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Published online: 07 Dec 2022.

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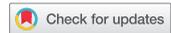
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Videoconferencing and Work-Family Conflict: Exploring the Role of Videoconference Fatigue

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ABSTRACT

Videoconferencing has become an essential communication tool for employees to engage in virtual meetings with their colleagues and complete work tasks remotely. However, there have been reports of a phenomenon termed *videoconference fatigue*. Concurrently, there has been an increase in work-family conflict among individuals working from home, due to an imbalance from role demands and expectations between work and family. With the rise of videoconferencing that has come to characterize work-from-home setups, it is important to explore the role videoconferencing plays on work-family conflict. We propose a model where the increase in use of videoconferencing as a result of working from home may lead to higher levels of videoconference fatigue, which will in turn result in greater work-family conflict. An online nationwide survey was conducted in Singapore with 590 respondents to test the proposed hypotheses. Results of serial mediation analyses conducted using PROCESS macro supported all hypotheses and indicated support for serial mediation. Emotional and occupational videoconference fatigue were further found to be significantly related to work-family conflict, whereas physical videoconference was not. Our results suggest that as videoconferencing continues to become the default mode of work-related communication, sustained investigation on its implications on work-family conflict is crucial.

Introduction

With government-mandated lockdowns all around the world following the spread of COVID-19, videoconferencing has become an essential tool for individuals to stay connected virtually (Lebow, 2020). It has also provided working individuals with the opportunity to complete tasks (De' et al., 2020) and socially connect with their teams as they transitioned to a remote working environment (Blanchard, 2021). Tools like Zoom, Microsoft Teams, Google Meet, Skype, and Cisco WebEx witnessed a substantial increase in usage (Henry & Shellenbarger, 2020). At the same time, there have been reports of videoconferencing leading to negative outcomes, such as exhaustion, burnout, and anxiety from factors like high cognitive load (Epstein, 2020) and social disconnection (Lee, 2020), leading some to term the phenomenon *Zoom fatigue* or *videoconference fatigue*. Thus, while

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videoconferencing helps facilitate home-based work, now the default in many countries amid the pandemic, it may also contribute to work-family conflict.

Indeed, with employees being asked to work from home, there has been an increase in work-family conflict among individuals resulting from an imbalance from role demands and expectations between work and family (Molino et al., 2020; Sadiq, 2020). Since the start of the pandemic, working from home has been the default working option in the small but financially and technologically advanced nation of Singapore (Baker, 2020; Mohan, 2021; Mohan & Ang, 2020), resulting in high levels of stress, and fatigue among employees (Rajah, 2021). The link between working from home and work-family conflict may not be direct, however. For example, both teleworking (Golden, 2012; Golden et al., 2006) and extensive use of information communication technologies (Ghislieri et al., 2021) have shown to impact work-family conflict. With the rise of videoconferencing that has come to characterize work-from-home setups, it is important to explore the role videoconferencing plays on work-family conflict. Additionally, previous studies on work-family conflict have shown to have detrimental effects on individuals such as physical and emotional exhaustion (Golden, 2012), making it imperative to study work-family conflict at a time when many employees now work from home and that fatigue due to videoconferencing being on the rise.

We propose a model where the increase in use of videoconferencing as a result of working from home may lead to higher levels of videoconference fatigue, which will in turn result in greater work-family conflict. More specifically, this paper anticipates that 1) individuals who spend more days in a week working from home will report spending more hours videoconferencing, 2) more time spent videoconferencing will result in higher levels of videoconference fatigue, and 3) greater levels of videoconference fatigue will lead to higher work-family conflict.

Literature Review

Working from Home

Working from home (WFH), also known as teleworking or remote working, has been a much-explored concept in the recent years. Predominantly used to improve work-life balance, it has been shown to reduce stress from commuting, freeing time for leisure, and reducing work distractions (Anderson & Kelliher, 2020). Studies found that either being physically present in the office or teleworking does not affect work performance (Baker et al., 2007; Bloom, 2014). In fact, studies have found many advantages of teleworking, or "flexwork" (Rice, 2017). At an organizational level, teleworking has been linked to improved job satisfaction and performance ratings; at an individual level, it has been shown to save costs and ensure greater autonomy; while at a societal level, teleworking has a positive impact in controlling commuter traffic and pollution and promote community involvement (Bailey & Kurland, 2002). However, several drawbacks have been noted. Studies have shown teleworking has resulted in detachment and feelings of isolation among individuals, decreased commitment, and "over-availability syndrome," where individuals are made to work beyond normal working hours (Harpaz, 2002, p. 77).

