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Remote Worker Communication During COVID-19: The Role of Quantity, Quality, and Supervisor Expectation-Setting

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Given the huge increase in remote work that has accompanied the Coronavirus disease (COVID-19) pandemic, understanding predictors of performance and wellbeing among remote workers has never been more timely. Effective communication is commonly cited as key to remote worker success, yet communication variables are rarely incorporated into remote work research. In the present study, we examined the relationship between communication frequency, communication quality, and supervisor-set communication expectations with daily job performance and burnout in an occupationally-diverse sample of employees. We used an experience sampling design and our hypotheses were tested with data collected over a 4-week period with a sample of 471 employees who shifted to full-time remote work due to COVID-19. Results indicated that daily communication quality was associated with daily performance and burnout. In addition, the extent to which supervisors established expectations about communication practices (e.g., expected response times to email) at the onset of the transition to remote work was positively associated with performance, but not burnout. Task interdependence was also tested as a moderator. Task interdependence moderated the relationship between communication quality and performance, such that the relationship was stronger when task interdependence was higher than when it was lower. Task interdependence also moderated the relationship between supervisor-set expectations and performance such that the relationship was stronger when task interdependence was lower than when it was higher. Expected curvilinear relationships between communication frequency and outcomes were not detected. Based on our findings, we provide recommendations for practice and future research.

Keywords: remote work, telecommuting, communication, job performance, burnout

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A focal point in the remote work literature has been on comparisons between remote and standard workers to the neglect of investigating contextual factors that vary within remote work arrangements and how they relate to remote work success (Allen et al., 2015). In particular, an important inquiry is better understand how factors that are qualitatively different when working away from a main office, such as the quality and quantity of communication, relate to remote work success. Moreover, the Coronavirus disease (COVID-19) pandemic brought about a huge increase in remote work, with estimates that 12.3% of U.S. workers were fully remote before the pandemic, 47.7% were fully remote in April 2020, 41.8% were fully remote in October 2020, and 22.9% project being remote in 2025 (Ozimek, 2020). Thus, understanding predictors of performance, as well as employee wellbeing, has never been more timely.

Communication is often cited as critical to remote worker success (Bélanger et al., 2001; DeSanctis & Monge, 1998). That is, in order to be effective, remote workers must be able to communicate with colleagues through means other than face-to-face, such as by email, phone, texting, instant messaging, and video conferencing (e.g., Sias et al., 2012). Researchers have highlighted that both the quantity and quality of communication matters (e.g., Marlow et al., 2018; Pearce, 2009), as does the broader communication context in which employees are operating—namely the extent that clear communication expectations and norms are set (e.g., Gilsdorf, 1998). Despite frequent mention of the importance of effective communication for remote worker success, there are surprisingly few tests linking it to remote work outcomes.

Given the increase in remote work and the limited research to date, the goal of the present study was to explore the relationship between three communication variables (communication quantity, communication quality, and supervisor-set communication expectations at onset of COVID-19) and two indicators of remote worker success (performance and wellbeing). We also examine a contextual moderator (task interdependence). We did so using an occupationally-diverse sample of workers who recently shifted to

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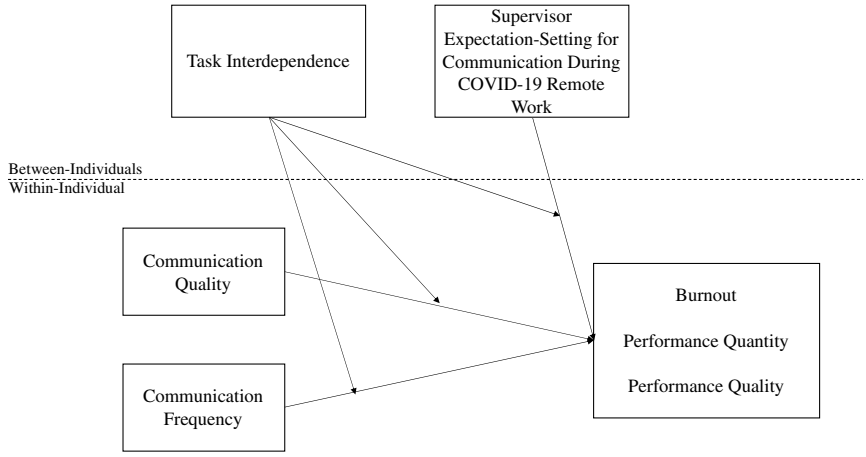
Figure 1
Study Theoretical Model



remote work due to COVID-19 based on a 4-week interval-contingent experience sampling design. Figure 1 portrays the study model.

In addition to testing communication variables in the largely untested context of remote work, our study advances the literature in several ways. First, we examined the link between constructs likely to vary day-to-day, communication quality and quantity, and outcomes at the within-person level across 20 workdays. Although previous research has established, largely outside of remote contexts, that communication quantity and quality are linked to performance (e.g., Marlow et al., 2018) and to a lesser extent burnout (e.g., Atouba, 2021; Graham & van Witteloostuijn, 2010), relationships have not been tested using a within-person design. This is a critical oversight because models linking communication and outcomes (e.g., Dulebohn & Hoch, 2017) are inherently within-person theories. That is, they focus on processes that unfold (Gabriel et al., 2019) after communication occurs. By focusing on the within-person experiences of remote workers closer to when they occur (Weiss & Rupp, 2011) rather than on average experiences, our research design is consistent with theory. This is important in that we have little understanding of the day-to-day experience of those working remotely.

A second advancement of our study is that we add a key variable not studied, but often cited as critical to remote worker success—supervisor-set communication expectations. Because our data were collected shortly after the rapid transition to remote work in the U.S. (April/May 2020), it provided a unique opportunity to examine these expectations. Remote work is often granted in a more deliberative way that involves shared guidelines (e.g., telework.gov). The fact that so many people were forced to suddenly work remote due to COVID-19 created variability on this construct, allowing us to examine a full range of effects. Third, we also included a job role-level feature, level of task interdependence required by a person's job, as a moderator. An oft mentioned issue about remote work is that it is only effective for certain types of workers or jobs (Golden & Gajendran, 2019). Although there is a small body of work that speaks to this point (cf. Allen et al., 2015), further examination of contextual moderators is critical to inform practice as organizations consider which jobs may remain remote in the future.

Additional contributions relate to our outcomes. In order to gain a full picture of the role of communication in remote work success, we simultaneously examine performance and burnout. This is particularly important given evidence that many new remote workers as a result of COVID-19 are performing well or even better than before, but at the cost of high levels of burnout (Maurer, 2020). Furthermore, a glaring limitation of the extant remote work literature is selection effects. Specifically, employees given remote work privileges are often those who managers view as conscientious and trustworthy (Kaplan et al., 2018). This makes it difficult to isolate the effects of remote work on performance and wellbeing, as these select remote workers may differ from standard workers in meaningful ways. Because COVID-19 necessitated remote work across employees, selection effects that have afflicted previous studies are minimized.

Lastly, by drawing from theories that reside in several distinct literatures, we enrich the theoretical ground associated with remote work. There is limited contemporary assimilation of the communication sciences with organizational behavior (see Fulk & Boyd, 1991, for an earlier synthesis). By applying theoretical ideas from communication, virtual teams, and stress, we construct a bridge across these research domains to better understand individual remote work experiences, which in turn can serve as the foundation for more comprehensive theory building.

Communication and Job Performance

Researchers note that communication is critical to organizational functioning (e.g., Euske & Roberts, 1987; Gouran et al., 1994), but no overarching theoretical framework that describes how communication facilitates organizational functioning exists, specifically through individual performance. Thus, we draw from other literatures to inform our model. Specifically, Dulebohn and Hoch's (2017) input-output-process model of virtual teams is relevant as it focuses on performance in a virtual context, which is similar to remote contexts, and it addresses individual-level performance. In simple terms, the model argues that key aspects of the organization, leadership, and team composition drive team cognitive, affective, motivational, and behavioral processes, which

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in turn impact team-level performance, individual-level performance, and attitudes. Contextual factors moderate paths in the model.

Of relevance to the present context is the behavioral processes, which include communication. The model, however, does not elucidate precisely what happens during communication that facilitates individual-level performance, leaving a "black box" of processes. We address this limitation by drawing from research on the functional role of communication, which suggests that communication enhances individual and group performance through the processes of facilitating the allocation and coordination of tasks among team members, resolving ambiguities or misunderstandings, allowing for exchange of information, fostering interpersonal connections, and creating a shared cognition (Bales, 1950, 1953; Bui et al., 2019; Fletcher & Major, 2006; Marlow et al., 2017; Salas et al., 1997).

Although not explicitly mentioned in Dulebohn and Hoch's model (2017), scholars in the teams (Bui et al., 2019; Marlow et al., 2017) and communication (Farace et al., 1977; Kramer, 1996; Mohr & Nevin, 1990) literatures have noted the need to take a more nuanced view of communication. Specifically, although there are many dimensions upon which communication can vary, there seems to be a clear distinction between quantity (frequency) and quality, defined as the extent to which information is adequately distributed (Marlow et al., 2017). From a theoretical standpoint, both quantity and quality of communication factor into the previously mentioned processes and contribute to performance, but the nature of these effects may differ.

With regard to frequency, greater interaction between coworkers simply provides greater opportunity for the performance-enhancing communication processes noted above to occur (Bui et al., 2019). However, it is necessary to integrate additional theoretical lenses, specifically those on communication overload, to fully understand the effects of communication frequency. This literature (Edmunds & Morris, 2000; Eppler & Mengis, 2004; Stephens et al., 2017) suggests that there is a threshold at which greater frequency of communication may no longer be beneficial. Communication overload involves the receipt and/or need to respond to more messages than one can effectively process. As such, on days when a person is overloaded they react by no longer adding information into decision-making, ignoring key information, becoming confused, losing productive time, accepting lower performance standards, or withdrawing (e.g., Eppler & Mengis, 2004; Farace et al., 1977; Miller, 1960). These reactions may in turn impact task performance relative to days when overload is not experienced (e.g., Chewning & Harrell, 1990; Patrashkova-Volzdoska et al., 2003). We expect that this overload effect is particularly salient in remote workers given that all of their communication requires some form of technology, which has been linked to a lower threshold for overload than in-person interactions (e.g., Kennedy et al., 2011).

Based on this, we argue that there is a curvilinear relationship (Schroder et al., 1967) between communication frequency and job performance, such that within-individuals more frequent daily communication relative to typical daily communication is beneficial for personal performance up to a point, after which benefits decline. This curvilinear relationship has been tested and supported in a few studies in the team context (Hoegl & Wagner, 2005; Leenders et al., 2003; Patrashkova-Volzdoska et al., 2003). However, none of these studies have examined the relationships within a remote context, nor on the theoretically appropriate within-persons level.

