes communication available, visible, and persistent.

Materially, persistence describes the relative permanence or ephemerality of communication and as such relates to key characteristics of collaboration technologies such as archiving, durability, recordability, and reviewability (Fox & McEwan, 2017). Hence, persistence may help employees as it allows them to access, save, capture, replicate and recirculate communication long after the message or signal is originally produced. Because communication is persistent, content can potentially be reused and reanalyzed over time. In practice, the ability of a technology to support persistence does not at all determine that communication will be available to others over time, or that users of a technology will recognize or perceive possibilities for persistence. Instead, persistence can be viewed as a possibility of technology use, and not an inherent feature of a technology nor a binary outcome (Evans, Pearce, Vitak, & Treem, 2016). In analyzing individuals' activities in online spaces Mynatt, O'Day, Adler, and Ito (1998) note that persistence can help "support a wide range of user interaction and collaborative activity" (p. 210). Workers may view persistence as supportive of knowledge sharing across space and time, and as facilitating the growth of available content in organizations (Treem & Leonardi, 2013).

Therefore, perceived persistence could moderate the effects of collaboration technology use and TASW, as members might take into account the ability to go back and look at the communication record without the need for synchronous collaboration with team members working at different location or in different time zones. Especially in dispersed teams, with workers collaborating across geographical distance and time zones, the persistence of communication allows individuals to go back to content and contribute at times that may not require them to work at night or during the weekends (Erhardt, Gibbs, Martin-Rios, & Sherblom, 2016). For example, a team member who is starting the workday can go back and look at the communication between other team members who may have already ended their workday without the need of interrupting each other outside office hours. This way, team members in different time zones could perform their parts of the collaborative work at their discretion by tracking the needed information from the durable communication records. Thus, we hypothesize:

H4: The perceived persistence of communication moderates the positive relationship between collaboration technology use and TASW such that the relationship becomes weaker as perceived persistence of communication increases.

Technological advances, and in particular the growth of collaboration technologies, have made it easier for people to get work done remotely. However, the ability to work anywhere, anytime often morphs into an expectation to work everywhere, all the time (von Bergen & Bressler, 2019). We argue that the perceived persistence of communication shapes anticipated interaction among team members and supplemental work. Specifically, in team work the perceived persistence of communication could help to mitigate the effects of response expectations on TASW. Perceived persistence of communication could moderate these effects because it provides workers with greater agency and discretion to revisit interactions and contribute at a later time, allowing workers to delay their responses (Erhardt et al., 2016). Similarly, employees working in dispersed teams may feel pressure to work after hours due to a lack of overlapping office hours with their colleagues (Espinosa & Carmel, 2003), especially if high shared response expectations prevail within the team. However, when perceived persistence of communication is higher team members are provided with more leeway in deciding when and where to contribute despite the team-level response expectations, reducing the need to perform TASW. Hence, we hypothesize:

H5: Perceived persistence of communication moderates the positive relationship between team-level response expectations and TASW such that the relationship becomes weaker as perceived persistence of communication increases.

## METHOD

### Procedure and Participants

The participants for this research were recruited from a global company, which we call Freight Inc., that offers products and services to improve trade and cargo flows. Freight Inc. has locations in over a hundred countries employing approximately 12,000 employees worldwide. Employees that worked in office roles (rather than field roles) and were part of a team of at least three members were eligible to participate. Teams were relatively stable, as team roles, leadership, and purpose, were well-defined (Wageman, Garner, & Mortensen, 2012). Specifically, international teams at Freight Inc. offer cargo handling solutions to their clients ranging from logistics planning and operations to automation solutions for cargo flows. These global cargo flow solutions require constant coordination and collaborations within and across global and local teams and organizational sites. The nature of the company's global operations creates opportunities for workers to collaborate and provide solutions to problems outside regular work times at their respective locations, for instance because clients, managers, or team members are located elsewhere. In our discussions with the liaisons at Freight Inc. it became apparent that employees were often connected to their coworkers outside work hours. These interactions involved both brief communication through email about work-related matters, and more substantial contributions and completion of tasks through collaboration technologies. At the time of this study Google Workspace (formerly G Suite) was the primary collaboration technology used within the teams and organization. As such Google Workspace was the focus of our inquiry into the practical implications of collaboration technology use. Google Workspace offers cloud-based productivity and collaboration tools that includes functionalities related to filesharing and online (video)conferencing. Google Workspace offers filesharing options (Google Drive) similar to Microsoft Office365 and online conferencing tools (Google Meet) similar to those offered in MS Teams for instance. Similar to Google Workspace, various alternative services, whether offered by Microsoft, IBM, or other smaller competitors, aim to facilitate collaborative work in a fluid online environment by allowing users to share, edit, and store documents independent of time and place and afford possibilities for online communication and meetings.

As such, Google Workspace integrates several applications that were particularly relevant to team collaboration – i.e. Google Drive and Google Meet. When working on cargo solutions for their clients Freight Inc. employees rely on Google Drive to share information, expertise, and edit and collaborate on spreadsheets and documents. Google Drive also offers a repository of company data relevant to their daily operations, facilitating anytime, anywhere access to information. Google Meet is primarily used to coordinate tasks and have virtual (audio and/or video) meetings with team members, for instance to explore cargo handling solutions between different (global) sites. Ultimately, the applications offered through Google Workspace are aimed at helping its users to keep their workflows organized.

In this study we draw on multilevel data from multiple sources. Individual and team-level responses were gathered from team members through an online survey and the company's human resource department provided demographics and background data. Questionnaires were administered in English. Employees participated on a voluntary basis and did not receive any compensation. They were contacted through email and questionnaires were collected during a three-week time period.