This has become especially evident since the COVID-19 pandemic, where WFH became the default working option for organizations around the world and will

continue to do so through flexible working hours and permanent WFH arrangements (Kovar, 2020; Lund et al., 2021). Especially in Singapore, where local companies exist alongside multinational companies who have located their regional offices in this city-state, WFH became the default mode in April 2020 (Mohan & Ang, 2020), leading to repercussions such as decreased mental health (Rajah, 2021) and high levels of stress (Teo, 2020).

As individuals are moving toward more isolated ways of working, there has been more emphasis on tech-mediated remote working to counter it (Davies, 2021). Studies on remote working have shown a reliance on communication technologies to maintain connection and online interaction (Blanchard, 2021), and tackle work stress and promote employee wellbeing (Zito et al., 2021). One tool that has been especially relevant and relied on during the pandemic has been videoconferencing.

Videoconferencing

Videoconferencing is a valuable tool in today's technology-driven environment. It enables an online exchange of information in terms of documents and presentation sharing (Rop & Bett, 2012), is geographically accessible (Lu & Peeta, 2009) and is the most cost-effective mode of visual communication (Panteli & Dawson, 2001). Videoconferencing is also an asset to communication. One of its key advantages is its synchronous nature, as it enables real-time interaction among participants from remote environments, while allowing them to avoid traveling (Rist & Hewer, 1996; Wang, 2004). It also transmits a two-way interaction from one member to another, or even among multiple members (Wainfan & Davis, 2004). As a communication tool, studies have shown that videoconferencing can affect or influence consequences such as user perceptions and social presence (Lowden & Hostetter, 2012), quality of experience (Schmitt et al., 2017), and even virtual collaboration (Wainfan & Davis, 2004). As it comprises both video and audio elements that transmit feed real time, videoconferencing has been found to be the most effective mode of communication in terms of media richness after face-to-face communication (Denstadli et al., 2012), especially when compared to other forms of communication, such as e-mails, chats, or phone. However, other scholars have posited that media richness is only one consideration, and proposed the importance of looking at social factors, for example, the context of medium use (Rice, 1992) and user perceptions of the medium (Schmitz & Fulk, 1991), as being key drivers of media technology adoption and effective use.

Videoconferencing became the preferred mode of social connection and interaction since the spread of the COVID-19 pandemic and the resulting lockdown, as it ensured undisrupted and effective remote working in organizations (Stone, 2020). As against more traditional forms of communications such as in-person meetings and conferences, more adaptable and accessible applications like Zoom have seen a ten-fold increase in usage as organizations moved to a remote working environment (De' et al., 2020). Additionally, other modes of communication, like e-mails and phone calls have had detrimental effects on employees, especially with regards to e-mails sent out-of-hours, and poor e-mail etiquette (Vuillème, 2020). Given that videoconferencing is essential in online interaction and collaboration between employees and stakeholders (Lowden & Hostetter, 2012), it can be assumed that the more employees work from home, the more amount of time they spend in videoconferencing.

However, implications from excessive videoconferencing have also come to the fore-front, as individuals noticed signs of tiredness and exhaustion, anxiety, and stress (Wolf, 2020) from various reasons like restricted physical environments (Blanchard, 2021), problems with internet connectivity (Irani, 2019), and a feeling of disconnect between them and the technology (Obrovac Sandqvist et al., 2020). This constant feeling of tiredness or exhaustion resulting from videoconferencing, as well as the stress accumulated from the overdependence of the ICT can result in technostress (Ragu-Nathan et al., 2008).