> *Hypothesis 1:* Within individuals, daily communication frequency has a positive relationship with daily performance (quantity and quality) up to a point, but that relationship becomes negative (e.g., inverted *U*-shape) at higher levels of communication frequency.

With regard to communication quality, researchers (e.g., Marks et al., 2000; Marlow et al., 2017) have asserted that quality should play a more critical and straightforward role than sheer quantity. Quality has been operationalized in numerous ways (e.g., accuracy, openness, clarity, effectiveness, timeliness; see Marlow et al., 2018, for a review), but, as noted above, the definition itself centers on adequate exchange of information. Thus, we hone in on the extent to which a person feels that they received the information needed to do their job as a key indicator of communication quality. This also has ties to job performance as having the information necessary to complete one's job is at the crux of effective task achievement (Wang & Noe, 2010). We expect a linear effect, as there is no reason to expect that obtaining key information, given its direct relevance with job functions, will have a detrimental effect on performance.

There is prior support for this prediction as studies in the general (i.e., not solely virtual) teams literature have examined the link between communication quality (broadly defined) and team performance, and the meta-analytic relationship is indeed positive at the between-persons level (Marlow et al., 2018). However, our study extends this work by focusing on a more specific, and arguably more relevant form of communication quality for individual performance (information receipt), including individual rather than team performance, honing in on the remote work context, and testing relationships at the within-person level.

> *Hypothesis 2:* Within individuals, daily communication quality positively relates to daily performance (quantity and quality).

Communication and Burnout

We also consider the role of communication quantity and quality on employee burnout. Burnout has not been implicated specifically in the aforementioned input-output-process models of communication given its focus on task performance outcomes. Thus, we borrow from previous work (Derks & Bakker, 2010) that has integrated communication into the job-demands resources model (JDR; Bakker & Demerouti, 2007) to explain the effects on burnout. The JDR generally argues that burnout is most likely experienced under conditions of high job demands (any factor that requires sustained effort or skills) and low job resources (aspects of the job that help achieve work goals and stimulate learning and development). In discussing communication frequency, Derks and Bakker (2010) propose that the function of communication frequency may change at varying levels. That is, at low to medium levels, communication acts as a resource in that it invokes the aforementioned processes (coordination, information exchange, etc.) that should be generally beneficial and function as resources, leading to a negative relationship between communication frequency and burnout. However, at higher levels, daily communication frequency may no

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longer function as a resource. The tendency for overload to occur may invoke the processes noted above (distraction, confusion, etc.), which can reduce the resourcefulness of communications and actually shift it to functioning like a demand, thereby positively relating to burnout. This also aligns with general notions of role overload as a job demand that negatively relates to burnout (e.g., Zohar, 1997). Indeed, this link was supported in a between-persons study of supervisor face-to-face interactions and emotional exhaustion (Graham & van Witteloostuijn, 2010). As such, we expect a similar curvilinear relationship as noted above with performance.

Hypothesis 3: Within individuals, daily communication frequency has a negative relationship with daily burnout (quantity and quality) up to a point, but that relationship becomes positive at higher levels of communication frequency.

With regard to communication quality, acquiring job-related knowledge should generally be considered a job resource, as it provides employees with the cognitive means to achieve work goals (Bakker & Demerouti, 2007; Demerouti et al., 2001). In this sense, we can expect when a person receives more high-quality information than usual it will act as a resource, protecting against burnout. We do not posit a curvilinear effect as there is no clear theoretical reason to expect that communication involving exchange of relevant knowledge would shift to act as a demand. Said otherwise, a greater quality of information should only contribute more to the resourcefulness of that information.

Hypothesis 4: Within individuals, daily communication quality negatively relates to daily burnout.

Communication Expectations

The broader organizational context and specifically the role of the supervisor are noted as important distal predictors of virtual team performance in Dulebohn and Hoch's (2017) model. Given that supervisor-set expectations with regard to communication policy (e.g., tools to be used, expected response times to emails/message chats) have been noted as particularly critical for remote workers, especially in the context of a rapid transition to remote work during COVID-19 (Kuntz, 2021; Newman & Ford, 2021), we also considered this variable as an important communication-related predictor, albeit at the between-person level, of performance and burnout.

Communication expectations serve multiple functions. First, they help align employees with organizational goals during remote work and how those goals might be best accomplished (Gilsdorf, 1998). This can facilitate performance processes as well as reduce additional demands that come with coordination or communication problems that can cause strain (Thielsch et al., 2021). Second, expectations help employees establish new routines, which can facilitate effective communication and sensemaking of new work processes (Newman & Ford, 2021; Weick et al., 2005). Third, they can serve as a resource in helping employees cope with uncertainty and resulting stress. Indeed, in a recent study conducted during COVID-19, Kuntz (2021) found that ambiguous communications from managers about changing roles and procedures contributed to employees' stress and difficulty coping with work demands. The crisis management literature also demonstrates that clear communication with regard to the organization's strategic direction is key to maintaining employee productivity and wellbeing (Malinen et al., 2019). In the case of the COVID-19 rapid transition to remote work, that vision should include expectations for how employees who previously worked face-to-face are to maintain contact while working remotely.

Drawing from these ideas, we expect people whose supervisors express clear standards and expectations for communication practices at the onset of remote work will have enhanced performance. We also expect burnout to be lower, owing to the effect on reducing job demands and stress from ambiguity, both of which are key predictors of burnout (Alarcon, 2011).

Hypothesis 5: Supervisor-set expectations regarding communication at onset of COVID-19 remote work (a) positively relates to job performance and (b) negatively relates to burnout.

The Moderating Role of Task Interdependence

Dulebohn and Hoch's (2017) model suggests a few key moderators of the link between communication and performance, which focus on the team context and nature of their tasks. This concept also aligns with structuration theories of communication (e.g., Giddens, 1984), which note the structure of roles and tasks in organizations as key determinants of communication processes. We incorporate this idea by examining task interdependence, or the extent that a job requires reliance on others for completion (Morgeson & Humphrey, 2006), as a structural feature that is cited as a key contextual variable for team communication processes (Marlow et al., 2018), and is explicitly modeled as a moderator of the link between behavioral processes, including communication, and performance by Dulebohn and Hoch. Further, it is a commonly studied job feature in remote work research (Allen et al., 2015), often modeled as a moderator between predictors and performance/wellbeing (e.g., Golden & Veiga, 2005).

We argue that the proposed daily within-person curvilinear relationship between communication frequency and job performance varies based on task interdependence generally required by a person's job. We expect that task interdependence functions similarly to a core essential task of the job (Campbell, 1990), as interdependent tasks by definition require coordination with others for completion. Thus, based on the notion that communication is more essential in jobs higher in task interdependence than those lower in it, we expect that the curvilinear relationship between communication and performance will be stronger up to the point of inflection ("too much communication"). After this threshold, we expect the moderation to take a different form, such that the negative relationship of too much communication with job performance is weaker in more interdependent jobs than in less interdependent jobs. Because people in more interdependent jobs are ostensibly habituated to high amounts of communication, they may be less vulnerable to the negative effects of overload. Sumecki et al. (2011) found support for a similar idea in their study of email; they found that the effect of email frequency on perceptions of overload was reduced when email was considered an essential business function.

Hypothesis 6: Typical task interdependence moderates the daily within-person curvilinear relationship between communication frequency and job performance, such that the relationship is stronger (more positive) for employees in higher versus lower task interdependent jobs up the point of inflection. After the

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point of inflection, the (negative) relationship is weaker for those in higher versus lower task interdependent jobs.

Following the same logic about the necessity of communication in more interdependent jobs, we expect the previously predicted linear relationship between communication quality and performance to be stronger under conditions of higher versus lower task interdependence.

Hypothesis 7: Typical task interdependence moderates the daily within-in person relationship between communication quality and job performance, such that the positive relationship is stronger for employees in jobs with higher versus lower task interdependence.

Moreover, we expect similar (though opposite in sign) relationships to occur with burnout. Although not invoked specifically in the JDR, several perspectives that the JDR draws from (e.g., Hobfoll, 1988; Thoits, 1994) mention the concept of resources differing in their relevance and function. This can include more stable person-level resources or those that have particular relevance in a given context (ten Brummelhuis & Bakker, 2012). Moreover, as noted by Hobfoll et al. (2018), how resources operate depends on the ecological context such that in one context a resource may be positive, but negative in another. For example, while social support is commonly viewed as a beneficial resource, in some cases it can be harmful (Beehr et al., 2010). We argue that the impact of communication frequency and quality as resources becomes particularly important under the context of higher versus lower task interdependence, and as such, the relationship between these resources and burnout becomes heightened.

Hypothesis 8: Typical task interdependence moderates the daily within-in person curvilinear relationship between communication frequency and burnout, such that the relationship is stronger (more negative) for employees in higher versus lower task interdependence jobs up the point of inflection. After the point of inflection, the (positive) relationship is weaker for those in higher versus lower task interdependence jobs.

Hypothesis 9: Typical task interdependence moderates the daily within-in person relationship between communication quality and burnout, such that the negative relationship is stronger for employees in jobs with higher versus lower task interdependence.

Lastly, we pose that task interdependence moderates relationships between communication expectations and job performance/burnout. Empirical (e.g., Sias et al., 2020) and theoretical work (Cooke et al., 2013) suggests that interdependence between team members often necessitates frequent communication. When task interdependence is high, communication and information flow become critically important to performance (Hoch & Kozlowski, 2014). In this sense, supervisor expectation-setting at remote work onset becomes superfluous because workers dependent on each other are likely to establish communication practices quickly in order to complete their jobs. In other words, high task interdependence creates a strong situation, which occurs when behavioral expectations are already high (i.e., to communicate) and there are incentives to comply (effective job performance; e.g., Johns, 2006; Mischel, 1977). We expect that this context reduces the importance of supervisors setting expectations at the onset of remote work on performance and burnout. This is not to say that these expectations are not meaningful; rather they have a weaker impact given the requirements of high task interdependence jobs.

Hypothesis 10: Typical task interdependence moderates the relationships between supervisor-set expectations and (a) job performance and (b) burnout, such that they are weaker when task interdependence is higher versus lower.

Method

Participants and Procedure

Participants were 471 employees who met the following criteria: Working at least 32 hr per week on a standard Monday–Friday day shift schedule, had transitioned to 100% remote work from a job that was primarily (>90% of hr) not remote before COVID-19, located in the U.S., and not self-employed. Participants were recruited through a variety of methods, including distribution on social media, through several organizations, and through researchers' personal networks and were compensated up to $82. See Table 1 for demographics.

