

Understanding “Zoom fatigue”: A mixed-method approach

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Abstract

Video conference meetings, which became frequent during the COVID-19 pandemic, might result in exhaustion (so-called “Zoom fatigue”). However, only little is known about “Zoom fatigue,” the objective characteristics shaping it, and the subjective experiences eliciting this phenomenon. Gaining this knowledge is critical for understanding work life during the pandemic. Study 1, a within-person quantitative investigation, tested whether video conferences are exhausting and if objective characteristics (i.e. meeting size, meeting duration, and the presence of the supervisor) moderate “Zoom fatigue”. Employees from Germany and Israel ($N = 81$) participated in a 2-week study, with meetings nested within persons ($n = 988$). Results showed that video conferences are exhausting—more than meetings held through other media. However, objective characteristics did not moderate this relationship. In Study 2, qualitative data from Germany and Israel ($N = 53$) revealed employees' subjective experiences in video conferences that may lead to “Zoom fatigue”. These include, for example, experiences of loss and comparison with the “good old times” before the pandemic. Employees suggested ways to mitigate “Zoom fatigue,” particularly, better management of meetings by leaders. Our results provide empirical

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support for “Zoom fatigue” and suggest which subjective experiences elicit this phenomenon, opening directions for research and practice.

KEYWORDS

COVID-19, employee well-being, exhaustion, meeting characteristics, video conferences, “Zoom fatigue”

INTRODUCTION

In March 2020, a pandemic began, with the COVID-19 virus spreading around the world, and millions of people forced into lockdown (World Health Organization, 2020). During this time, many employees moved into remote work arrangements (i.e. home office; Rudolph et al., 2020), using video conferences extensively (e.g. the video conference platform “Zoom”). Subsequently, employees started to report feelings of exhaustion attributed to video conferences. Terms like “Zoom fatigue” and “Zoom exhaustion” became well known (Parker, 2020; Wiederhold, 2020). A Google search found thousands of results using the keywords “Zoom fatigue” since March 2020 (e.g. BBC, <https://www.bbc.com/>). However, research regarding “Zoom fatigue” is scarce (see Bennett et al., 2021 and Shockley et al., 2021 for recent exceptions). Thus, the questions of whether video conference meetings during the pandemic are indeed exhausting—and what are the objective characteristics and subjective experiences related to it—remain open. Using a mixed-method approach, with a within-person investigation and a qualitative study, we aim to answer these questions. Study 1 examines if video conference meetings during the pandemic are related to exhaustion on the within-person level (i.e. compared with meetings held through other media) and test the role of moderators concerning objective meeting characteristics (i.e. meeting duration, meeting size, and the presence of the supervisor). Study 2 adds a qualitative investigation regarding subjective experiences during video conferences that potentially lead to “Zoom fatigue.” Both studies complement each other by approaching “Zoom fatigue” as a phenomenon potentially related to objective meeting characteristics (Study 1) and subjective experiences in video conference meetings during the pandemic (Study 2).

The COVID-19 pandemic is an unknown situation characterized by feelings of uncertainty and potentially different work-related strain processes (Rigotti et al., 2020; Rudolph et al., 2020) with face-to-face interactions being an exception and remote work becoming the norm (Wang, Liu, Qian, et al., 2020). As an extreme, unprecedented situation, the pandemic might have set the ground for “Zoom fatigue” to emerge. Accordingly, employees’ strain reactions (e.g. exhaustion) to video conferences may reflect not only objective meeting characteristics as suggested in the meeting literature (e.g. meeting duration; Cohen et al., 2011) but also stem from a unique set of experiences reflecting work during the pandemic.

We draw on arguments from media richness theory (Ishii et al., 2019) to understand the emergence and experience of “Zoom fatigue.” The original theory suggests that interactions held through “richer” communication media (i.e. media that involve more cues; Daft et al., 1987) yield better communication. More recent extensions consider other features of media (e.g. the immediacy of feedback, symbol variety) as benefiting work-related processes (e.g. affect management; Maruping & Agarwal, 2004). According to this logic, video conferences would be considered richer than other media (e.g. emails and phone calls) but not as rich as