Technostress has been defined as the stress caused by "one's inability to cope or deal with ICTs in a healthy manner" (Ayyagari et al., 2011, p. 832; Brod, 1984). It can result from an accumulation of factors such as overdependence on communication technologies, constant updates and upgrades and introduction of new advancements, multitasking, social isolation, and distractions from work (Ragu-Nathan et al., 2008). Research on the antecedents of technostress identified three key factors – an increasing dependence of individuals on communication technologies, a gap in the knowledge of performing tasks using increasingly sophisticated communication technologies, and the impact of these technologies on work environment and culture (Ragu-Nathan et al., 2008). The impact of technostress among individuals is essentially a combination of the characteristics of the technology used, usage context and individual factors (Tarafdar et al., 2015).

With this in mind, individuals who work from home appear to be especially prone to technostress. People working from home are expected not only to remain contactable through online communication, but also to be well-versed with tools such as videoconferencing apps. With existing family expectations and commitments, communication technologies appear to have a compounding effect on individuals, adding technostress as an additional layer of pressure (Vuillème, 2020). Hence, technostress may help to explain a major concern of excessive use of videoconferencing – videoconference fatigue.

Videoconference Fatigue

While some studies refer to the phenomenon as zoom fatigue, we prefer a more general term in the form of videoconference fatigue. Li and Yee (2022) define it as a "non-pathological tiredness arising from videoconferencing which manifests in physical, emotional, cognitive and social ways" (p. 18). Studies have found that the experience of videoconference fatigue is influenced by the frequency and length of videoconference meetings (Bennett et al., 2021; Li et al., 2022). Other than the chronemic element, antecedents of videoconference fatigue can include psychological, social, technical and organizational factors which can lead to stress and self-doubt in meeting work demands (Döring et al., 2022; Li & Yee, 2022). In this study, we are particularly interested in three dimensions of videoconference fatigue: physical – which refers to the bodily tiredness that can manifest through exhaustion and burnout, emotional – encompassing stress and anxiety, and occupational – referring to a perceived inability to complete work tasks and demands.

In terms of theoretical foundation, videoconference fatigue has been studied in the context of media richness theory, where fatigue arises from the lack of cues videoconferencing provides as a medium when compared with face-to-face communication (Massner, 2021). Fauville et al. (2021) measured the effects of fatigue on individuals in the categories of general fatigue or tiredness, visual fatigue or blurry vision, social fatigue or feeling of isolation and wanting to be alone, emotional fatigue or being moody or irritable, and

motivational fatigue or losing motivation to do anything after videoconferencing. Other studies have looked at the effects of facial dissatisfaction (Ratan et al., 2021), eccentric gaze (Kushner, 2021), and camera use (Ngien & Hogan, 2022; Shockley et al., 2021). While these studies confirm that videoconferencing, especially during the pandemic, has led to stress, exhaustion, and fatigue among individuals, much of the research has centered on the impact of technological factors and nonverbal cues. To our knowledge there is a lack of exploration or discussion on social and contextual factors relating to videoconference fatigue. Increased time spent on videoconferencing at home can lead to tensions and conflict between family and work, as employees struggle to juggle family demands with work commitments. The resultant pressure can add to the exhaustion one feels during videoconference meetings. Indeed, studies which measured the impact of communication technologies use showed that the stress or anxiety resulting from the use of these tools can lead to negative social consequences, with one key result being work-family conflict (Ayyagari et al., 2011; Suh & Lee, 2017).

Work-family Conflict

Studies have previously shown the negative impact of teleworking (Ellison, 1999; Rice, 2017). These can include higher levels of stress, burnout and increased workload (Ayyagari et al., 2011; Valcour & Hunter, 2004). With regard to the boundaries between work and family, teleworking has been found to lead to invasion of home privacy, an intrusion of family time by work demands, depletion of resources to respond to family commitments and an increased work-family conflict (Bloom et al., 2015; Valcour & Hunter, 2004). Communication scholars have attempted to untangle the complex relationships between teleworking, work-family boundaries and ICT use (Rice, 2017), explicate the impact of organizational antecedents and effects on work-family conflict (Kirby et al., 2013), provide an understanding of how employees navigate and respond to the interactions between work and family routines (Medved, 2004), and explore potential theoretical frameworks through the lenses of organizational and family communication to integrate work-family research (Golden et al., 2006).