Interested potential participants first completed an eligibility survey. Those eligible were forwarded the baseline survey, in which supervisor-set expectations, task interdependence, Level-2 controls, and demographics were included. The daily study began the week following baseline completion, during which participants completed a survey every day between 4:00 and 11:00 p.m. local time Monday through Friday for 4 weeks. It included measures of communication frequency and quality, performance quality and quantity, and burnout. Data were collected between April 27 and June 12, 2020. For reference, the mean number of daily cases of COVID-19 in the zip codes where our participants were located was 133 at the start of the study and 89 at the end of the study.[1] We received 7,361 usable daily surveys, reflecting an average response rate of 78.2% (15.6 of the 20 daily surveys, $SD = 4.9$) across participants. Missing values were excluded from analyses. This study was approved by the University of Georgia's Internal Review Board [IRB] (PROJECT00002201; "Adjustment and Effectiveness of Rapid Transition Remote Work").

Measures

Responses were set on a 5-point agreement Likert scale unless otherwise noted.

Daily Communication Frequency

Daily communication frequency was measured with Fonner and Roloff's (2012) scale, which asks participants to rate how frequently they communicated with two separate targets (supervisor, colleagues) using video conferencing, phone, instant messaging/text, and email. Responses were set on a 5-point frequency scale that ranged from *not at all* to *7+ times today*. Total daily

[1] These values were calculated using the John's Hopkin's COVID-19 database (https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data). Specifically, we tied participant's zip codes to county-level cases and deaths data in the database from the first 2 weeks of daily surveys and final 2 weeks of daily surveys to produce average new cases per day in our participants' regions.

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Table 1
Participant Demographic Information

Variable	*M* or %	*SD*
Gender		
Male	35.11%	
Female	64.26%	
Gender variant/nonconforming	0.21%	
Prefer not to say	0.43%	
Race		
White	85.31%	
Hispanic or Latino or Spanish origin of any race	5.51%	
Asian	3.06%	
Black or African-American	4.90%	
Native Hawaiian or other Pacific Islander	0.41%	
Other	0.41%	
Prefer not to disclose	0.41%	
Education		
High school graduate	0.64%	
Some college, no degree	4.67%	
Associate's degree	3.18%	
Bachelor's degree	36.94%	
Master's degree	36.31%	
Professional degree	2.76%	
Doctoral degree	15.50%	
Industry		
Accommodation or food service	0.43%	
Admin, support, waste management, or remediation services	1.06%	
Arts, entertainment, or recreation	2.13%	
Construction	1.06%	
Educational services	34.47%	
Finance or insurance	8.09%	
Forestry, fishing, hunting, or agriculture support	0.64%	
Health care or social assistance	7.02%	
Information	3.19%	
Management of companies or enterprises	0.64%	
Manufacturing	3.62%	
Other services (except public administration)	0.64%	
Professional, scientific, or technical services	15.96%	
Real estate or rental and leasing	0.64%	
Retail trade	0.85%	
Transportation or warehousing	2.77%	
Utilities	0.43%	
Wholesale trade	0.64%	
Other	15.74%	
Age	36.17	10.09
Work hours per week	42.02	5.27
Job tenure (years)	5.78	6.57
Organizational tenure (years)	6.30	6.40
Personal income[a]	4.43	2.17
Supervisory status (% supervising others)	39.06%	

[a] Income was measured using the following scale: 1 = *Under $20,000*, 2 = *$20,000–$39,999*, 3 = *$40,000–$59,999*, 4 = *$60,000–$79,999*, 5 = *$80,000–$99,999*, 6 = *$100,000–$119,999*, 7 = *$120,000–$139,999*, 8 = *$140,000–$159,999*, 9 = *$160,000–$179,999*, 10 = *$180,000–$199,999*, 11 = *$200,000+*.

communication was computed by summing responses to the eight items.[2]

Communication Quality

Communication quality was measured with a single item: "Today, I was able to get the key information from others I needed to do my job."

Daily Performance Quantity and Quality

We created single item measures for each of these constructs: "In terms of the quantity of work you completed today, on a scale of 1–10 where 1 = *very little work* and 10 = *more work than anticipated*, how would you rate yourself?" and "In terms of the quality of work you completed today, on a scale of 1–10 where 1= *very poor quality* and 10 = *exceptional quality*, how would you rate yourself?"

Daily Burnout

Daily burnout was assessed with an item ("Today, I felt burned out at work") similar to an item from Wagner et al.'s (2014) four-item measure but adapted to the day versus moment.

Typical Job Task Interdependence

Typical job task interdependence was measured with three items (see Appendix A) from van der Vegt et al.'s (2001) 5-item scale ($\alpha = .75$). Participants were asked to think about the timeframe of the 6 months before the transition to remote work.

[2] We thank an anonymous reviewer for pointing out that the measurement of communication frequency in this manner does not take into account a person's subjective interpretation of how much communication is adequate versus too little or too much; the same amount of communication could be perceived very differently across people based on disposition or the nature of their job. We believe that by virtue of conducting within-person centered analyses we have naturally controlled for this to some extent. That is, we are comparing the effects of frequency compared to a person's typical day in terms of communication frequency. Thus, higher values are by definition high for that individual person. This still doesn't imply that they will perceive the communication as too much, but it does create some natural standardization of what is higher than average for that person.

To further address this issue empirically, we collected a small sample of additional data. This came from a subsample of our original participants. We required that they were currently working remotely >80% of the time and not self-employed. We received 95 responses, 22 started the survey but were not eligible, One failed our attention check, and two ultimately did not complete any of the daily surveys, leaving a final sample of 70. This subsample was 68.6% female, 82.9% White, 35.17 ($SD = 8.34$) years old on average, worked 43.47 hr ($SD = 7.69$) per week, and were working remotely on average 94.80% ($SD = 7.90$) of the time.

Participants completed a daily survey each day for 3 days where we included our original communication measure, burnout, and performance, and an additional measure of communication frequency, the amount of communication I had with my supervisor (work colleagues) today was . . . with a 5-point Likert response scale that ranged from "far too little" to "far too much". Level-1 N was 188. The within-person centered correlation between the original frequency measure ($M = 15.77$; $SD = 4.26$) and the subjective measure ($M = 2.90$; $SD = .37$) was $r = .29$, $p < .01$. These suggest that there is a trend such that higher frequency of communication is indeed more likely to be perceived as "too much." The correlation is medium in size however which also lends some credence to the reviewer's point that there is some variability with regard to how much is perceived as too much. We also examined the correlations between each of these measures and the outcomes we used in the original study (measured in the same way). In no case was the correlation between the original frequency communication measure and an outcome significantly different from that of the subjective measure (performance quantity: Within-person centered rs = .12, −.04, $z = 1.83$, $p = .07$; performance quality: rs = −.09, −.07, $z = .23$, $p = .82$; burnout: rs = .02, −.04, $z = .68$, $p = .50$).

We also note that we did not include internal consistency reliability estimates or confirmatory factor analysis for this measure as it is a formative, rather than reflexive, measure where such estimates carry little meaning (Bollen & Lennox, 1991; Howell, 1987). See Mohr et al. (1996) for additional discussion of summing communication scales across mediums and how this functions in a formative manner.

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Supervisor-Set Expectations Regarding Communication at Onset of Remote Work

Supervisor-set expectations regarding communication at onset of remote work was assessed via five items (see Appendix A) that were created for the study ($\alpha = .88$). We could not locate a measure that mapped on well to the construct; thus, we created this scale based on reviews of the existing literature (Gilsdorf, 1998) as well as articles related to the COVID-19-induced transition to remote work (e.g., Gurchiek, 2020; Larson et al., 2020; Williams, 2020).[3]

Results

Given the nested nature of the data, we employed multilevel analysis in R Version 4.0.3 using the nlme package (Pinheiro & Bates, 2000) to test hypotheses. Estimates of the percentage of within-individual variance in the daily measures are in Table 2. When testing hypotheses, we group-mean centered our within-individual predictors to remove variance attributable to the person-level of analysis, and we grand-mean centered our between-individual predictors and moderators (Bliese, 2000; Enders & Tofighi, 2007). We included Level-1 control variables with fixed effects slopes for the day of the week and the week of the study, in addition to controlling for significant autocorrelation (Beal & Weiss, 2003; Bliese, 2016; Gabriel et al., 2018). At Level-2 we controlled for trait anxiety, job tenure, and typical weekly work hours.[4]

Means, standard deviations, and intercorrelations are presented in Table 2 and multilevel regression analyses are in Table 3. Neither Hypothesis 1 nor Hypothesis 3 (curvilinear relationship of communication frequency with performance and burnout, respectively) was supported. Although there was a significant curvilinear effect (performance quantity: $\gamma_{10} = .01$, $p < .001$; performance quality: $\gamma_{10} = .002$, $p = .002$; burnout: $\gamma_{10} = .001$, $p = .003$), it does not exhibit the predicted inverted *U*- or *U*-shaped relationships (see Figures 2 and 3).[5] Hypotheses 2 and 4 (communication quality with performance and burnout, respectively) were both supported (performance quantity: $\gamma_{10} = .37$, $p < .001$; performance quality: $\gamma_{10} = .38$, $p < .001$; burnout: $\gamma_{10} = -.15$, $p < .001$).[6] Hypothesis 5a and 5b involved the relationships between supervisor-set expectations and performance and burnout, respectively. Hypothesis 5a was supported (performance quantity: $\gamma_{01} = .21$, $p < .001$; performance quality: $\gamma_{01} = .14$, $p = .01$), but Hypothesis 5b was not ($\gamma_{01} = -.02$, $p = .52$).

Hypotheses 6 and 8, which involved the moderating role of task interdependence in the curvilinear relationship between communication frequency and performance and burnout were not supported, nor tested because there was not a significant amount of between-individual variance in the quadratic communication frequency slope to warrant testing for moderation (performance quantity: $\tau_{11} = .00$, $p = 1.0$; performance quality: $\tau_{11} = .00$, $p = .56$; burnout: $\tau_{11} = .00$, $p = 1.0$). Hypotheses 7 and 9 involved the moderation of task interdependence on communication quality and performance and burnout relationships, respectively. Hypothesis 7 was partially supported, as there was a significant interaction (see Figure 4) for performance quality ($\gamma_{11} = .07$, $p = .02$), but not quantity ($\gamma_{11} = .07$, $p = .06$). Hypothesis 9 was not supported ($\gamma_{11} = .00$, $p = .99$). Hypothesis 10a and 10b involved the interaction between supervisor expectations and task interdependence on performance and burnout. Support was found for performance quantity and quality ($\gamma_{01} = -.22$, $p < .001$; $\gamma_{01} = -.15$, $p = .01$, Figures 5 and 6), but not burnout ($\gamma_{01} = .06$, $p = .10$).