face-to-face communication (Daft & Lengel, 1986; Fulk & Collins-Jarvis, 2001). A conclusion would be that video conference meetings should be less exhausting than, for instance, meetings held through phone calls or written communication. However, mixed empirical evidence concerning media richness (e.g. Dennis & Kinney, 1998; Walther & Parks, 2002) led to further developments in the theory. Specifically, the perception of media is not always based on objective cues but subjectively shaped such that “each medium represents a ‘symbol’ in an organization. For example, an addressed letter on the organization’s letterhead represents formality” (Ishii et al., 2019, p. 125), and emails may signal “stress” (Barley et al., 2011). In line with this perspective, we suggest that “Zoom fatigue” emerged because video conferences gained a range of symbolic meanings during the pandemic (Fulk, 1993; Trevino et al., 1987). In other words, subjective experiences in video conferences (see Study 2) might have led to elevated exhaustion levels attributed to video conferences (Study 1) and shape how objective meeting characteristics (e.g. amount of time spent in meetings; Luong & Rogelberg, 2005) are perceived and evaluated.

To deeply understand employees’ experiences in work during the pandemic and uncover what lies behind “Zoom fatigue” and how objective characteristics and subjective experiences might shape it, it is necessary to take an integrative approach. Accordingly, we use a mixed-method approach (Creswell et al., 2007; Creswell & Clark, 2011), with an explanatory design, in which qualitative findings are added to quantitative results to achieve a better understanding of the research questions (Molina-Azorin, 2012; Sandberg, 2005).

We contribute to the literature by promoting the understanding of working life during the pandemic (Rigotti et al., 2020). First, in Study 1, we provide further empirical support for the existence of “Zoom fatigue” (see Bennett et al., 2021; Shockley et al., 2021). Specifically, to test that it is the video conference meeting—and not any form of work meeting—which is exhausting, we compare video conference meetings to meetings held through other communication media. This is a critical step to establish that “Zoom fatigue” exists. Considering that exhaustion puts employees at risk of reduced performance (Halbesleben & Bowler, 2007; Halbesleben & Wheeler, 2011; Trougakos et al., 2015), finding that video conferences are indeed exhausting practically implies that organizations should consider using other communication media for meetings more frequently during the pandemic.

Second, our mixed-method approach, combining quantitative and qualitative data (Molina-Azorin, 2012), is critical to capture the complexity and novelty of the pandemic situation. Specifically, organizations can only fully support their employees when understanding both the objective characteristics (Study 1) and the subjective experiences (Study 2) related to “Zoom fatigue.” Identifying such characteristics will inform both theory and practice regarding how video conference meetings should be designed. By this, we also contribute to the meeting literature, assessing whether previous objective characteristics already identified as important (e.g. meeting size; Allen et al., 2020; Cohen et al., 2011) can be generalized to work during the pandemic.

Third, we theoretically add to trends in media richness theory, moving “from objective to subjective views toward media richness” (Ishii et al., 2019, p. 124). Accordingly, in our qualitative study, we aim to uncover subjective experiences underlying exhaustion in video conference meetings (Trevino et al., 1987). Specifically, in the exceptional case of almost no face-to-face interactions, “it is possible that the media choice itself may carry symbolic cues” (Trevino et al., 1990, p. 85). Finding that video conferences are more exhausting than other, objectively richer, communication media (Daft et al., 1987; Maruping & Agarwal, 2004) would support moving toward a symbolic interpretation of media (Barley et al., 2011), especially in times of crisis that restructure which and how media is used.

STUDY 1

Are video conferences during the pandemic exhausting?

Media richness theory suggests that video conferences (i.e. with one person or more) are “richer” than other communication media (e.g. phone calls and emails), for example, in information availability and immediacy of feedback (Daft et al., 1987; Fulk & Collins-Jarvis, 2001; Maruping & Agarwal, 2004). Compared with face-to-face communication, however, video conferences are considered not as rich because they offer less nonverbal cues and reduced personal focus (Daft et al., 1987; Wegge et al., 2007).

Evidence regarding employees' attitudes toward video conferences is mixed. On the one hand, data before the pandemic show that people prefer face-to-face communication over video conferences (Denstadli et al., 2012; Proost et al., 2020). On the other hand, lab studies found no differences in terms of communication satisfaction (Dennis & Kinney, 1998), and in some contexts (e.g. when reducing the need for long travel) video conferences were preferred (Denstadli et al., 2012). To the best of our knowledge, only one experiment investigated strain due to video conferences before the pandemic and found no support for such an effect (Wegge et al., 2007). In summary, according to findings from before the pandemic, the classic media richness theory (Daft et al., 1987), and more recent extensions of media richness (Maruping & Agarwal, 2004), there is no justification to suggest the phenomenon of “Zoom fatigue.”