In total 443 participants nested in 122 teams completed the questionnaire. In total there are 1075 teams with at least 3 team members, hence the team-level response rate is 11.35%, the within team response rate of participating teams was 40%. Finally, at the individual level 443 of the 5310 eligible employees participated (8.3%). The average team size was four, ranging from three to ten members in each team. Of these 122 teams, 67 teams were comprised of co-located members and 55 teams consisted of dispersed members, of which 25 teams had members working in different time zones. At the individual level we examined whether non-response was due to any individual employee characteristics using data provided by the human resources department. Independent samples T-tests demonstrate that participants were slightly older than non-respondents ($M_{(respondents)}$ = 42.74, $SD$ = 10.26; $M_{(non\text{-}response)}$ =41.31 $SD$ = 10.72; $t$ = -2.836, $p$ = .005). Respondents did not differ from non-respondents in terms of organizational tenure ($M_{(respondents)}$ = 7.02, $SD$ = 8.32; $M_{(non\text{-}response)}$ =7.79 $SD$ = 8.67; $t$ = 1.816, $p$ = .069); average weekly work hours ($M_{(respondents)}$ = 39.29, $SD$ = 3.83; $M_{(non\text{-}response)}$ =39.48 $SD$ = 9.45; $t$ = 0.411, $p$ = .681); or gender ($\chi^2$ = 0.244, $p$ = .621), respondents were mostly male (77.4%). These results indicate that non-response is not likely to be a result of these demographic or employment characteristics.

**Measures**

**Dependent variable.** *Technology-assisted supplemental work* (TASW) was measured using a four-item scale adopted from Fenner and Renn (2010). All items were rated with a five-point scale ranging from 1 = *never* to 5 = *always (every day)*. Participants were instructed to indicate how frequently they engaged in supplemental work in an average week (e.g. "When I fall behind in my work during the day, I work hard at home at night or on weekends to get caught up by using my smartphone or computer"; see appendix A for all items). The scale statistics are $\alpha$ = .91 $M$ = 2.60 $SD$ = 1.12.

**Independent Variables**

**Individual level measures.** *Collaboration Technology Use* was measured using a seven-item scale assessing several work practices that are commonly performed through these technologies at the organization. The scale items were self-constructed for the purpose of this study and similar to formative measures previously used by Bala, Massey, and Montoya (2017). A selected group of workers at the research site provided an expert review to assess the extent to which these items adequately captured the most common work practices. Respondents were asked to indicate how frequently (1 = weekly or less to 6 = multiple times per hour) they performed these behaviors using collaboration technologies (i.e., Google Workspace). Sample items include: “I use Google Drive to share files” The scale statistics are $\alpha$ = .88 *M* = 3.02 *SD* = 0.82.

*Perceived persistence of communication* was measured using a four-item scale by Fox and McEwan (2017). Persistence refers to the permanence or ephemerality of communication (Fox & McEwan, 2017, p. 303). As per the authors’ suggestion we changed the wording “this channel” (p. 303) in the original items to collaboration technologies to reflect the focus of this study. Respondents were asked to what extent information shared through ICTs remained available. Responses to statements could vary between 1 = strongly disagree and 5 = strongly agree. A sample item was: “The collaboration technologies we use at [organization] keep a record of communication that I can go back to and look at.” In line with Rice et al. (2017) perceived persistence is conceptualized as individual level perception. The across-team variance in perceived persistence is $\sigma^2_{u0}$= .098 and the within team variance is $\sigma^2_{e}$= .728, suggesting the shared variance at group level (ICC[1]) is 11.9%. This indicates that perceived persistence did indeed differ among workers overall, and within teams. The scale statistics are $\alpha$ = .94 *M* = 3.68 *SD* = 0.91.

**Team level measures.** *Response expectations* were measured adopting the six-items published by Derks et al. (2015, p. 163) assessing response expectations of supervisors and coworkers. Respondents were prompted to consider the statements as they relate to their work team. We adopted the measures by Derks and colleagues based on a direct consensus model of composition, rather than a referent-shift model**.** The direct-consensus composition model suggests that the average level of response expectations is considered to be an adequate representation of the response expectations of the group as a whole (van Mierlo et al., 2018). Wallace et al. (2016) suggest that aggregation choices are dependent on the conceptual and empirical justification. *Conceptually*, when there is consensus and response expectations are shared by other members of the team, the aggregate composes a construct at the team level (e.g. response norms). Hence, althought the referent measured was "I" or "My supervisor" the referent of interest was the team (i.e. collective response expectations within the team). Thus, response expectations represent a social norm about responsiveness that are understood by members of a group and guide or constrain (social) behavior without the force of policy (Caldini & Trost, 1998). At the team level response expectations include the shared expectations valued others – i.e., referents, here supervisors and team colleagues – have of responsiveness within their team.

*Empirically*, a direct consensus method is particularly appropriate for the study of norms formation because it reflects a process of interaction which is the basis of the norm construction (Tagger & Ellis, 2007). Individuals may have difficulties acting as reliable informants about the group as a whole (van Mierlo et al., 2008). However, within-group homogeneity is a valid assumption as expectations derived from interactions with dispersed supervisors and colleagues are often shared within teams. Third, as indicated below coefficients of agreement support aggregation of individual-level data to the team level. As such the direct consensus model is deemed an appropriate composition model for response expectations (Chan, 1998).