Supplementary Analyses

As a way to deepen our understanding of the link between communication frequency and performance/burnout, we conducted posthoc analyses where we tested Hypotheses 1, 3, 6, and 8 separately by medium (video calls, email, instant messaging/text, phone) summed across source.[7] Results differed by medium. Although there were several significant linear positive effects, the only significant curvilinear effects were for texting and burnout and performance quality; the nature of these relationships took a similar form to those in the main analyses (Figures 2 and 3). There were no significant interactions between the curvilinear terms and task interdependence. Overall, when focusing on a single medium in isolation rather than the daily sum of all mediums, higher communication related to higher performance as well as burnout in a linear fashion.

Given research suggesting some differences in the nature and function of coworker versus manager communication (cf. Ploeger-Lyons & Kelley, 2017), we also tested Hypotheses 1 and 3 with

[3] Because this was a newly created scale, we underwent additional efforts to provide evidence for its validity. We obtained additional data from a subsample of our original participants using the same data collection method discussed in Footnote 2. However, we had 72 valid responses instead of 70 (two people did the baseline survey but not daily surveys). From these participants, we focused on only those who indicated that they had been reporting to their supervisor for over 1 year to ensure they were considering the same supervisor from the original data collection, $N = 57$. The details of this analysis, which are presented in Appendix B, support the validity of our scale as relating to general leadership and communication behaviors but being unique from indicators of a high-quality relationship between the supervisor and subordinate.

[4] Trait anxiety was measured with the five-item anxiety facet of neuroticism from the International Personality Item Pool [IPIP] (Goldberg et al., 2006; coefficient $\alpha = .90$). Results are consistent with and without the control variables. However, given that some relationships were significant, we retained all controls in our models to provide a more conservative test of the study's hypotheses.

[5] As we proposed hypotheses regarding interaction effects for each of our Level-1 predictors, we initially modeled these slopes as random. However, further tests revealed there was not a significant amount of between-individuals variance in the quadratic communication frequency slope to warrant testing for moderated effects. Given these findings and that we did not make any hypotheses regarding moderated effects for the linear communication frequency term, we modelled these as fixed slopes in subsequent analyses in order to reduce model complexity.

[6] We also exploratorily tested for curvilinear effects of communication quality. None were significant.

[7] Ideally, we would have tested for all communication mediums and sources separately in the same equation in order to fully examine their unique effects. However, this increased model complexity substantially (i.e., required 26 fixed effects and 10 random effects) and the model would not converge. We did two things in order to obtain model convergence. We summed across the source to reduce the equation to four predictors of each medium and their respective curvilinear terms instead of eight predictors. We then only modeled as random effects those communication terms which demonstrated statistically significant between-person variance in slopes. We also removed the random effect of communication quality (which was used to test Hypotheses 7 and 9) which then allowed the model to converge. As such, the models used in the hypothesis testing and supplementary analyses are not directly comparable as they do not contain identical terms (i.e., the supplementary analysis is not controlling for the interaction effects between communication quality and task interdependence on job performance and burnout).

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Table 2

Variance Estimates, Means, Standard Deviations, and Intercorrelations

Variable	Within-person variance (e^2)	Between-person variance (r^2)	% of within-person variance	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Communication quality	0.51	0.28	64.56	—																
2. Communication frequency	15.26	9.38	61.93	.08**	—															
3. Task interdependence				.01	.15**	(.75)														
4. Expectations				.10*	.15**	.04	(.88)													
5. Burnout	0.74	0.92	44.58	−.12**	.03**	.12*	−.04	—												
6. Performance quantity	2.90	2.15	57.42	.15**	.12**	−.06	.17**	−.04**	—											
7. Performance quality	1.87	1.89	49.73	.18**	.08**	−.12*	.12*	−.15**	.50**	—										
8. Supervisor status[a]				−.01	.15**	.11*	−.11*	.02	−.03	−.02	—									
9. Job tenure				−.05	−.02	−.11*	.08	−.06	.04	.04	.19**	—								
10. Work hours[b]				−.06	.05	.00	−.13*	.02	.02	.01	.13*	.10*	—							
11. Anxiety				−.15**	−.08	.12*	.01	.36**	−.18**	−.24**	−.05	−.10*	−.09	(.90)						
12. Race[c]				.00	−.01	.04	−.13**	−.03	−.04	.05	.11*	.08	.00	.01	—					
13. Gender[d]				.04	−.08	.02	.03	.10*	−.06	−.05	−.05	−.01	−.07	.16**	.05	—				
14. Education[e]				−.11*	−.11*	.06	−.19**	.11*	−.21**	−.23**	.13*	.04	.20**	.00	.00	.04	—			
15. Compliance				.05	−.05	.00	−.16**	.02	.10*	.10*	.06	.01	.04	.03	.06	.10*	.18**	—		
16. Day of the week				−.01	.03*	.03	.06	.01	.03**	.05**	—	—	—	—	—	—	—	—	—	
17. Week				−.08**	−.03*	−.03	−.13**	.05**	.05**	.06**	—	—	—	—	—	—	—	—	−.02	—
M				3.74	14.12	3.87	2.62	2.77	6.42	7.40	0.39	5.79	42.03	2.97	0.85	0.64	6.57	15.63	—	—
SD				0.88	4.97	0.94	1.14	1.29	2.23	1.92	0.49	6.57	5.26	1.04	0.35	0.48	1.01	4.75	—	—

Note. Level 1 $n = 7291–7294$; Level 2 $n = 471$. Reliability information is located on the diagonal. Correlations for the Level-1 variables are group-mean centered relationships among the daily variables. Level-1 variables were aggregated to provide estimates of the Level-2 relationships. The percentage of variance within-individuals was calculated as $e^2/(e^2 + r^2)$. Correlation coefficients are not provided in cells with dashes because the variable does not have clear meaning when aggregated at Level 2. Expectations = supervisor expectation-setting for communication; Compliance = percentage of daily surveys completed.

[a] Supervisor = 1; Nonsupervisor = 0; Note the sample size for correlations with supervisor status is $N = 426$ due to a technical glitch that resulted in missing data. [b] Average number of hours per week spent in paid employment. [c] White = 1; 0 = All other racial categories. [d] Female = 1; Male = 0. [e] Education was coded as follows: None–8th grade = 1; 9th–11th grade = 2; High school graduate = 3; Some college, no degree = 4; Associate's degree = 5; Bachelor's degree = 6; Master's degree = 7; Professional degree or Doctoral degree = 8.

* $p < .05$. ** $p < .01$.

Table 3
Results From Multilevel Analysis

Predictor	Burnout			Performance quantity			Performance quality		
	γ	*SE*	*t*	γ	*SE*	*t*	γ	*SE*	*T*
Between levels									
Intercept	2.76**	0.04	64.19	6.30**	0.07	91.95	7.32**	0.06	114.87
Task interdependence	0.08	0.05	1.69	−0.08	0.07	−1.10	−0.15*	0.07	−2.21
Supervisor expectation-setting for communication	−0.02	0.04	−0.64	0.21**	0.06	3.52	0.14*	0.06	2.53
Task interdependence × Communication quality	0.00	0.02	0.00	0.07	0.04	1.86	0.07*	0.03	2.35
Task interdependence × Supervisor expectation-setting for communication	0.06	0.04	1.64	−0.22**	0.06	−3.68	−0.15*	0.06	−2.67
Within level									
Communication quality	−0.15**	0.02	−8.20	0.37**	0.03	10.64	0.38**	0.03	12.69
Communication frequency-linear	0.01**	0.00	3.39	0.05**	0.01	10.46	0.02**	0.00	5.41
Communication frequency-quadratic	0.001**	0.00	3.01	0.01**	0.00	7.31	0.002**	0.00	3.03
Day of the week	0.01	0.01	1.26	0.04**	0.01	3.12	0.05**	0.01	4.54
Week	0.03**	0.01	3.01	0.10**	0.02	4.59	0.09**	0.02	5.42
Trait anxiety	0.34**	0.04	8.12	−0.26**	0.06	−3.94	−0.30**	0.06	−4.88
Job tenure	0.00	0.01	−0.50	0.00	0.01	0.36	0.00	0.01	−0.12
Work hours	0.01	0.01	0.97	0.01	0.01	0.78	0.00	0.01	0.17
Pseudo R^2	2.36%			4.14%			5.14%		

Note. Level 1 n = 7,291–7,294; Level 2 n = 471. Nonitalicized variables are the focal study variables; italicized variables are controls. Estimates reflect unstandardized coefficients. Pseudo R^2 is calculated as the percentage change in the within-individual variance between the null and final models (Snijders & Bosker, 1994).
* $p < .05$. ** $p < .01$.

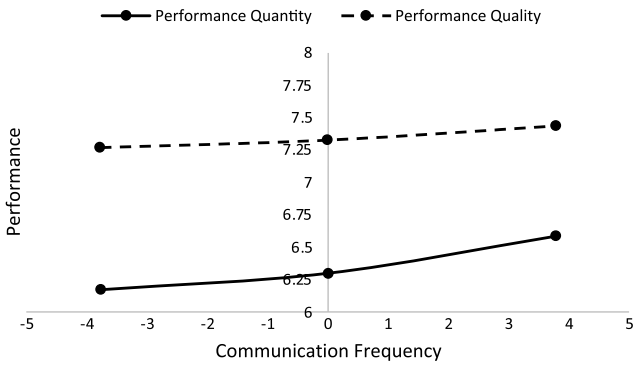
results separated by source. Results were entirely consistent with the combined analyses, exhibiting similar curvilinear relationships. In addition, there was one significant interaction (coworker communication and task interdependence on performance quantity), though it was not in line with predictions. See Appendix C for detailed results.

Discussion

Our research advances understanding of communication in relation to remote worker job performance and burnout using an experience sampling design. Drawing from team and communication theories, we expected an inverted *U*-shape relationship between communication frequency and performance. There was a significant positive linear and curvilinear effect, but the curvilinear association was opposite to that expected– the slope was steeper at higher levels, indicating more frequent communication had an even stronger relationship with performance. This is counter to theories of communication overload. From a theory building standpoint, additional research is needed to understand why this unexpected curvilinear effect occurred. Speculatively, it could be due to context. Uncertainties associated with COVID-19 and being new to remote work could have made (over)communication beneficial. On the other hand, the within-person assessment may be driving differential effects. Although theory is at the within-person level (when a person becomes overloaded, their performance suffers), overload may take more than a single day to occur, which would be more likely captured in cross-sectional studies where frequency is looked at cumulatively or on average. We also suggest additional research into the role of specific communication mediums, as results did not fully replicate when testing each in isolation. For example, it would be useful to explore specific daily combinations of mediums in more depth to see if certain combinations are more protective or harmful than others.