Nonetheless, in the current pandemic situation, one should not overlook that “so many people are reporting similar experiences that it's earned its own slang term” (i.e. “Zoom fatigue”; Sklar, 2020, para. 4). In a recent study, Bennett et al. (2021) showed that during the pandemic, video conference meetings were related to more exhaustion compared with a normal daily trajectory of exhaustion. Thus, there is a good reason to further investigate if video conference meetings during the COVID-19 pandemic are exhausting. However, during the pandemic, any work meeting (i.e. using any media) might be exhausting. If this is the case, the phenomenon reported by employees is not “Zoom fatigue” but “Meeting fatigue”. To rule out this possibility, we compare video conference meetings to meetings held through other media.

Hypothesis 1. Video conference meetings will be more exhausting than meetings held through other media.

Objective meeting characteristics as moderators of video conference exhaustion

Meeting characteristics play an important role in meeting effectiveness (Leach et al., 2009; Standaert et al., 2021), employees' attitudes toward meetings (e.g. meeting satisfaction; Cohen et al., 2011; Rogelberg et al., 2010), and exhaustion following meetings (Luong & Rogelberg, 2005). However, whether objective *video conference* characteristics are important for strain responses attributed to them remains mainly unstudied (Wainfan & Davis, 2004). Building on findings from the meeting literature, we suggest that characteristics related to video conference meetings (i.e. meeting duration, meeting size, and the presence of the supervisor) moderate the relation between video conferences and exhaustion.

Specifically, we suggest that video conference duration moderates the relationship of video conferences with exhaustion. The idea that longer video conferences might be more exhausting

was proposed during the pandemic. It was suggested, for example, that “given our shorter attention spans right now, avoid defaulting to the hour-long meeting” (Rogelberg, 2020, para. 8) and that “shorter meetings are important for Zoom calls” (Parker, 2020, para. 25). These suggestions are reasonable considering that video conferences are often characterized by routine changes of information (Standaert et al., 2021) that require vigilance and attention (Bennett et al., 2021), and maintaining attention might foster exhaustion (Cummings et al., 2016; Szalma et al., 2004; Warm et al., 2008). Hence, we hypothesize the following:

Hypothesis 2. The relation between video conferences and exhaustion will be moderated by the meeting duration, such that longer video conferences will be more exhausting.

Further, we propose that meeting size (i.e. the number of participants in the video conference) moderates the relation of video conferences with exhaustion. Evidence from the meeting literature suggests that meeting size relates to perceptions of lower meeting quality and effectiveness (Allen et al., 2020; Cohen et al., 2011). In virtual communication, people were less satisfied with computer-based collaborations in larger groups (Baltes et al., 2002). Similarly, information from the current COVID-19 pandemic suggests that “remote meetings plummet in quality as size increases” (Rogelberg, 2020, para. 7) and that “multiperson screens magnify this exhausting problem” (Sklar, 2020, para. 10). Hence, we hypothesize the following:

Hypothesis 3. The relation between video conferences and exhaustion will be moderated by the meeting size, such that larger video conferences will be more exhausting.

Power dynamics between leaders and followers are inherent in meetings (Nyquist et al., 2018). When higher-power persons are present, employees may feel that they should control themselves more as compared with a situation when their interaction partner has relatively less power than them (Diefendorff et al., 2010). We propose that video conferences where a higher-power person (e.g. supervisor) is present are more exhausting compared with meetings where this is not the case. Information from online media in the context of the COVID-19 pandemic supports these ideas. It was suggested, for example, that interacting with people that employees do not feel close with might strengthen video conference exhaustion (Fosslien & Duffy, 2020) perhaps because video conferences are “fairly intimate and can even feel invasive” (Fosslien & Duffy, 2020, para. 12). Hence, we hypothesize the following:

Hypothesis 4. The relation between video conferences and exhaustion will be moderated by the relative power of the interaction partner, such that video conferences in which one's supervisor takes part will be more exhausting.