Respondents were asked to indicate their agreement or disagreement with regards to expectation about responsiveness in their role within their team. Respondents were prompted to consider the context of their work teams and direct supervisor; "Please consider the interactions with other members of your team and your team supersivor when responding to the following statements." Sample items were: "My supervisor expects me to respond to work-related messages during my free time" and "When I send a message to colleagues during the weekend, most colleagues respond the same day." Response categories ranged from 1 = strongly disagree to 5 = strongly agree. The scale statistics are $\alpha = .86$ $M = 2.20$ $SD = 0.94$.

A prerequisite to conducting multilevel analysis is demonstrating that higher-level predictors share substantial within-group variance. Intra-class correlation (ICC(1)), is used to assess proportional consistency of the total variance that can be explained by team membership, indicating that the proportion of the variability in individual team member's ratings could be attributed to team membership. ICC(2) provides an estimate for reliability of group means, based on mean squares from one-way ANOVA. For this study the ICC(1) for response expectations was 0.28. The shared variance among team members was significant ($F = 2{,}532$ $p < 0.001$). In addition, the ICC(2) for response expectations was .86, exceeding the 0.7 value recommended by Klein and Kozlowski (2000).

**Controls.** Although not the main focus of our analysis, we believe that team level parameters– e.g., team size and team dispersion – and individual characteristics of work – e.g., working hours – related to structural and spatio-temporal context may operate as confounding factors in the relationships underlying the extent to which workers engage in TASW. Human resource data allow us to control for quasi-material features of the team contexts (Barley, et al., 2011; Olson & Olson, 2000) that can play an important role in how workers extend their efforts beyond regular work hours in global organizations.

***Individual level controls***. *Team leader location*. In (globally) dispersed teams the location of the team leader may also play a role as team members working at a distance (compared to their team leader) may feel excluded and "out of the loop" (O'Leary & Cummings, 2007). Thus, members working remotely from team leaders may have a stronger need to show their presence and contribution by engaging in TASW. Subsequently, for each member human resource data was used to determine whether the supervisor was co-located (0) or working in a remote location (1). Finally, *work hours* and *tenure* are included as TASW is closely associated with employees' time management and ability to organize their work, actual work hours and organizational tenure may impact TASW (Fenner & Renn, 2010). Work hours and organizational tenure for all respondents was provided by human resources data in hours per week and total number of years, respectively.

***Team level controls***. *Time zone differences*. When working across time zones, other team members or leaders may take remote employee's TASW for granted as synchronous collaboration within the team is sometimes needed, even though real-time problem solving in global teams often decreases as time differences increase (O'Leary & Cummings 2007). At the same time, remote members may experience higher pressure for responsiveness outside office hours as time differences exacerbate the lag in response time in distributed teams (Sarker & Sahay, 2004). Based on the geographical location of each team member in a team the maximum time difference within each team was calculated. The average time difference within dispersed teams was 3.64 hours, ranging from 1 hour (Helsinki, Finland and Milan, Italy) to 12.5 hours (between team members in Chennai, India, and Oakland, USA). *Co-location of team members*, referring to spatial distance, can also play a role in how much employees engage in TASW. Spatial distance has been shown to have several effects on collaboration (see e.g. Cummings, Espinosa, & Pickering, 2009). Teams of which the constituent members were completely co-located were coded 0, and teams with members that were not co-located were coded 1. Finally, *team size* can be of importance, as in larger teams coordination of work may become more complex and make extensions of work outside regular hours more likely. Conversely, in smaller teams it may be easier to accommodate individual needs and awareness of others' overtime and schedules are more obvious (Bowers, et al., 2000). Team size was measured simply as the number of employees that constitute the team.

**Confirmatory Factor Analysis**

A multilevel confirmatory factor analysis for the four-factor model was conducted indicating excellent model fit: $\chi^2$ (177)=369.46; CFI= 0.97; TLI=0.96; SRMR= 0.06 and RMSEA= 0.050. The latent variables were scaled by fixing the factor loadings of the first indicator for each latent variable, error terms were modeled independently, and cross-loadings were not estimated. Note that a one-factor solution for collaboration technology use and response expectations indicated significantly better model fit compared to the two-factor solutions splitting Google Meet and Drive use and supervisor and coworker expectations ($\Delta\chi^2$= 41.21, $p$ < .001). For response expectations the items load strong on the single factor at the between level, ranging from .75 to .99. Consistent with our assumption that response expectations operate at the team level of analysis the factor loadings of the items at the within level, ranging from .42 to .85, are not as strong as the between factor loadings. Overall, convergent and discriminant validity was established. Convergent validity was examined by evaluating the average variance extracted (AVE) of each construct against its correlation with other constructs in the model. Notably, the average variance extracted (AVE) which are all above the threshold of .50, ranging from .52 to .79. Correlations ranged from .00 to .43. All constructs demonstrate convergent validity. Discriminant validity was established by evaluating the maximum shared variance (MSV), ranging between .08 and .18, against the square root of the AVE, ranging between .72 and .89. All constructs demonstrate good discriminant validity as the MSV is lower than the AVE.

**Strategy of Analysis.** The nested data structure with individual responses at level 1 (*N* = 443) nested within teams at level 2 (*N* = 122) was analyzed using hierarchical linear modeling. Prior to hypotheses testing individual level predictor, collaboration technology use, and the moderator, persistence of communication, were centered to the individual mean. The team level predictor, response norms, was centered around the grand mean (Bauer & Curran, 2005). Curve estimations demonstrated that the relationships in the model were sufficiently linear. To test our hypotheses, we start with the null model and subsequently estimate a sequence of increasingly complex models adding level 1 and level 2 predictors as well as (cross-level) interactions and controls. Overall, the analysis focused on understanding the factors that explain three sources of variance at two levels: a) lower level direct effects i.e., individual level factors; b) cross level direct effects i.e., team level factors; and c) cross-level interactions i.e., cross level factors that explain variance across-group slopes.