We found that communication quality related positively to performance and the link was stronger than that with frequency. This further highlights the need to take into account what is occurring during communication in addition to frequency. Interestingly, the quality of communication has not been well-integrated into the frameworks we used to link communication and performance though it is noted in reviews and in other research (Marlow et al., 2017). To extend theory, we advocate for explicitly incorporating both quantity and quality and considering them in tandem for model refinement. Tying in communication overload theory as well, it may be that the quantity of communication directly impacts the quality and its subsequent overload properties in a curvilinear way. That is, it may be difficult to achieve high-quality communication when

Figure 2
Curvilinear Effect of Communication Frequency on Performance Quantity and Performance Quality



Note. Communication frequency was group-mean centered thus 0 represents the average intercept and the other points plotted represent ±1 *SD* around the mean. Although statistically significant, the curvilinear effect is quite small and as such may have limited practical importance. The range of values for performance quantity and quality is from 1 to 10 but is truncated to better illustrate effects.

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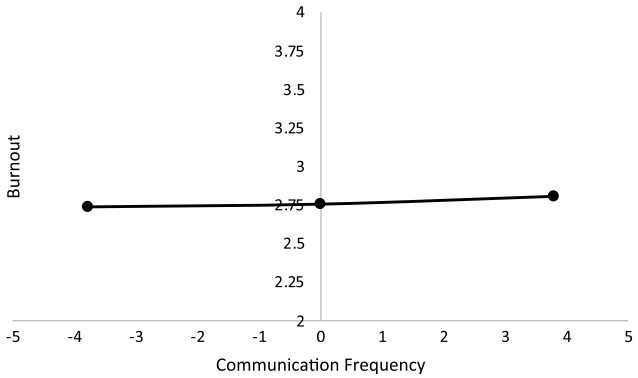
Figure 3

Curvilinear Effect of Communication Frequency on Burnout



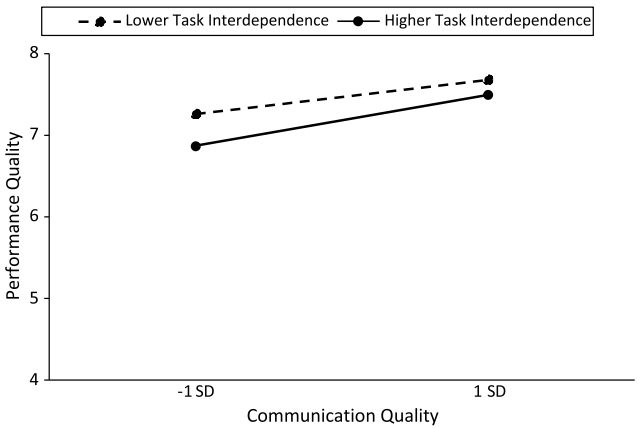
Note. Communication frequency was group-mean centered thus 0 represents the average intercept and the other points plotted represent ±1 *SD* around the mean. Although statistically significant, the curvilinear effect is quite small and as such may have limited practical importance. The range of values for burnout is from 1 to 5 but is truncated to better illustrate effects.

accompanied by limited frequency, but then with too much communication the quality inherent in any given communication episode can become difficult to discern.

Turning to burnout, our hypothesis was not supported with communication frequency. Contrary to expectations the relationship was positive across all levels, though it was more positive at the extreme. On the other hand, communication quality was negatively related to burnout, demonstrating that it is not only important for performance, but also for wellbeing. In terms of extending theory, the fact that communication frequency is good for performance but bad for wellbeing has not been incorporated into any of the basic communication frameworks—largely because wellbeing is neglected. Dulebohn and Hoch (2017) include satisfaction but assume that satisfaction and performance will be similarly (and positively) affected. Clearly, we need to better understand why and when this performance-burnout tradeoff occurs, and whether it is unique to the COVID-19 context when stress is generally heightened. We argued that JDR may be a useful theory to understand this, and perhaps integrating the core idea that one variable can differentially function as both a demand and resource under varying conditions would help elucidate the issue. Moreover, examining trait-level moderators, such as high extraversion could help extend research in this area. For example, introverted individuals may have different thresholds at which communication shifts from a resource to a demand relative to extraverts.

Figure 4

Interaction Between Task Interdependence and Communication Quality on Performance Quality



Note. The range of values for performance quality is from 1 to 10 but is truncated to better illustrate effects.

With regard to practice, given the small effect sizes, we hesitate to emphasize the communication frequency results. However, we do think our findings provide some food for thought for managers. In considering communication frequency, managers should recognize the potential tradeoff between performance and burnout. Small gains in performance are unlikely to be beneficial over time if accompanied by an increase in burnout. Rather than focusing on communication quantity, managers may be better served by focusing on quality, which is beneficial for both performance and burnout. These findings may also be considered alongside those with regard to communication expectations, which was beneficial for both performance and burnout. That is, part of the expectation-setting process could include discussions of communication quantity that meets the individual social and work-related needs of the employee and the supervisor, as well as ways to build high-quality and socially-supportive exchanges.

Our results with regard to communication expectations can inform policies. Providing a clear set of guidelines that includes information such as which communication tools should be used for specific tasks (e.g., Zoom vs. email) can help new remote workers make sense of and adapt to the modified work context. This can be useful for other rapid remote work transition contexts (e.g., weather events) or for general remote work policy development. Future research would benefit from further analysis into precisely which policies are most effective (i.e., when is email more effective than a virtual video meeting), as this is likely important in addition to setting expectations. As many organizations postpandemic consider hybrid remote work policies (i.e., some days in the office, some days outside the office), communication expectations will become even more important as people navigate multiple working environments. Theoretically, this finding speaks to the need for communication expectations to be explicitly incorporated into models of remote work effectiveness; for example, Dulebohn and Hoch's (2017) model is vague in terms of contextual influences on remote worker effectiveness, and supervisor expectation-setting seems to be a key specific contextual variable. Future research would benefit from replicating findings outside of the forced shift to remote work as well to determine if this only matters in the unique COVID-19 context or generally in any remote arrangement. We suspect the latter, given general research on the role of expectations in reducing stress (e.g., Kuntz, 2021).

Lastly, we found that the relationship between communication quality and performance is stronger when task interdependence is higher. This provides an explicit test of an idea put forth in Dulebohn and Hoch (2017). It also provides more reinforcement that task interdependence is a meaningful contextual variable that should be modeled as communication theories are refined, especially within the remote worker context. We also found that supervisor expectation-setting matters less for performance when interdependence is higher

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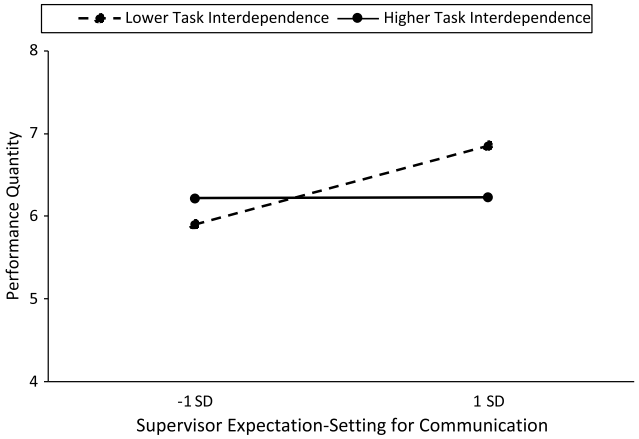
Figure 5

Interaction Between Task Interdependence and Supervisor Expectation-Setting for Communication on Performance Quantity



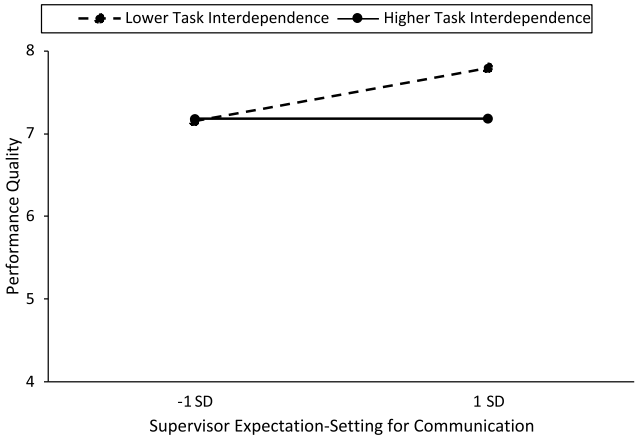
Note. The range of values for performance quantity is from 1 to 10 but is truncated to better illustrate effects.

versus lower. To our knowledge this is the first test of how expectations interact with different types of job characteristics. Ultimately, this could inform prioritization of where to focus when setting communication expectations in other crises. If resources or communication bandwidth is limited, prioritizing setting clear expectations for workers who have less interdependence may be beneficial.

Our study has limitations. We used single item measures for several constructs. While common in experience sampling research due to practical constraints (Fisher & To, 2012), it may introduce reliability concerns (Nunnally, 1978). Our communication measures were limited in that they did not differentiate frequency between one-way and two-way communication and did not take into account days when job-related information was not actually needed. Our study is based on self-report, which could introduce common method bias. Replication with objective measures of communication frequency and supervisor reports of performance are needed. Despite these limitations we provide a rare investigation of within-person communication processes and outcomes within the remote work context in a unique situation where participants did not self-select into remote work.

Figure 6

Interaction Between Task Interdependence and Supervisor Expectation-Setting for Communication on Performance Quality



Note. The range of values for performance quality is from 1 to 10 but is truncated to better illustrate effects.

References

Alarcon, G. M. (2011). A meta-analysis of burnout with job demands, resources, and attitudes. *Journal of Vocational Behavior*, *79*(2), 549–562. https://doi.org/10.1016/j.jvb.2011.03.007

Allen, T. D., Golden, T. D., & Shockley, K. M. (2015). How effective is telecommuting? Assessing the status of our scientific findings. *Psychological Science in the Public Interest*, *16*(2), 40–68. https://doi.org/10.1177/1529100615593273

Atouba, Y. (2021). How does participation impact IT workers' organizational commitment? Examining the mediating roles of internal communication adequacy, burnout and job satisfaction. *Leadership & Organization Development Journal*. Advance online publication. https://doi.org/10.1108/LODJ-09-2020-0422

Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the art. *Journal of Managerial Psychology*, *22*(3), 309–328. https://doi.org/10.1108/02683940710733115

Bales, R. F. (1950). *Interaction process analysis; a method for the study of small groups*. Addison-Wesley.