METHOD

Procedure and participants

Data were collected during the COVID-19 pandemic breakout in March–April 2020 in Germany and Israel. The study began with a general survey, followed by a 2-week (i.e. 10 workdays)

within-person investigation, with three daily measurement points (i.e. first survey in the morning, second survey in the midday, and third survey in the afternoon). The surveys were designed to target specific meetings, together with a measurement point after work (see Dimotakis et al., 2011 for a similar procedure).

In Germany, two students recruited study participants using their personal networks as part of a research project supervised by the first author. In Israel, the first author recruited participants using personal connections and social media (e.g. Facebook). As a prerequisite, participants were asked if they continue working during the COVID-19 lockdown. We sent participants a general survey before the within-person part. During the within-person investigation, we emailed the link for the first survey at 8:00 (participation was possible until 11:30), the link for the second survey at 12:00 (participation was possible until 15:30), and the link for the third survey at 16:00 (participation was possible until 20:00). Participants answered the surveys online.

In total, 171 people from Germany and 94 people from Israel registered for the study. Of the people who registered, 107 people from Germany and 58 people from Israel filled in the general survey and indicated that they continue working during the lockdown. For the final analysis, we included 81 participants, 52 from Germany, and 29 from Israel (70.4% women) who answered the general survey and at least two daily surveys (i.e. the first survey and the second survey, the first survey and the third survey, the second survey, and the third survey) of the within-person investigation ($n = 988$). On average, participants provided data on 12.19 surveys.

Participants' occupations varied greatly (e.g. secretary, financial advisor, and teacher), and 37 per cent held a leadership position. Mean age was 39.26 years ($SD = 10.64$). Mean job tenure was 9.76 years ($SD = 8.52$). Of the participants, 13.6 per cent reported that they live alone, and 42 per cent reported that they have kids living with them at home. German and Israeli participants did not differ significantly in gender ($\chi^2(1) = 1.70, p = .19$) or tenure ($t = -.35, p = .72$). However, the Israeli sample was significantly older ($t = 2.87, p < .01$). Moreover, German participants had fewer children living with them at home ($\chi^2(1) = 29.78, p < .01$), reflecting known demographic differences between the countries (OECD Family Database, 2016).

We checked whether the 81 participants included in the final data set differed from the 69 who answered the general survey but did not meet the inclusion criteria. There were no significant differences in age ($t(148) = -.60, p = .54$), percentage of people living alone ($\chi^2(1) = .15, p = .69$), or the number of children living at home ($\chi^2(1) = .80, p = .36$). However, in the final dataset, there were significantly more women ($\chi^2(1) = 4.46, p = .03$).

Measures

Surveys were presented in German and Hebrew, in Germany and Israel, respectively. We used a back-translation procedure when needed (Brislin, 1970). The demographics were assessed in the general survey. In the within-person investigation, we assessed exhaustion in every survey. In the first and the second surveys, we assessed data regarding specific meetings. We asked participants to report about a recent meeting held through any possible communication medium. Only in case of no work-related meeting, participants reported on a private interaction (e.g. with family members). Of the reported 716 meetings, 151 were private interactions.

Exhaustion

We measured exhaustion three times a day instructing participants to report how they feel “at the moment,” with a 5-point Likert scale (1 = *totally disagree* to 5 = *totally agree*). Exhaustion measured in the morning (i.e. first survey) was treated as a control variable. Exhaustion measured subsequent to the first meeting (i.e. measured in the second survey) was the outcome variable for the first meeting. Exhaustion measured subsequent to the second meeting (i.e. measured in the third survey) was the outcome variable for the second meeting. To measure exhaustion, we followed previous within-person studies (e.g. Hülshager et al., 2013) and used four items adjusted for daily use, adapted from the German and the Hebrew versions of the emotional exhaustion subscale of the Maslach Burnout Inventory (Büssing & Perrar, 1992; Etzion, 1988; Maslach & Jackson, 1981). A sample item was “I feel exhausted.” Cronbach's alpha was .93 for the first survey, .93 for the second survey, and .92 for the third survey.

Medium of communication

In the first and the second survey, we asked participants to report about a recent work-related meeting. Referring to the medium of communication, we asked participants “Which medium was used to conduct the meeting” with several optional answers. Participants could choose if the meeting was held through a video conference platform, a phone call, written communication, or face-to-face. Out of the 716 meetings reported, 37.70 per cent were via a video conference platform, 16.89 per cent were done by phone call, 22.34 per cent were written (i.e. email or chat), and 23.60 per cent were face-to-face.