## RESULTS

### Descriptive Statistics and Control Variables

Correlations and descriptive statistics are provided in Table 1. In order to examine the proportion of variance that is attributed to different levels of analysis we tested the Null model for TASW. The results indicate that the mean for TASW was 2.60 ($\gamma_{00}$, $t$ = 38.97, $p$ < .001). The model also demonstrates significant variance component at the team level ($\sigma^2_{u0}$ = 0.264 $\chi^2$ = 241.47, df = 121, p < .001). The across-team variance in individual TASW is .264 and the within team variance is .983. As shown in Table 2 the ICC = .212, which means that team differences account for about 21.2% of the variability TASW. Hence, these results provide evidence for a nested data structure that requires a multilevel modeling analytical approach.

Model 4 in Table 2 examines controls for team structures and individual work characteristics ($\Delta$-2x log = 12.61, *Δdf* = 6 *p* = .050). Specifically, the findings indicate that team level controls; team-member dispersion ($\gamma$ = .095, *SE* = .141, *t* = 0.673, *p* = .502) and, team size ($\gamma$ = -.041, *SE* = .044, *t* = -0.940, *p* = .351) are not significantly related to TASW. The results further indicate that time zone differences are associated with TASW ($\gamma$ = .070, *SE* = .025, *t* = 2.788, *p* = .006), suggesting that the larger the time zone difference between team members, the more they engage in TASW. Finally, individual level controls; supervisor dispersion ($\gamma$ =.023, *SE* = .136, *t* = 0.170, *p* = .865), organizational tenure ($\gamma$ = .004, *SE* = .006, *t* = 0.614, *p* = .539), and working hours ($\gamma$ = -.008, *SE* = .013, *t* = -0.616, *p* = .538) are not associated with TASW.

**Hypothesis Testing**

Figure 1 depicts the results of our hypothesized model. Model 1 in Table 2 demonstrates the effects of individual level predictors on TASW, this model includes the main effects of communication technology use and persistence of communication. The model including the individual level predictors showed significant improvement over the Null Model ($\Delta$-2x log = 18.27, *Δdf* = 2 $p < .001$). The estimate for collaboration technology use ($\gamma$ = .316, *SE* = .080, *t* = 3.961, $p < .001$) was statistically significant and positive, supporting H1. Persistence of communication was not significantly related to TASW ($\gamma$ = .053, *SE* = .065, *t* = 0.829, *p* = .408).

Subsequently, in model two response expectations were added to the model again demonstrating significant model improvement ($\Delta$-2x log = 34.05, *Δdf* = 1 $p < .001$). The results showed (see Table 2) that response expectations exhibit a strong positive effect on TASW ($\gamma$ = .554, *SE* = .089, *t* = 6.216, $p < .001$). This finding supports H2. Subsequently, model three adds the hypothesized interaction terms, demonstrating a significant model improvement compared to the model without the interactions (Δ-2x log = 8.57, *Δdf* = 3 *p* = .036). There was no significant interaction between collaboration technology use and response expectations (γ = .076, *SE* = .126, *t* = 0.602, *p* = .547), suggesting that higher response expectations within teams do not affect the relationship between individual technology use and TASW. Hence, H3 was not supported.

Hypothesis 4 reflects the assumption that persistence of communication moderates the impact of communication technology use on TASW, such that this relationship is weaker when persistence of communication is higher. The results further demonstrate that persistence of communication moderates the effects of collaboration technology use on TASW (γ = -.273, *SE* = .102, *t* = -2.693, *p* = .007). The interaction was probed using the Johnson-Neyman technique (Bauer & Curran, 2005). Figure 2 plots the conditional effect (dashed line) of collaboration technology use on TASW across the distribution of persistence of communication, including a 95% confidence interval (grey area around dashed line). The confidence interval indicates that collaboration technology use is negatively related to TASW when the mean-centered value of persistence of communication is below 0.40 (i.e., 4.08 in raw values). This suggests that when persistence of communication is low, collaboration technology use is positively associated with TASW. In contrast, at high levels of persistence (above 0.40) there is no significant relationship between collaboration technology use and TASW (Figure 2). In other words, the positive relationship between collaboration technology use and TASW is weakened as the level of persistence increases. These findings support the argument that persistence of communication and collaboration technology use provide employees more agency over their work, allowing the possibility to address work demands at their discretion, whether at nights, weekends or, probably preferably, during regular work hours (in the near future, for instance). When communication persistence is higher workers are less likely to engage in supplemental work practices than when communication persistence is lower in teams where collaboration technology use is high. These findings support H4.

Conversely, H5 suggested that persistence of communication would moderate the effect of response expectations on TASW. As demonstrated in the slopes as outcomes model (model 3) in Table 2, team level response expectations did not interact with individual level persistence of communication ($\gamma = .099$, $SE = .105$, $t = 0.941$, $p = .347$). Therefore, the findings lack support for H5. Finally, the model explains 6.23% of the variance at level 1 and 57.95% of variance at level 2, yielding a total explained variance of 18.52%.

## DISCUSSION

### Theoretical Implications

This study examines various concomitant pressures underlying the performance of TASW. In doing so we make several contributions to the understanding of what drives supplemental work in an environment of high connectivity, interdependent tasks, and diverse team structures – a context increasingly found in contemporary organizations.