Bales, R. F. (1953). The equilibrium problem in small groups. In T. Parsons, R. F. Bales, & E. Shils (Eds.), *Working papers in the theory of action* (pp. 111–161). Free Press.

Beal, D. J., & Weiss, H. M. (2003). Methods of ecological momentary assessment in organizational research. *Organizational Research Methods*, *6*(4), 440–464. https://doi.org/10.1177/1094428103257361

Beehr, T. A., Bowling, N. A., & Bennett, M. M. (2010). Occupational stress and failures of social support: When helping hurts. *Journal of Occupational Health Psychology*, *15*(1), 45–59. https://doi.org/10.1037/a0018234

Bélanger, F., Collins, R. W., & Cheney, P. H. (2001). Technology requirements and work group communication for telecommuters. *Information Systems Research*, *12*(2), 155–176. https://doi.org/10.1287/isre.12.2.155.9695

Bliese, P. D. (2000). Within-group agreement, non-independence, and reliability: Implications for data aggregation and analysis. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 349–381). Jossey-Bass.

Bliese, P. D. (2016). *Multilevel modeling in R (2.6): A brief introduction to R, the multilevel package and the nlme package* [Software CRAN Documentation].

Bollen, K., & Lennox, R. (1991). Conventional wisdom on measurement: A structural equation perspective. *Psychological Bulletin*, *110*(2), 305–314. https://doi.org/10.1037/0033-2909.110.2.305

Bui, H., Chau, V. S., Degl'Innocenti, M., Leone, L., & Vicentini, F. (2019). The resilient organisation: A meta-analysis of the effect of communication on team diversity and team performance. *Applied Psychology*, *68*(4), 621–657. https://doi.org/10.1111/apps.12203

Campbell, J. P. (1990). Modeling the performance prediction problem in industrial and organizational psychology. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of industrial and organizational psychology* (2nd ed., Vol. 1, pp. 687–732). Consulting Psychologists Press.

Chewning, E. G., Jr., & Harrell, A. M. (1990). The effect of information load on decision makers' cue utilization levels and decision quality in a financial distress decision task. *Accounting, Organizations and Society*, *15*(6), 527–542. https://doi.org/10.1016/0361-3682(90)90033-Q

Cooke, N. J., Gorman, J. C., Myers, C. W., & Duran, J. L. (2013). Interactive team cognition. *Cognitive Science*, *37*(2), 255–285. https://doi.org/10.1111/cogs.12009

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Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, *86*(3), 499–512. https://doi.org/10.1037/0021-9010.86.3.499

Derks, D., & Bakker, A. B. (2010). The impact of e-mail communication on organizational life. *Cyberpsychology: Journal of Psychosocial Research of Cyberspace*, *4*(1), Article 4. https://cyberpsychology.eu/article/view/4233

DeSanctis, G., & Monge, P. (1998). Communication processes for virtual organizations. *Journal of Computer-Mediated Communication*, *3*(4), Article JCMC347. https://doi.org/10.1111/j.1083-6101.1998.tb00083.x

Dulebohn, J. H., & Hoch, J. E. (2017). Virtual teams in organizations. *Human Resource Management Review*, *27*(4), 569–574. https://doi.org/10.1016/j.hrmr.2016.12.004

Edmunds, A., & Morris, A. (2000). The problem of information overload in business organisations: A review of the literature. *International Journal of Information Management*, *20*(1), 17–28. https://doi.org/10.1016/S0268-4012(99)00051-1

Enders, C. K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods*, *12*(2), 121–138. https://doi.org/10.1037/1082-989X.12.2.121

Eppler, M. J., & Mengis, J. (2004). The concept of information overload: A review of literature from organization science, accounting, marketing, MIS, and related disciplines. *The Information Society*, *20*(5), 325–344. https://doi.org/10.1080/01972240490507974

Euske, N. A., & Roberts, K. H. (1987). Evolving perspectives in organization theory: Communication implications. In F. M. Jablin, L. L. Putnam, K. Roberts, & L. Porter (Eds.), *Handbook of organizational communication: An interdisciplinary perspective* (pp. 41–69). Sage Publications.

Farace, R. V., Monge, P. R., & Russell, H. M. (1977). *Communicating and organizing*. Random House.

Fisher, C. D., & To, M. L. (2012). Using experience sampling methodology in organizational behavior. *Journal of Organizational Behavior*, *33*(7), 865–877. https://doi.org/10.1002/job.1803

Fletcher, T. D., & Major, D. A. (2006). The effects of communication modality on performance and self-ratings of teamwork components. *Journal of Computer-Mediated Communication*, *11*(2), 557–576. https://doi.org/10.1111/j.1083-6101.2006.00027.x

Fonner, K. L., & Roloff, M. E. (2012). Testing the connectivity paradox: Linking teleworkers' communication media use to social presence, stress from interruptions, and organizational identification. *Communication Monographs*, *79*(2), 205–231. https://doi.org/10.1080/03637751.2012.673000

Fulk, J., & Boyd, B. (1991). Emerging theories of communication in organizations. *Journal of Management*, *17*(2), 407–446. https://doi.org/10.1177/014920639101700207

Gabriel, A. S., Koopman, J., Rosen, C. C., & Johnson, R. E. (2018). Helping others or helping oneself? An episodic examination of the behavioral consequences of helping at work. *Personnel Psychology*, *71*(1), 85–107. https://doi.org/10.1111/peps.12229

Gabriel, A. S., Podsakoff, N. P., Beal, D. J., Scott, B. A., Sonnentag, S., Trougakos, J. P., & Butts, M. M. (2019). Experience sampling methods: A discussion of critical trends and considerations for scholarly advancement. *Organizational Research Methods*, *22*(4), 969–1006. https://doi.org/10.1177/1094428118802626

Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration*. University of California Press.

Gilsdorf, J. W. (1998). Organizational rules on communicating: How employees are—and are not-learning the ropes. *Journal of Business Communication*, *35*(2), 173–201. https://doi.org/10.1177/002194369803500201

Goldberg, L. R., Johnson, J. A., Eber, H. W., Hogan, R., Ashton, M. C., Cloninger, C. R., & Gough, H. G. (2006). The international personality item pool and the future of public-domain personality measures. *Journal of Research in Personality*, *40*(1), 84–96. https://doi.org/10.1016/j.jrp.2005.08.007

Golden, T. D., & Gajendran, R. S. (2019). Unpacking the role of a telecommuter's job in their performance: Examining job complexity, problem solving, interdependence, and social support. *Journal of Business and Psychology*, *34*(1), 55–69. https://doi.org/10.1007/s10869-018-9530-4

Golden, T. D., & Veiga, J. F. (2005). The impact of extent of telecommuting on job satisfaction: Resolving inconsistent findings. *Journal of Management*, *31*(2), 301–318. https://doi.org/10.1177/0149206304271768

Gouran, D. S., Wiethoff, W. E., & Doelger, J. A. (1994). *Mastering communication* (2nd ed.). Allyn & Bacon.

Graham, L. N., & van Witteloostuijn, A. (2010). *Leader-member exchange, communication frequency and burnout* (Discussion Paper Series 10-08). Tjalling C. Koopmans Research Institute, UtrechtSchool of Economics, Utrecht University. https://ideas.repec.org/p/use/tkiwps/1008.html

Gurchiek, K. (2020, March 5). *Coronavirus and teleworking employees: Set guidelines, priorities*. SHRM. https://www.shrm.org/hr-today/news/hr-news/pages/ronavirus-and-teleworking-employees-set-guidelines-priorities.aspx

Hobfoll, S. E. (1988). *The ecology of stress*. Hemisphere Publishing.

Hobfoll, S. E., Halbesleben, J., Neveu, J.-P., & Westman, M. (2018). Conservation of resources in the organizational context: The reality of resources and their consequences. *Annual Review of Organizational Psychology and Organizational Behavior*, *5*(1), 103–128. https://doi.org/10.1146/annurev-orgpsych-032117-104640

Hoch, J. E., & Kozlowski, S. W. J. (2014). Leading virtual teams: Hierarchical leadership, structural supports, and shared team leadership. *Journal of Applied Psychology*, *99*(3), 390–403. https://doi.org/10.1037/a0030264

Hoegl, M., & Wagner, S. M. (2005). Buyer-supplier collaboration in product development projects. *Journal of Management*, *31*(4), 530–548. https://doi.org/10.1177/0149206304272291

Howell, R. D. (1987). Covariance structure modeling and measurement issues: A note on "interrelations among a channel entity's power sources." *Journal of Marketing Research*, *24*(1), 119–126. https://doi.org/10.1177/002224378702400112

Johns, G. (2006). The essential impact of context on organizational behavior. *Academy of Management Review*, *31*(2), 386–408. https://doi.org/10.5465/amr.2006.20208687

Kaplan, S., Engelsted, L., Lei, X., & Lockwood, K. (2018). Unpackaging manager mistrust in allowing telework: Comparing and integrating theoretical perspectives. *Journal of Business and Psychology*, *33*(3), 365–382. https://doi.org/10.1007/s10869-017-9498-5

Kennedy, D. M., McComb, S. A., & Vozdolska, R. R. (2011). An investigation of project complexity's influence on team communication using Monte Carlo simulation. *Journal of Engineering and Technology Management*, *28*(3), 109–127. https://doi.org/10.1016/j.jengtecman.2011.03.001

Kramer, M. W. (1996). A longitudinal study of peer communication during job transfers: The impact of frequency, quality, and network multiplexity on adjustment. *Human Communication Research*, *23*(1), 59–86. https://doi.org/10.1111/j.1468-2958.1996.tb00387.x

Kuntz, J. C. (2021). Resilience in times of global pandemic: Steering recovery and thriving trajectories. *Applied Psychology*, *70*, 188–215. https://doi.org/10.1111/apps.12296

Larson, B. Z., Vroman, S. R., & Makarius, E. E. (2020, March 18). *A guide to managing your (newly) remote workers*. Harvard Business Review. https://hbr.org/2020/03/a-guide-to-managing-your-newly-remote-workers

Leenders, R., Engelen, J., & Kratzer, J. (2003). Virtuality, communication, and new product team creativity: A social network perspective. *Journal of Engineering and Technology Management*, *20*(1–2), 69–92. https://doi.org/10.1016/S0923-4748(03)00005-5