In particular, Ballard and Seibold (2003) proposed the Meso Level Model of Organizational Temporality to illustrate how employees navigate the complexities of chronemic factors with regard to work. They suggest eleven ways that employees experience or "act out" time, and found that flexible work arrangements are associated with higher amounts of communication load (Ballard & Seibold, 2006). Further, the influence of organizational norms and employees' subjective experiences of time, in this case increased flexibility of work arrangements, can be moderated by individual factors like the experience of work-family conflict (Ballard & Seibold, 2003).

Work-family conflict occurs when working individuals experience conflict with their immediate or extended families due to pressure from role demands and expectations (Golden et al., 2006). It can be categorized into two types of conflict – time-based conflict, which occurs when the amount of time dedicated on an individual's work interferes with the responsibilities toward their family, and strain-based conflict, which occurs when the strain resulting from work interferes with the responsibilities toward the individual's family (Netemeyer et al., 1996; Golden et al., 2006). These conflicts can cause tension between an individual's work and family, thus resulting in emotional and physical exhaustion, which is

"psychologically and physically draining, hindering or preventing an individual's ability to cope and leading to feelings of being overwhelmed" (Golden, 2012, p. 256). Often, micro-practices such as calling the spouse, or preparing a child's clothing at night can be accounted toward causes for work-family conflict (Medved, 2004).

More recently, the pandemic has shown detrimental effects on individuals between their work and family (Andrade & Petiz Lousã, 2021; Molino et al., 2020; Sadiq, 2020). Additionally, the excessive use of communication technologies in combination with high workload and isolation from the pandemic was also significantly related to work-family conflict (Ghislieri et al., 2021; Molino et al., 2020). This becomes perspicuous in the context of WFH videoconferencing.

The increase in videoconferencing use have blurred the boundaries between home and work, creating an "always-on" culture where employees are expected to respond and stay connected at all times (Okabe-Miyamoto et al., 2021). This close proximity of home and work is emotionally draining (Ashforth et al., 2000) as employees struggle with distractions and role commitments. Indeed, the use of virtual meeting software led to role conflict among working parents and caregivers (Waizenegger et al., 2020), notably so among working mothers with multiple children (Pennington et al., 2022). Moreover, increased teleworking arrangements during the pandemic resulted in greater difficulty among employees to handle work-family conflicts (Palumbo, 2020). One of the key manifestations of videoconference fatigue is the physical depletion of energy and exhaustion during and at the end of meetings (Li & Yee, 2022). As fatigue has been found to be an antecedent of work-family conflict (Dierdorff & Ellington, 2008), we suggest that videoconference fatigue as a result of WFH arrangements is a source for both time-based and strain-based conflict.

Hence, building on previous findings on the link between excessive use of communication technologies and work-home conflict (Golden et al., 2006), we anticipate that time spent on videoconferencing and the fatigue that it causes among videoconference users can lead to work-family conflict. Based on the above review, our conceptual framework is as follows. With more individuals working from home, there is an increased reliance on communication technology to stay connected and work remotely. We hence hypothesize that individuals who spend more days in a week working from home will report spending more hours videoconferencing (H1). This increased dependence on videoconferencing tools results in information and work overload, causing individuals to experience fatigue and exhaustion. This leads us to propose that more time spent videoconferencing will result in higher levels of videoconference fatigue (H2). Stronger perceptions of videoconference fatigue may overwhelm individuals who already have to juggle between work demands and family expectations. We therefore hypothesize that increased feelings of videoconference fatigue will lead to higher work-family conflict (H3). We were further interested in the relative influence of the sub-dimensions of videoconference fatigue on work-family conflict and hence pose the following research question (RQ1): Are there differences in the impact of physical, emotional and occupational dimensions of videoconference fatigue on the experience of work-family conflict?

Figure 1 illustrates the conceptual model that is tested in this study.