First, the findings give rise to reconsider the importance of TASW in the context of an increasingly boundaryless work environment. They do so especially against the backdrop of a global health pandemic and the associated remote work mandates that have almost overnight retired the 'nine-to-five commuter' in favour of the '24/7 always available' worker. It might be tempting to abandon the idea that employees have designated times to engage with work-related issues (i.e., work hours) and down-time in which workers recover from work (i.e., non-work hours). However, in contrast we believe that what constitutes work and non-work time, and by extension when and why workers engage in supplemental work practices is now more important than ever. Research has shown that employees increasingly experience greater difficulties in managing work and nonwork times (Wang, et al., 2021), for instance as (forced) remote work leads to greater task setbacks (Chong et al., 2020), or as they, willingly or compulsory, sacrifice nonwork time to engage in supplemental work (Xiao, et al., 2021). Hence, it is important to highlight the need for time off, recovery from work, sleep, and the overall benefits of time in daily life that is distinctly recognized as non-work. In a working paper DeFilippis et al. (2020) report that the average workday span increased by 8.2% during a single lockdown period. The authors concluded that the average workday span of an employee was higher in every week following the lockdown than any week in the eight weeks prior to the lockdown. Our findings contribute to addressing contemporary challenges in organizational behavior by identifying important mechanisms that contribute to this increase in workday span, and in identifying drivers of these processes also suggest potential interventions. Specifically, we demonstrate that interdependent work in teams supported by collaboration technology use increases supplemental work while persistence of communication can, only at high levels, mitigate this impact. In addition, when high response expectations are shared within a team employees may reciprocate by engaging in supplemental work, and this happens independently from individual collaboration technology use or perceptions of persistence. These findings indicate that increased use of collaboration technologies, which we might expect in an environment of distributed work, is not deterministic of increased TASW, and that workers' engagement with the affordances of these technologies (namely persistence) may limit TASW. Moreover, organizations or teams wishing to limit potential increases in TASW can make response expectations more explicit to reduce this potential pressure on workers.

Conceptually, in terms of what this means for our understanding of supplemental work it is important to acknowledge that what constitutes after-hour work remains highly relevant, especially in times where employees may feel pressured to encroach upon their own nonwork time. For instance, flexibility is often constrained by task demands, local clients, fixed deadlines, static workflows and the demands and characteristics of employees' social lives. Hence, our position is that supplemental work is highly dependent on the perceptions and individual practices of workers, rather than what we would traditionally view as office hours (e.g., 8am – 6pm: Nurmi & Hinds, 2020). The results of this study are not restricted to a standard or uniform idea of work and non-work time, and therefore offer a more ecologically valid representation of what drives TASW across a variety of diverse organizational and team contexts.

In addition, this study brings some conceptual clarity to the study of connectivity and supplemental work by explicitly recognizing the distinctions between technology use and TASW, and between TASW and connectivity. This is important as previous research adopting a TASW framework has often conflated technology use after hours, work-related extensions of availability, and connectivity, without articulating the conceptual and empirical differences between these uses and practices. Because connectivity demands are an inherent feature of contemporary (global) work (Nurmi & Hinds, 2020), it is critical to articulate the nature of these demands in terms of distinct technological and social pressures.

We demonstrate that individual technology use and team-level response expectations represent two important drivers of TASW that operate independently. Specifically, the findings suggest that technology use may present a pressure to engage in TASW by affording the possibility to do so, while team-level response expecations operate as a (independent) social pressure to engage in TASW. The absence of cross-level interactions between these pressures appear to counter earlier work that argued that the flexibility of technology and response expectations are intertwined and contribute to a spiral of escalating engagement in work by organizational members (Mazmanian et al., 2013). Recognizing that these drivers can operate independently pushes back against deterministic views that having more technology available anytime or anywhere will inevitably result in TASW. While at the same time recognizing that shared team-level expectations, and individual technological uses may operate more in parallel rather than intertwined as previously assumed. Moreover, by examining TASW among individuals operating in diverse team structures these findings are robust across teams with various levels of dispersion and demonstrate that the pressures underlying TASW are not driven by distance among workers. However, it should be noted that when teams work across various time zones we do find a small incremental increase in TASW. Overall, the findings highlight the relevance of recognizing TASW as emerging from multiple individual, social and material pressures that are likely to be present across a variety of work contexts.

The significant influence of team-level effects on TASW demonstrates the need to examine organizational ICTs as enacted through multi-level processes (Bélanger, Watson-Manheim, & Swan, 2013). The results indicate the importance of the perceived obligation of team members in understanding the likelihood of an individual engaging in TASW. Specifically, response expectations have a strong positive effect on the performance of TASW. Work in teams creates a form of interdependence such that the ability of any single team member to complete work tasks is dependent on the work of others. Therefore, individual team members may feel pressure to engage in TASW to avoid holding up work for the entire team. Examining TASW in a context of collaborative team work highlights the different types of obligations and pressures workers face when considering supplemental work. Specifically, we demonstrate that shared response expectations at the team level represent a pressure that shapes individual work practices such that employees engage in supplemental work to conform with the expectations within the team.