Liden, R., & Maslyn, J. (1998). Multidimensionality of leader-member exchange: An empirical assessment through scale development. *Journal of Management*, *24*(1), 43–72. https://doi.org/10.1016/S0149-2063(99)80053-1

Malinen, S., Hatton, T., Naswall, K., & Kuntz, J. (2019). Strategies to enhance employee well-being and organisational performance in a post-crisis environment: A case study. *Journal of Contingencies and Crisis Management*, *27*(1), 79–86. https://doi.org/10.1111/1468-5973.12227

Marks, M. A., Zaccaro, S. J., & Mathieu, J. E. (2000). Performance implications of leader briefings and team-interaction training for team adaptation to novel environments. *Journal of Applied Psychology*, *85*(6), 971–986. https://doi.org/10.1037/0021-9010.85.6.971

Marlow, S. L., Lacerenza, C. N., Paoletti, J., Burke, C. S., & Salas, E. (2018). Does team communication represent a one-size-fits-all approach?: A meta-analysis of team communication and performance. *Organizational Behavior and Human Decision Processes*, *144*, 145–170. https://doi.org/10.1016/j.obhdp.2017.08.001

Marlow, S. L., Lacerenza, C. N., & Salas, E. (2017). Communication in virtual teams: A conceptual framework and research agenda. *Human Resource Management Review*, *27*(4), 575–589. https://doi.org/10.1016/j.hrmr.2016.12.005

Maurer, R. (2020, September 16). *Study finds productivity not deterred by shift to remote work*. SHRM. https://www.shrm.org/hr-today/news/hr-news/pages/study-productivity-shift-remote-work-covid-coronavirus.aspx

Miller, J. G. (1960). Information input overload and psychopathology. *The American Journal of Psychiatry*, *116*, 695–704. https://doi.org/10.1176/ajp.116.8.695

Mills, B. T. (2019). *Identifying employees who fit with electronic communication styles* [Dissertation]. University of South Florida.

Mischel, W. (1977). The interaction of person and situation. In D. Magnusson & N. S. Endler (Eds.), *Personality at the cross-roads: Current issues in interactional psychology* (pp. 333–352). Lawrence Erlbaum.

Mohr, J. J., Fisher, R. J., & Nevin, J. R. (1996). Collaborative communication in interfirm relationships: Moderating effects of integration and control. *Journal of Marketing*, *60*(3), 103–115. https://doi.org/10.1177/002224299606000307

Mohr, J., & Nevin, J. R. (1990). Communication strategies in marketing channels: A theoretical perspective. *Journal of Marketing*, *54*(4), 36–51. https://doi.org/10.1177/002224299005400404

Morgeson, F. P., & Humphrey, S. E. (2006). The Work Design Questionnaire (WDQ): Developing and validating a comprehensive measure for assessing job design and the nature of work. *Journal of Applied Psychology*, *91*(6), 1321–1339. https://doi.org/10.1037/0021-9010.91.6.1321

Newman, S. A., & Ford, R. C. (2021). Five steps to leading your team in the virtual COVID-19 workplace. *Organizational Dynamics*, *50*(1), 1–11. https://doi.org/10.1016/j.orgdyn.2020.100802

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). McGraw-Hill.

Ozimek, A. (2020). *The future of remote work* [Press release]. Upwork. https://www.ssrn.com/abstract=3638597

Patrashkova-Volzdoska, R. R., McComb, S. A., Green, S. G., & Compton, W. D. (2003). Examining a curvilinear relationship between communication frequency and team performance in cross-functional project teams. *IEEE Transactions on Engineering Management*, *50*(3), 262–269. https://doi.org/10.1109/TEM.2003.817298

Pearce, J. A., II. (2009). Successful corporate telecommuting with technology considerations for late adopters. *Organizational Dynamics*, *38*(1), 16–25. https://doi.org/10.1016/j.orgdyn.2008.10.002

Pinheiro, J. C., & Bates, D. M. (2000). *Mixed-Effects models in S and S-PLUS*. Springer. https://doi.org/10.1007/0-387-22747-4_1

Ploeger-Lyons, N. A., & Kelley, K. M. (2017). Coworker communication. In C. R. Scott, J. R. Barker, T. Kuhn, J. Keyton, P. K. Turner, & L. K. Lewis (Eds.), *The international encyclopedia of organizational communication* (pp. 1–14). American Cancer Society. https://doi.org/10.1002/9781118955567.wbieoc049

Salas, E., Cannon-Bowers, J. A., & Johnston, J. H. (1997). How can you turn a team of experts into an expert team?: Emerging training strategies. In C. Zsambok & G. Klein (Eds.), *Naturalistic decision making* (pp. 359–370). Lawrence Erlbaum.

Schroder, H. M., Driver, M. J., & Streufert, S. (1967). *Human information processing: Individuals and groups functioning in complex social situations*. Holt, Rinehart and Winston.

Sias, P. M., Pedersen, H., Gallagher, E. B., & Kopaneva, I. (2012). Workplace friendship in the electronically connected organization. *Human Communication Research*, *38*(3), 253–279. https://doi.org/10.1111/j.1468-2958.2012.01428.x

Sias, P. M., Tsetsi, E., Woo, N., & Smith, A. D. (2020). With a little help from my friends: Perceived task interdependence, coworker communication, and workplace friendship. *Communication Studies*, *71*(4), 528–549. https://doi.org/10.1080/10510974.2020.1749863

Snijders, T. A. B., & Bosker, R. J. (1994). Modeled variance in two-level models. *Sociological Methods & Research*, *22*(3), 342–363. https://doi.org/10.1177/0049124194022003004

Stephens, K. K., Mandhana, D. M., Kim, J. J., Li, X., Glowacki, E. M., & Cruz, I. (2017). Reconceptualizing communication overload and building a theoretical foundation: Communication overload. *Communication Theory*, *27*(3), 269–289. https://doi.org/10.1111/comt.12116

Sumecki, D., Chipulu, M., & Ojiako, U. (2011). Email overload: Exploring the moderating role of the perception of email as a "business critical" tool. *International Journal of Information Management*, *31*(5), 407–414. https://doi.org/10.1016/j.ijinfomgt.2010.12.008

ten Brummelhuis, L. L., & Bakker, A. B. (2012). A resource perspective on the work-home interface: The work-home resources model. *American Psychologist*, *67*(7), 545–556. https://doi.org/10.1037/a0027974

Thielsch, M. T., Röseler, S., Kirsch, J., Lamers, C., & Hertel, G. (2021). Managing pandemics Demands, resources, and effective behaviors within crisis management teams. *Applied Psychology*, *70*(1), 1–38. https://doi.org/10.1111/apps.12303

Thoits, P. A. (1994). Stressors and problem-solving: The individual as psychological activist. *Journal of Health and Social Behavior*, *35*(2), 143–160. https://doi.org/10.2307/2137362

Treadway, D. C., Hochwarter, W. A., Ferris, G. R., Kacmar, C. J., Douglas, C., Ammeter, A. P., & Buckley, M. R. (2004). Leader political skill and employee reactions. *The Leadership Quarterly*, *15*(4), 493–513. https://doi.org/10.1016/j.leaqua.2004.05.004

van der Vegt, G. S., Emans, B. J. M., & Vliert, E. (2001). Patterns of interdependence in work teams: A two-level investigation of the relations with job and team satisfaction. *Personnel Psychology*, *54*(1), 51–69. https://doi.org/10.1111/j.1744-6570.2001.tb00085.x

Wagner, D. T., Barnes, C. M., & Scott, B. A. (2014). Driving it home: How workplace emotional labor harms employee home life. *Personnel Psychology*, *67*(2), 487–516. https://doi.org/10.1111/peps.12044

Wang, S., & Noe, R. A. (2010). Knowledge sharing: A review and directions for future research. *Human Resource Management Review*, *20*(2), 115–131. https://doi.org/10.1016/j.hrmr.2009.10.001

Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (2005). Organizing and the process of sensemaking. *Organization Science*, *16*(4), 409–421. https://doi.org/10.1287/orsc.1050.0133

Weiss, H. M., & Rupp, D. E. (2011). Experiencing work: An essay on a person-centric work psychology. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, *4*(1), 83–97. https://doi.org/10.1111/j.1754-9434.2010.01302.x

Williams, M. (2020, April 8). *Setting expectations: How to have a collaborative, empowering and productive remote working relationship* [Hubspot]. Careers Blog. https://www.hubspot.com/careers-blog/setting-remote-expectations

Zimmermann, P., Wit, A., & Gill, R. (2008). The relative importance of leadership behaviours in virtual and face-to-face communication settings. *Leadership*, *4*(3), 321–337. https://doi.org/10.1177/1742715008092388

Zohar, D. (1997). Predicting burnout with a hassle-based measure of role demands. *Journal of Organizational Behavior*, *18*(2), 101–115. https://doi.org/10.1002/(SICI)1099-1379(199703)18:2<101::AID-JOB788>3.0.CO;2-Y

(*Appendices follow*)

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Appendix A

Measure Information

Supervisor Expectation-Setting Regarding Communication at Onset of Remote Work Measure

At the onset of working remote during COVID-19, to what extent did your supervisor-set expectations regarding . . .

- Communication tools that should be used (e.g., Zoom should be used for all meetings)
- Expected response time to emails/message chats
- General availability of employees
- General decorum for video conferencing
- Communication frequency (e.g., how often you should communicate with other coworkers)

Response scale: 1 = *Not at all*, 2 = *A little*, 3 = *Somewhat*, 4 = *A good deal*, and 5 = *A very large extent.*

Typical Task Interdependence

Three items from van der Vegt et al. (2001) 5-item scale

In the 6 months BEFORE the transition to remote work due to COVID-19 . . .

- I had to obtain information and advice from others in order to complete my work.
- I had to work closely with others to do my work properly.
- In order to complete my work, I had to collaborate with others extensively

Response scale: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Agree Nor Disagree*, 4 = *Agree*, and 5 = *Strongly Agree.*

Appendix B

Validation Efforts for Supervisor Expectation-Setting Regarding Communication at Onset of Remote Work Measure

For validation purposes, we expected that our new measure would relate to the general communication openness of the supervisor because supervisors who communicate more effectively and clearly should be better at communicating expectations and should be more likely to think about the importance of setting communication expectations. We also expected effective leadership behaviors, which we measured via task-oriented leadership behaviors and relationship-oriented leadership behaviors to relate to supervisor-set expectations regarding communication given that the content of the measure largely focuses on setting expectations related to communication behaviors that are oriented toward completing tasks and how to interact with others. We expected the correlations to be moderate in size as to also show some evidence that our measure was a related albeit distinct construct (i.e., discriminant validity).