Method

An online nationwide survey was conducted in Singapore in Fall 2021 to test the proposed hypotheses. We worked with a commercial polling company that maintains panels of
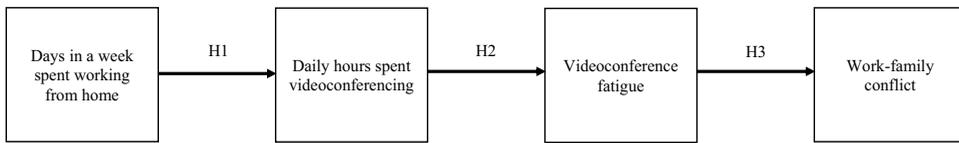
Figure 1. Proposed conceptual model.

respondents in Singapore. The company recruited 590 respondents to participate in the online survey. Participants needed to be at least 21 years of age and residing in Singapore. Respondents had an average age of 41.9 years (SD = 11.88), of which 277 were female (46.9%). The sample identified as 85.4% Chinese, 7.9% Malay, 4.9% Indian and 1.9% others, mirroring the multi-racial characteristics of the Singapore population. 89.0% (n = 525) of respondents reported being in full-time employment, 5.8% reported being in part-time employment, and 5.3% reported being employed on a freelance basis. On average, respondents participated in two videoconference meetings a day, with *Zoom* being the videoconference tool they used most often.

The study was approved by the Institutional Review Board of [anonymized for review]. Participation was completely voluntary. Informed consent was first sought from the respondents prior to data collection. The polling company provided incentives to the respondents in the form of points redeemable for vouchers for their completion of the survey.

Measures

Participants were asked to fill out the number of days they spent in a typical week working from home (M = 3.42, SD = 2.04), and the number of hours they spent in a day using videoconferencing tools (M = 3.39, SD = 3.17).

Videoconference fatigue was measured using eight items that were developed for this study, based on the physical, emotional and occupational dimensions of videoconference fatigue that were described in other studies (Bennett et al., 2021; Fauville et al., 2021; Li & Yee, 2022). Items were measured on a five-point Likert scale and averaged to form an overall score for videoconference fatigue (M = 2.49, SD = 1.06, α = .95). The sub-component of physical videoconference fatigue (M = 2.44, SD = 1.11) comprised of three items (e.g., "How much do you suffer from body aches after videoconferencing?"). Emotional videoconference fatigue (M = 2.52, SD = 1.16) comprised of three items (e.g., "How stressed do you feel after videoconferencing"). The occupational dimension of videoconference fatigue (M = 2.54, SD = 1.13) was measured using two items (e.g., "How much do you feel that you don't have energy to meet work demands after videoconferencing?").

Work-family conflict was assessed using six items adapted from Carlson et al. (2000) and reworded to fit the context of working from home. This measure has previously been employed and validated with sound results (Golden, 2012). Example items include "Work-from-home keeps me from my family activities more than I would like," and "When I finish my work-from-home duties I am often too exhausted to participate in family activities/responsibilities." Items were measured on a five-point Likert scale and averaged to form an

Table 1. Descriptive statistics and correlations.

		M	SD	1	2	3	4	5	6	7
1	No. of days in a week spent WFH	3.42	2.04	-	0.17**	0.10*	.10*	.07	.11**	0.06
2	No. of hours spent daily on videoconferencing	3.39	3.17	0.17**	-	0.51**	.49**	.46**	.47**	0.34**
3	Videoconference fatigue (VF)	2.45	1.06	0.10*	0.51**	-	.97**	.91**	.92**	0.60**
4	Physical VF	2.44	1.11	.10*	.49**	.97**	-	.81**	.82**	.54**
5	Emotional VF	2.52	1.16	.07	.46**	.91**	.81**	-	.80**	.58**
6	Occupational VF	2.54	1.13	.11**	.47**	.92**	.82**	.80**	-	.59**
7	Work-family conflict	3.18	0.91	0.06	0.34**	0.60**	.54**	.58**	.59**	-

Note: *$p < 0.05$. **$p < 0.01$.

overall score for work-family conflict ($M = 3.18$, $SD = .91$, $\alpha = .93$). A summary of the descriptive statistics and correlations of all key variables are presented in Table 1.

Results

Confirmatory factor analysis (CFA) was first conducted to analyze how well the observed indicators measure the latent variables, and explore the distinctiveness between variables. Results showed a good model fit (χ^2 (df) = 278.31(96); χ^2/df = 2.90; CFI = .98; TLI = .97; RMSEA = .06) To test the proposed hypotheses, serial mediation analyses were conducted using PROCESS macro (Model 6) for SPSS (Hayes, 2013), with age and gender entered as covariates. The model tested serial mediation from days in a week spent working from home to daily hours spent on videoconferencing to videoconference fatigue to work-family conflict.