With the idea of a traditional work environment morphing, and opportunities for work no longer encumbered by time and space, determining drivers of supplemental work are more important than ever. While it may be tempting to succumb to rhetoric that available connectivity and collaboration technologies make supplemental work *fait accompli*, the results indicate that employees can play an active role in managing pressures associated with the use of collaboration technologies. For instance, the results indicate that when collaboration technology use was associated with high persistence of communication, the effect on TASW was lessened. This suggests workers are adjusting behaviors in conjunction with the ways collaboration technology alter communication possibilities. Previous examinations of the interplay between materiality and human agency in the context of technology implementation have highlighted the ways workers altered behaviors to adjust to the material limitations of new technologies (e.g., Leonardi, 2011). The findings of this work indicate the opposite; the materiality of the collaboration technologies changed routines as workers were afforded more agency over how to complete work. Though the ability of collaboration technologies to make information more available across time and space is often viewed as a key driver of TASW (Duxbury, et al., 1996; Venkatesh & Vitalari 1992), the results regarding persistence of communication challenge this assumption and demonstrate the need to examine the material features of technology and ways it might support more flexibility in work. This suggests that collaboration technologies may present different forms of agency and ways of working relative to communication technologies that do not focus on interdependent action or are concerned with availability or connectivity (Dery, et al., 2014).

Broadly this work contributes to a growing line of organizational scholarship on the ways flexible and robust ICTs might alter ways of working (e.g. Leonardi, 2007; Zammuto et al 2007), by demonstrating the ways interdependency and expanded boundaries of use associated with collaboration technologies pose new challenges. Specifically, as individuals perceive persistence and response expectations differently they may approach TASW in a manner that matches with their individual work goals. In noting the different ways employees might perceive and appropriate the materiality of IT in organizations, Griffith, Sawyer, and

Poole (2019) develop the concept of *systems savvy* to refer to, "individual's capacity to see the interdependence of technological and social systems and to construct synergies between them" (p. 491). The findings of this work are consistent with the idea that individuals vary in how they identify and manage the technical and social aspects of workplace technology and that this has consequences for individuals' choices regarding work behaviors. Specifically, the findings suggest that materiality of technology interacts with collaboration technology use shaping individual work practices, but that the impact of team-level response expectations on TASW is unaffected by these material affordances. Furthermore, this study indicates that considerations of systems savvy should extend beyond traditional work contexts to consider TASW. Collectively, these findings indicate the need to consider the ways multiple forms and sources of agency, including the materiality of technology and team organization, interact with individual agency to support or even encourage different ways of working (Bourdreau & Robey, 2005). By considering the antecedents to the role of technology in work efforts that extend beyond traditional organizational structures, this work adds to our understanding of how organizational ICTs can shape the boundaries (or lack thereof) individuals enact between work and other activities (Winter et al., 2014).

**Practical Implications**

The findings are highly relevant in an era in which work is increasingly characterized by dispersed work practices and hyper-connectivity through (organizational) ICTs. Escalating engagement, which leads employees to work everywhere all the time, is one of the most prominent challenges in contemporary forms of organizing. The findings of this study add to our understanding of these challenges by demonstrating what individual and team level characteristics contribute to such extended work practices, providing organizations, managers, and practitioners with concrete insights that may steer organizational interventions. First, the findings demonstrate a strong positive effect of team-level response expectations on

TASW. Clearly the shared expectation of needing to be responsive at all times leads workers to extend their work practices to nights and weekends. From that perspective many organizations may follow countries such as France (El Khomri law: Martin, 2017) and Germany (anti stress law: Stuart, 2014) that have either laws in place, or proposed, to regulate employees' connectivity after-hours. At the very least such debates provide a clear step to cut employees' technological 'leashes' by signaling that constant connectivity should not be the norm and workers have a right to detach from work (von Bergen & Bressler, 2019). Similarly, several companies have set their internal servers not to route email to individual accounts after hours, a popular example being Volkswagen (Haridy, 2018). Organizations have an important role in clarifying expectations and there is an onus on managers *and* employees to better manage and negotiate collective expectations about constant communication (Becker et al., 2018).

Second, the findings confirm the assumption that the use of collaboration technologies is associated with higher levels of TASW, but this relationship is less strong when persistence of communication is high rather than low. Hence, the findings suggest that especially at high levels of persistence, collaboration technology use may not increase individual TASW. For organizations implementing these technologies and developers who build them these findings are interesting as they may inform design decisions. This means that organizations and developers should pay specific attention to how their technologies may afford a continuous and persistent stream of information and communication that employees may use at their discretion.

**Limitations and Future Directions**

As with any study several limitations need to be acknowledged in light of the findings presented here. First, this study relies on cross-sectional survey data collected from 433 employees spread over 122 teams. Although the study included secondary data sources, the lack of longitudinal data limits our ability to make strong (causal) claims about the hypothesized relationships in our model, or include temporality in our modeling. Second, this study considered the effects of team structure and response expectations. While team structure largely failed to uniquely contribute to explain variance in individual level TASW, response expectations were found to have positive effects. This suggests that other social dynamics at a group level may also contribute to explain variance in TASW. For instance, psychological and broader organizational climates characterized by promoting workaholism and competitiveness may also contribute to TASW (Fenner & Renn, 2004; 2010), as well as team and organizational level work-life boundary preferences and initiatives (Kossek et al., 2010). Hence, future studies may consider a broader model that also accounts for organizational climate and work-life issues. Third, TASW covers voluntary supplemental work that is not covered by a formal contract, however, supplemental work can also be performed as part of an agreement with other team members or supervisors. Although, not necessarily covered in a formal contract, supplemental work as part of an agreement may render some mechanisms related to agency and control more or less relevant. Future research may further develop our understanding of TASW by explicating a more nuanced framework for supplemental work.