We also tested whether this measure would vary with indicators of relationship quality between the subordinate and supervisor, which we measured via leader–member exchange and trust in supervisor. We anticipated our measure to be distinct from these two concepts, indicating that people's reactions to how much a supervisor-set expectations regarding communication reflects more than their relationships with their supervisor.

In terms of correlating these constructs with our initial measure, we faced a temporal challenge. That is, the original measure was focused on supervisor-set expectations regarding communication at the *onset* of remote work. This made sense in our original data collection as the study took place shortly after the onset of remote work. However, we did not feel like we would be able to accurately capture this variable a year later given recall bias and how shifting communication expectations could influence how one recalled earlier expectation setting. We also did not feel like we could accurately ask people to report on their perceptions of supervisor communication openness, task-oriented leadership behaviors, relationship-oriented leadership behaviors, trust, and leader–member exchange thinking back to the onset of remote work given the same recall issues. Thus, we asked them in the new survey to think about supervisor-set expectations as well as the validation variables using the timeframe of "since you have been working remote due to COVID-19." Because this was a subset of the sample from the original study, we were able to link these responses to their original supervisor-set expectations regarding communication at the onset of COVID responses. Patterns of correlations were similar, although generally larger when the temporal timeframes were matched. The correlation between the original expectations measure and the new one was $r = .53$, $p < .001$

Information on the measures used are listed in Table B1 below. The correlations between measures are also listed in Table B2 below. The pattern of correlations are in line with expectations, providing evidence to support the validity of our scale.

(*Appendices continue*)

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Table B1
Measure Information for Validation Study

Construct	Measure citation	No. items	Coefficient α	Example item
Supervisor-set expectations regarding communication at the onset of remote work (imputed from original study)	Study created	5	.91	See Appendix A
Supervisor-set expectations regarding communication throughout the time working remote (newly measured)	Study created	5	.85	Same items as above but with timeframe of "throughout the time you have been working remote due to COVID-19"
Task-oriented leadership behaviors	Zimmermann et al. (2008)	7	.84	"My supervisor has set clear tasks for team members"
Relationship-oriented leadership behaviors	Zimmermann et al. (2008)	5	.88	"My supervisor has made people feel like part of the team"
Communication openness	Mills (2019)	5	.95	"It has been easy to communicate openly with my supervisor"
Leader–member exchange	Shortened from Liden and Maslyn (1998)	3	.79	"I have liked my supervisor very much as a person"
Trust in supervisor	Treadway et al. (2004)	4	.82	"I have complete trust that my supervisor will treat me fairly"

Table B2
Correlations Between Validation Scales and Supervisor-Set Expectations Regarding Communication Measures

Validation variable	Supervisor-set expectations regarding communication at the onset of remote work (imputed from original study)	Supervisor-set expectations regarding communication throughout the time working remote (newly measured)
Task-oriented leadership behaviors	.39**	.41**
Relationship-oriented leadership behaviors	.18	.27*
Communication openness	.22	.27*
Leader–member exchange	.05	.15
Trust in supervisor	−.04	−.06

Note. $N = 57$.
* $p < .05$. ** $p < .01$.

Appendix C

Supplementary Analyses

Interpretation of Findings: When considering each communication medium separately (summed across source), the results differed from the main analyses in a few ways. First, the significant curvilinear relationships between most mediums and performance (quantity and quality) and burnout are no longer significant. The exception is text messaging and performance quality and burnout. In these cases, the nature of the curvilinear relationships mimicked those of the main (combined) results. Similarly, the linear relationships between each communication medium and our dependent variables were quite consistent with our main (combined) results. In all cases except email and texting with burnout, each communication medium exhibited significant positive linear relationships

(*Appendices continue*)

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Table C1

Results of Supplementary Analyses With Communication Mediums Examined Separately

Predictor	Burnout			Performance quantity			Performance quality		
	γ	*SE*	*t*	γ	*SE*	*t*	γ	*SE*	*t*
Between levels									
Intercept	2.74**	0.05	58.68	6.41**	0.07	87.26	7.40**	0.07	111.58
Task interdependence	0.12*	0.05	2.35	−0.09	0.08	−1.17	−0.18*	0.07	−2.58
Supervisor expectation-setting for communication	−0.03	0.04	−0.72	0.17**	0.06	2.87	0.14*	0.06	2.48
Task interdependence × Supervisor expectation-setting for communication	0.08	0.04	1.86	−0.22**	0.06	−3.70	−0.18**	0.06	−3.03
Task interdependence × Video communication frequency-linear	−0.01	0.01	−0.83	0.08*	0.03	2.73	0.02	0.02	0.97
Task interdependence × Video communication frequency-quadratic	0.01	0.01	1.14	−0.03	0.02	−1.78	—	—	—
Task interdependence × Email communication frequency-linear	0.01	0.01	0.50	0.04	0.02	1.71	0.01	0.02	0.75
Task interdependence × Email communication frequency-quadratic	—	—	—	—	—	—	—	—	—
Task interdependence × Phone communication frequency-linear	−0.03*	0.02	−1.97	0.04	0.03	1.29	0.04	0.02	1.66
Task interdependence × Phone communication frequency-quadratic	0.00	0.01	0.21	—	—	—	—	—	—
Task interdependence × Text communication frequency-linear	0.01	0.01	0.65	0.01	0.02	0.28	0.00	0.02	−0.05
Task interdependence × Text communication frequency-quadratic	—	—	—	—	—	—	0.00	0.01	−0.32
Within level									
Communication quality	−0.15**	0.01	−10.29	0.30**	0.03	10.92	0.33**	0.02	14.71
Video communication frequency-linear	0.03*	0.01	2.55	0.18**	0.03	6.76	0.05*	0.02	2.31
Video communication frequency-quadratic	0.00	0.01	−0.26	0.00	0.01	−0.06	−0.01	0.01	−1.02
Email communication frequency-linear	0.02	0.01	1.83	0.16**	0.02	7.73	0.07**	0.02	4.51
Email communication frequency-quadratic	0.01	0.01	1.56	−0.01	0.01	−1.49	0.00	0.01	0.18
Phone communication frequency-linear	0.05**	0.02	3.08	0.17**	0.03	6.07	0.06*	0.02	2.61
Phone communication frequency-quadratic	0.00	0.01	−0.49	−0.01	0.01	−0.49	−0.01	0.01	−1.05
Text communication frequency-linear	0.00	0.01	−0.48	0.10**	0.02	4.56	0.05**	0.02	3.10
Text communication frequency-quadratic	0.02**	0.00	3.38	0.00	0.01	−0.32	−0.02*	0.01	−2.37
Day of the week	0.01	0.01	1.51	0.04**	0.01	3.13	0.05**	0.01	4.33
Week	0.03**	0.01	2.81	0.09**	0.02	4.27	0.08**	0.02	4.76
Pseudo R^2	4.65%			10.04%			8.34%		

Note. Level 1 n = 7,281–7,284; Level 2 n = 471. Nonitalicized variables are the focal study variables; italicized variables are controls. Estimates reflect unstandardized coefficients. Pseudo R^2 is calculated as the percentage change in the within-individual variance between the null and final models (Snijders & Bosker, 1994). Cells with dashes are instances where there was not a significant amount of between-individuals variance in the quadratic communication frequency slope to warrant testing for moderated effects.

* $p < .05$. ** $p < .01$.

(*Appendices continue*)

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Table C2

Results of Supplementary Analyses With Source of Communication Examined Separately

Predictor	Burnout			Performance quantity			Performance quality		
	γ	*SE*	*t*	γ	*SE*	*t*	γ	*SE*	*t*
Between levels									
Intercept	2.74**	0.04	63.52	6.21**	0.07	87.44	7.29**	0.06	113.78
Task interdependence	0.08	0.05	1.66	−0.13	0.08	−1.67	−0.16*	0.07	−2.28
Supervisor expectation-setting for communication	−0.02	0.04	−0.67	0.19**	0.06	3.30	0.14*	0.06	2.50
Task interdependence × Communication quality	0.00	0.02	0.00	0.06	0.04	1.63	0.07*	0.03	2.36
Task interdependence × Supervisor expectation-setting for communication	0.06	0.04	1.63	−0.23**	0.06	−3.88	−0.15*	0.06	−2.71
Task interdependence × Coworker communication frequency-linear	—	—	—	0.02	0.01	1.86	—	—	—
Task interdependence × Coworker communication frequency-quadratic	—	—	—	0.004*	0.00	2.32	—	—	—
Within level									
Communication quality	−0.15**	0.02	−8.26	0.35**	0.03	10.30	0.37**	0.03	12.55
Supervisor communication frequency-linear	0.01	0.01	1.64	0.04**	0.01	4.38	0.02*	0.01	2.48
Supervisor communication frequency-quadratic	0.003*	0.00	2.45	0.01**	0.00	3.82	0.004*	0.00	1.99
Coworker communication frequency-linear	0.01**	0.00	3.09	0.09**	0.01	10.39	0.03**	0.01	5.35
Coworker communication frequency-quadratic	0.002*	0.00	2.57	0.02**	0.00	9.57	0.005**	0.00	4.17
Day of the week	0.01	0.01	1.27	0.04**	0.01	2.88	0.05**	0.01	4.54
Week	0.03**	0.01	3.01	0.10**	0.02	4.63	0.09**	0.02	5.46
Trait anxiety	0.34**	0.04	8.16	−0.24**	0.06	−3.73	−0.29**	0.06	−4.84
Job tenure	0.00	0.01	−0.51	0.00	0.01	0.12	0.00	0.01	−0.15
Work hours	0.01	0.01	0.96	0.01	0.01	0.41	0.00	0.01	0.16
Pseudo R^2	2.46%			6.69%			5.31%		

Note. Level 1 n = 7,291–7,294; Level 2 n = 471. Nonitalicized variables are the focal study variables; italicized variables are controls. Estimates reflect unstandardized coefficients. Pseudo R^2 is calculated as the percentage change in the within-individual variance between the null and final models (Snijders & Bosker, 1994). Cells with dashes are instances where there was not a significant amount of between-individuals variance in the quadratic communication frequency slope to warrant testing for moderated effects.

* $p < .05$. ** $p < .01$.

with all three outcomes such that greater amounts of communication are better for performance and worse for burnout. Consistent with the findings presented in the main part of the paper, there were no significant hypothesized interactions between the different communication mediums and task interdependence.

Interpretation of Findings: The results with source of communication were very consistent with the original combined analyses—all curvilinear effects were significant and were of the same nature. The only difference was there was one significant interaction in these additional analyses (coworker communication and task interdependence on performance quantity), although it was not in the predicted manner.

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