Results showed that the number of days participants worked from home significantly predicted the number of hours they spent daily on videoconferencing ($b = .26$, $SE = .07$, $p < .001$), hence supporting H1. Number of hours spent on videoconferencing significantly predicted the experience of videoconference fatigue ($b = .15$, $SE = .01$, $p < .001$), therefore supporting H2. Videoconference fatigue significantly predicted the experience of work-family conflict ($b = .49$, $SE = .03$, $p < .001$), providing support for H3. A summary of the unstandardized regression coefficients and model information is presented in Table 2.

Examining the model holistically, the bias-corrected bootstrap 95% confidence for the indirect effect did not include zero ($b = .02$, $SE = .01$, 95% CI = .01 to .03), while the bias-corrected bootstrap 95% confidence for the direct effect included zero ($b = -.001$, $SE = .02$, 95% CI = −.03 to .03), thereby supporting the serial mediation model. Figure 2 presents the results of our analysis.

To answer RQ1, a hierarchical multiple regression was conducted with the physical, emotional and occupational dimensions of videoconference fatigue as independent variables and work-family conflict being the dependent variable. All Tolerance values were greater than 0.1, suggesting there were no multicollinearity issues (Hair et al., 2010). The first block of predictors comprised the control variables of gender and age, with the two demographic variables contributing significantly to the model. The full model in the second block added in the physical, emotional and occupational dimensions of videoconference fatigue for analysis. Results showed that emotional videoconference fatigue ($\beta = .29$, $p < .001$) and occupational videoconference fatigue ($\beta = .32$, $p < .001$) significantly predicted work-family conflict. The demographic variables along with physical videoconference fatigue were not significant predictors. These findings are presented in Table 3.

Table 2. Unstandardized regression coefficients, standard errors, bootstrap 95% Confidence Interval and model summary information.

|				Bootstrap 95% CI	
Antecedent	Coefficient	SE	p	Lower	Upper
M_1 Daily videoconferencing hours					
Age	−0.05	0.01	<0.001	−0.07	−.003
Gender (1 = male, 2 = female)	0.04	0.26	0.87	−0.47	0.56
X (Days in a week spent WFH)	0.26	0.07	<0.001	0.13	0.39
Constant	5.02	0.71	<0.001	3.63	6.42
		$R^2 = 0.06$, $F(3, 586) = 12.13$, $p < .001$			
M_2 Videoconference fatigue					
Age	−0.02	0.01	<0.001	−0.03	−0.01
Gender (1 = male, 2 = female)	−0.20	0.07	<0.01	−0.34	−0.05
X (Days in a week spent WFH)	0.01	0.02	0.64	−0.03	0.05
M_1 (Daily videoconferencing hours)	0.15	0.01	<0.001	0.13	0.18
Constant	2.97	0.21	<0.001	2.56	3.38
		$R^2 = 0.30$, $F(4,585) = 63.70$, $p < .001$			
Y Work-family conflict					
Age	0.01	0.01	0.62	−0.01	0.04
Gender (1 = male, 2 = female)	−0.12	0.06	0.04	−0.24	−0.01
X (Days in a week spent WFH)	0.01	0.02	0.89	−0.03	0.03
M_1 (Daily videoconferencing hours)	0.01	0.01	0.17	−0.01	0.04
M_2 (Videoconference fatigue)	0.49	0.03	<0.001	0.43	0.56
Constant	2.03	0.20	<0.001	1.64	2.42
		$R^2 = 0.37$, $F(5, 584) = 67.6$, $p < .001$			
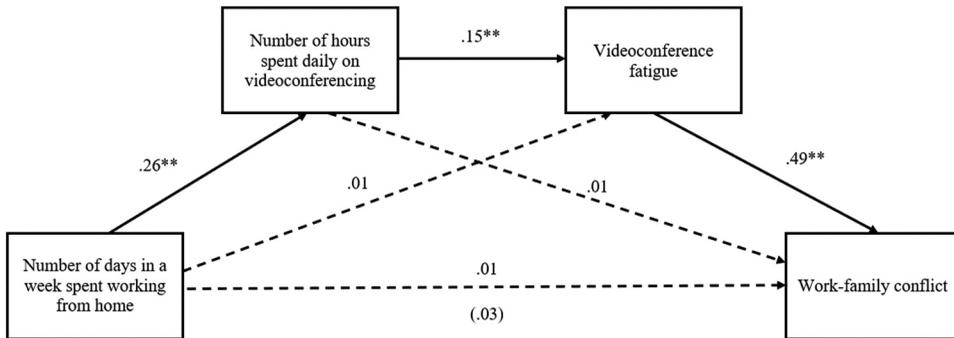
Figure 2. Results of serial mediation analysis.