Finally, the current study is situated in a global company that relies on Google Workspace to facilitate collaboration. The use of different features forms the overall perception of platform use, but to account for the different types of use and variability in effects a broader set of features could be explored. Hence, focusing on Google Workspace and operationalizing feature level use of this technology may limit our ability to extrapolate to collaboration technologies more broadly. Future studies may seek to examine these mechanisms with other (cloud-based) collaboration technologies, across organizations and types of work. Despite some limitations, this study advances our understanding of TASW by demonstrating how individual, social, and material pressures contribute to TASW.

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**Appendix**

**Study Scales**

**Collaboration Technology Use**

- I use [collaboration technology] to share files
- I use [collaboration technology] to edit files
- I use [collaboration technology] to collaborate in shared documents
- I use [collaboration technology] to store files
- I use [collaboration technology] for videoconferencing
- I use [collaboration technology] to chat with coworkers
- I use [collaboration technology] for audio conferencing

**Persistence of communication (Fox & McEwan, 2017)**

- The collaboration technologies we use at [organization] keep a record of communication that I can go back and look at.
- I can retrieve past messages that been sent through collaboration technologies
- Collaboration technologies used at [organization] keep a record of communication that can last long after the initial communication
- Communication through collaboration technologies exists long after the initial interaction is finished.

**Response Expectations (Derks, van Duin, Tims, & Bakker, 2015)**

- My supervisor expects me to respond to work-related messages during my free time after work
- When I don’t answer to messages in my free time, my supervisor clearly shows that he/she does not appreciate it.
- I feel that I have to respond to messages from my supervisor immediately also during leisure time.
- I often receive messages from my colleagues during the weekend.
- When I send a message to colleagues during the weekend, most colleagues react the same day.
- If I do not respond to messages from my colleagues, my position in the group is threatened.

**Technology-Assisted Supplemental Work (Fenner & Renn, 2010)**

- When I fall behind in my work during the day, I work hard at home at night or on weekends to get caught up by using my smartphone or computer
- I perform job-related tasks at home at night or on weekends using my smartphone or computer
- I feel my smartphone or computer is helpful in enabling me to work at home at night or on weekend
- When there is an urgent issue or deadline at work, I tend to perform work-related tasks at home during the night or on weekends using my smartphone or computer

Table 1:
Means, Standard Deviations, and Correlations for all Study Variables.

| Variable | M (SD) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Level 1 variables* | | | | | | | | | | |
| 1. TASW | 2.60 (1.12) | **.91** | | | | | | | | |
| 2. Collaboration technology use | 3.02 (0.82) | .23* | **.88** | | | | | | | |
| 3. Persistence of communication | 3.68 (0.98) | .12* | .31* | **.94** | | | | | | |
| *Level 2 variables* | | | | | | | | | | |
| 4. Response expectations | 2.20 (0.94) | .32* | .04 | -.01 | **.86** | | | | | |
| *Controls* | | | | | | | | | | |
| 5. Co-location (spatial distance) | 0.45 (0.50) | .16* | .10* | .01 | .20* | - | | | | |
| 6. Time-zone difference | 3.64 (2.43) | .19* | .13* | .18* | .06 | .39* | - | | | |
| 7. Team size | 3.95 (1.42) | -.03 | -.14* | -..08 | .03 | -.02 | .09* | - | | |
| 8. Team leader location | 0.28 (0.45) | .12* | .08 | .03 | .13* | .60* | .30 | .01 | - | |
| 9. Working hours p/w | 39.29 (3.83) | .04 | .03 | .04 | .18* | .01 | -.01 | .09* | .11* | - |
| 10. Organizational tenure | 7.02 (8.32) | .01 | -.18* | -.12* | -.01 | .09* | -.04 | .08 | -.08 | .03 |

Note: Values on the diagonal are alpha coefficients. Significant correlations are flagged p < .05 *.

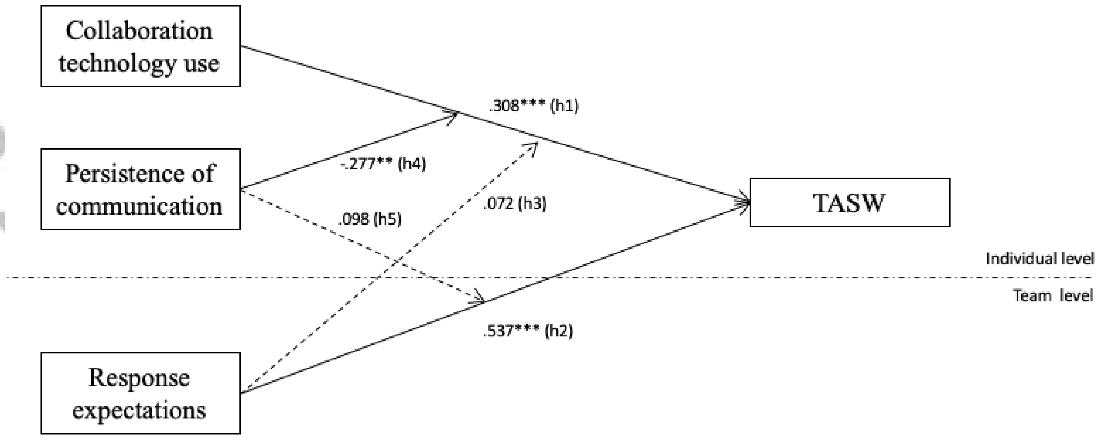
Table 2:
Multilevel Results for Technology-Assisted Supplemental Work.

| Level and variable | Technology-Assisted Supplemental Work | | | | |
|---|---|---|---|---|---|
| | Null Model | Model 1 L1 predictors | Model 2 L2 predictors | Model 3 (cross-level) interactions | Model 4 with controls |
| **Level 1 predictors** | | | | | |
| Intercept | 2.601 (0.067)*** | 2.601 (0.067)*** | 2.604 (0.057)*** | 2.631 (0.059)*** | 3.031 (0.559)*** |
| Collaboration technology use | | 0.316 (0.080)*** | 0.316 (0.080)*** | 0.304 (0.080)*** | 0.308 (0.080)*** |
| Persistence of communication | | 0.053 (0.065) | 0.053 (0.064) | 0.057 (0.065) | 0.059 (0.065) |
| **Level 2 predictors** | | | | | |
| Response expectations | | | 0.554 (0.089)*** | 0.556 (0.089)*** | 0.537 (0.086)*** |
| **Interaction terms** | | | | | |
| Collaboration technology Use x persistence of communication | | | | -0.273 (0.102)** | -0.277 (0.101)** |
| Response expectations x persistence of communication | | | | 0.099 (0.105) | 0.098 (0.106) |
| Response expectations x Collaboration technology use | | | | 0.076 (0.126) | 0.072 (0.127) |
| **Controls** | | | | | |
| Co-location (spatial distance) | | | | | 0.095 (0.141) |
| Time-zone difference | | | | | 0.070 (0.025)** |
| Team size | | | | | -0.041 (0.044) |
| Team leader location | | | | | 0.023 (0.136) |
| Weekly work hours | | | | | -0.008 (0.013) |
| Organizational Tenure | | | | | 0.004 (0.006) |
| **Variance Components** | | | | | |
| Variance (L1) individuals | 0.983 | 0.929 | 0.921 | 0.901 | 0.905 |
| Variance (L2) teams | 0.264 | 0.278 | 0.157 | 0.158 | 0.111 |
| ICC | 0.212 | | | | |
| $R^2$ | | | | | 18.52% |
| **Model information** | | | | | |
| AIC | 1337.37 | 1323.10 | 1291.05 | 1288.48 | 1287.87 |
| -2 log likelihood (FIML) | 1331.37 | 1313.10 | 1279.05 | 1270.48 | 1257.87 |
| Number of parameters | 3 | 5 | 6 | 9 | 15 |

Note: FIML = Full information maximum Likelihood estimation; L1 = Level 1; L2 = Level 2. Values in parentheses are standard errors; t-statistics are computed as ratio of each regression coefficient divided by its standard error (reported in text). Significance levels are indicated as *** $p < .001$ ** $p < .01$.

Figure 1:

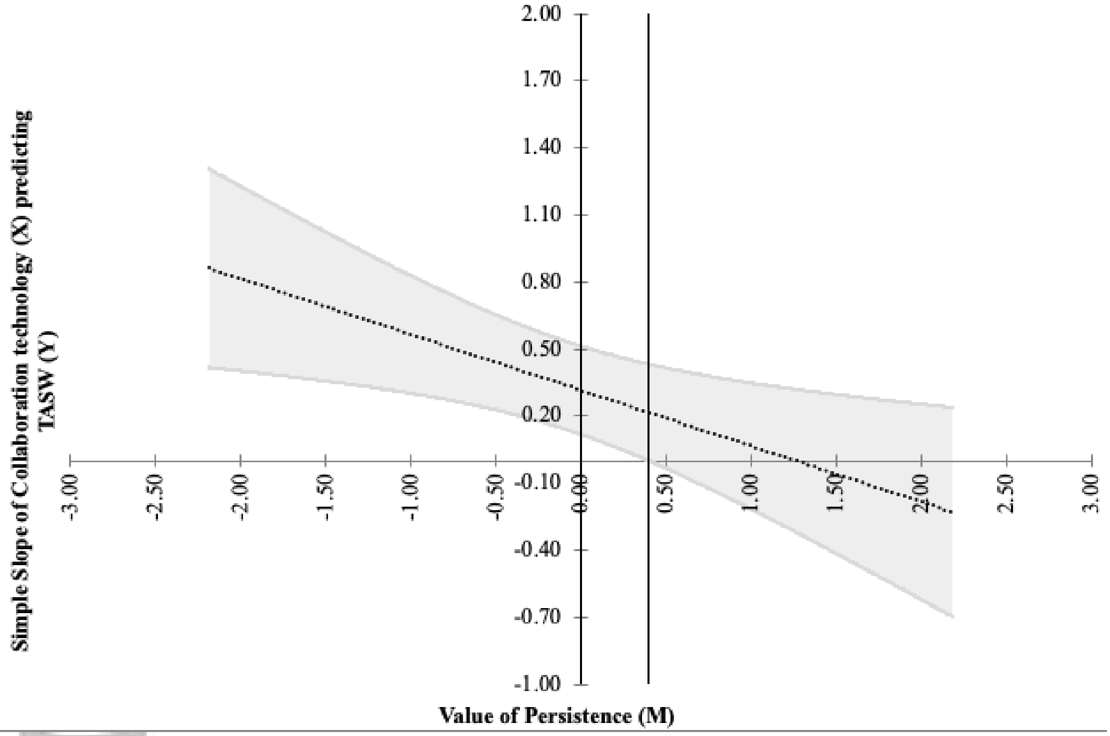
Multi-level regression model of the antecedents of technology-assisted supplemental work.




Note. Unstandardized structural regression weights are shown. Significance is flagged; *** p. < .001, ** p. <.01

Figure 2:

J-N Interaction Plot for Persistence and Collaboration Technology Use on TASW.




*Note:* the vertical line next to the Y-axis indicates the region of significance marker.