Table 3. Hierarchical regression analysis for predicting work-family conflict from dimensions of video-conference fatigue.

	Block 1			Block 2		
	B	SE B	β	B	SE B	β
Gender (female)	−.21	.08	−.11**	−.11	.06	−.06
Age	-.01	.01	-.16***	.01	.01	.03
Physical videoconference fatigue				.05	.05	.06
Emotional videoconference fatigue				.22	.05	.29***
Occupational videoconference fatigue				.26	.05	.32***
R^2 changes		.04***			.35*** (Final R^2 = .38)	

Note. ** $p < 0.01$. *** $p < 0.001$.

Discussion

Through a national online survey conducted in Singapore, a small Asian nation known for an efficient information technology infrastructure, which has implemented work-from-home schemes as the default, this study revisited the link between and work-family conflict as a time when the physical space between home and work has collapsed. Proposing that such a link is not direct, but rather mediated by various factors, we tested the impact of videoconferencing, which has become the main tool for work-based communication, as well as that of the fatigue that excessive videoconferencing can cause. Using technostress as our conceptual framework, we found that consistent with our predictions, days spent working from home increases time spent on videoconferencing, which increases videoconference fatigue, which then increases work-family conflict. This serial mediation is statistically significant.

It is important to note that our results showed no direct link between number of days working from home and the extent of work-family conflict. Thus, working from home – which may mean for many employees staying in the same physical space with household members while carrying out work-related tasks – does not automatically lead to work-family conflict. What happens during the course of working from home is what matters. In this study, we found that high levels of videoconferencing may cause fatigue, and this is what contributes to experiencing work-family conflict. Spending too much time on videoconferencing can be physically and emotionally taxing. Participants in our study spent an average of almost three and a half hours daily videoconferencing. Kershaw et al. (2021) found that virtual meetings lasting two or more hours were associated with lower wellbeing among employees as compared to meeting durations of an hour or less. Others have found similar links between meeting duration and videoconference fatigue (Fauville et al., 2021, Quieroz et al., 2021). Hence, it appears that keeping meetings to not more than hour will be the most optimal for employees working from home.

Our results further show that it is not physical fatigue that results in work-family conflict. Rather, the emotional stress and lack of energy to meet work demands and complete tasks are the key factors leading to work-family conflict. This shows that while employees may suffer from physical exhaustion as a result of excessive videoconferencing, it is the toll on their mental and emotional wellbeing that can lead to friction between work and family. Greater stress and feelings of inadequacy to meet work demands can lead to irritation and frustration, which are pressure points resulting in tension between work-family boundaries. These findings also lend support to previous studies and theorizing that focused on work-family conflict. For example, T. D. Golden et al. (2006) proposed two types of conflict: time-based and strain-based. Strain can be a result of the emotional stress and occupational dimension of videoconference fatigue. As such, future studies should examine the link between these two types of conflict and the nature of videoconferencing and videoconference fatigue.

Results here also contribute to existing theorizing of the complexities between employees' experience of time during work and individual outcomes (Ballard & Seibold, 2003). A previous study found flexible work arrangements leading to higher communication load (Ballard & Seibold, 2006), with work-family conflict proposed a moderator based on the Meso Level Model of Organizational Temporality. Findings here suggest that the relationship between these factors may be more complex than originally conceived. Work-family

conflict is shown here as a consequence of videoconference fatigue, which itself has been proposed by scholars as a result of communication and information overload (Li & Yee, 2022). It appears that the chronemic perceptions of employees with regard to flexible work arrangements may lead to more complex organizational, group and individual outcomes than addressed in the model.

Our findings also add to the growing literature on videoconference fatigue. Studies have documented the different types of fatigue that people experience due to videoconferencing. Fatigue has been shown to be caused by cognitive overload, lack of non-verbal cues, reduced mobility, among others (e.g., Bennett et al., 2021; Bailenson, 2021; Fauville et al., 2021). Focusing on the Singapore context, we found support for the link between hours spend on videoconferencing and the experience of videoconference fatigue, providing empirical evidence from outside the Western context that most studies have so far focused on. As videoconferencing continues to become the default mode of work-related communication as the world emerges out of the pandemic, sustained investigation on its short-term and long-term effects is crucial. This study can help contribute toward finding the source of the conflict that stems from videoconferencing, thus helping future studies explore what organizations, and the role of communications and ICTs can do to mitigate such effects. In practical terms, this can mean adhering to planned videoconference meeting durations and not extending them unless absolutely necessary. Some videoconferencing tools have built-in functions that remind attendees when the scheduled meeting time is almost up. These enhancements are helpful not only in keeping track of meeting durations, but help to relieve the normative pressure on employees to speak up when meetings are extended, as they are a feature of the videoconference tool and the messages are sent to all participants automatically. Organizations should make use of these functions to ensure that videoconference meetings are not excessively long.

We employed the concept of technostress to explain the relationships in our study. Past studies on technostress have often examined technological factors and individual outcomes. In other words, how the use of communication technologies can lead to psychological outcomes. Our study expanded on the concept further, by examining how perceptions of exhaustion as a result of videoconferencing use can lead to negative social outcomes, manifested through tensions between work and family. As communication is essentially a social activity, future studies should seek to incorporate the social element into the technostress model. For example, by exploring how technostress can lead to different outcomes based on the context of online social interactions, or its effects on offline social networks.

Of course, the findings of this study must be interpreted within the context of several limitations. First, the survey method has inherent constraints. While we sought a national sample that mirrors the demographic distribution of the Singapore adult population, our sample excluded younger participants, whose experience with using videoconferencing for school is equally important to understand. Our data is also heavily reliant on the willingness and ability of the respondents to report their personal experiences, habits, and perceptions. Therefore, future studies can build on our findings reported here to continue this examination using other methodological approaches. Second, we focused on the context of Singapore, a small nation with efficient internet infrastructure. Thus, our findings may not be applicable to contexts where internet access is low or unreliable; these may actually exacerbate the experience of online fatigue. Still, we hope that our findings contribute to the

important work in this area by providing empirical evidence from outside the Western context that has traditionally dominated research on the impact of new technologies as well as encourage similar investigations in other contexts, especially in the Global South, which have also implemented WFH setups amid several constraints. Third, while we were interested in the context of videoconference fatigue as a result of working from home, our measure of videoconference use did not specifically ask respondents the location of their videoconference engagement. As the WFH mandate was implemented in Singapore at the time of our study, we assumed that respondents will be videoconferencing from home. However, we cannot be certain that this is true in all cases for our respondents. Although WFH was compulsory for most organizations, some employees were allowed to work in offices for businesses that were considered essential or important to have employees on-site (e.g., logistics and manufacturing). Regrettably, respondents in the survey were not asked about the venue of their videoconferencing sessions, or the nature of their occupation, which might provide more insight into the possible links between work location and videoconference activity. Nonetheless, future studies should explore specific differences between videoconferencing at home versus at work, and ascertain if factors like specific locations within the home (e.g., living room where there is greater family interaction or study room where there tends to be more privacy) may play a role in understanding the effects of videoconference fatigue on work-family conflict.

Finally, we focused on general measures of work-family conflict, when it is plausible that employees across different types of industries may have varied experiences with WFH and videoconference fatigue. Similarly, videoconferencing is just one of the several communication technologies being used in a WFH setup, alongside messaging apps as well as the traditional e-mail. Future studies may compare the impact of these different communication platforms on employees' experience and fatigue as we continue to find ways to mitigate the negative effects of work-related adjustments needed to navigate a post-pandemic world.

Disclosure Statement

Funding

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