¹ Out of the 270 video conference meetings, 90.0 per cent (243 meetings) were work-related.

Meeting duration

For every meeting, we asked participants “how long was the meeting in minutes?” On average, meetings lasted 32.22 min ($SD = 33.07$). Video conferences lasted on average 48.19 min ($SD = 35.20$).²

Meeting size

For every meeting, we asked participants “how many people took part in the meeting?” The mean number of participants in a meeting was 4.02 ($SD = 6.48$). In video conferences, the mean number of participants was 7.13 ($SD = 9.37$).³

Interaction partner

We asked participants “who was the other person(s) in the meeting?” and gave them several options: my supervisor, my colleague/s, my subordinates, customers, others. Supervisors took part in 27.65 per cent of the meetings and in 41.48 per cent of the video conferences.

Control variables

To make sure that changes in exhaustion are not due to previous levels of exhaustion, we controlled for morning exhaustion in our analysis (Gabriel et al., 2019). In addition, to rule out that changes in exhaustion are not purely a consequence of natural changes in exhaustion during the day (Bennett et al., 2021; Hülshager, 2016), we created a control variable termed “meeting.” This variable represents the order of the meeting (i.e. the first reported meeting and the second reported meeting) as a proxy for the time of the day. Moreover, although our interest was in work-related meetings, due to the COVID-19 pandemic, participants also had private interactions during their workday (i.e. 21.08% of all reported meetings, 9% of the meetings held through video conferences).⁴ Therefore, we controlled for the type of interaction (i.e. work-related or private) in our analysis. Finally, we controlled for the day of data collection in which the meetings were reported (i.e. day 1 to day 10), to make sure that there are no day-specific effects in our data, and test for potential habituation effects in which people might have gotten used to video conferences and therefore became less exhausted by them from day-to-day.

Data preparation

Following recommendations for analysis and interpretation of dummy variables (Canela et al., 2019), we created the set of dummy variables based on our hypotheses. Specifically, we were interested if video conferences are more exhausting than meetings held through other media (see Hypothesis 1). Thus, the dummy variable “video conference” was the predictor variable in our analysis. Because we had no specific hypothesis regarding other media, we integrated meetings held through “phone call,” “written communication,” and “face-to-face” into one dummy variable representing the baseline (i.e. reference) category. Similarly, for the variable “interaction partner” there were four possible answers, and our core interest was meetings in which the supervisor takes part (Hypothesis 4). Thus, the dummy variable “supervisor” was the one we used in our analysis, and the other interaction partners (i.e. subordinate, customer, and colleagues) on which we had no specific hypothesis were integrated into one dummy variable and treated as the baseline category.

Data analysis strategy

Our participants did not provide data on all available surveys thus there is some data missing from our dataset. Missing data are common in within-person studies (Gabriel et al., 2019) and are expected when collecting data during the lockdown. Based on recommendations to achieve unbiased parameters (Newman, 2014), we used FIML (full information maximum likelihood) estimation in Mplus 7.1 (Muthén & Muthén, 1998–2012).

Our data have two levels, with meetings nested within persons. Therefore, we conducted a multilevel analysis with Mplus 7.1 (Muthén & Muthén, 1998–2012). We followed Preacher et al.’s (2016) approach for testing multilevel moderation effects and focused on the within-person level. Accordingly, we modeled the interaction terms on the within-person, and person-mean centered our variables when forming the interaction terms (Enders & Tofighi, 2007).

In the analysis, we first ran a model with the control variables (i.e. the variable “day,” the variable “meeting,” morning exhaustion, the dummy variable “type of interaction”) and our

main predictor (i.e. the dummy variable “video conference”). In a second step, we added the main effects of our moderators (i.e. meeting duration in minutes, meeting size, and the dummy variable “supervisor”). In the final step, we added all interaction terms (i.e. created by multiplying the dummy variable “video conference” with the respective moderator) predicting subsequent exhaustion.⁵ We ran the analysis also without the control variables (Gabriel et al., 2019), and the results of the hypotheses tests remained unchanged.

STUDY 1 RESULTS AND DISCUSSION

Table 1 displays the means, standard deviations, and correlations among study variables. We computed the correlations in Mplus 7.1 (Muthén & Muthén, 1998–2012) to account for the multilevel nature of the data. From the within-person correlations, the stability of exhaustion is apparent by a significant positive correlation of exhaustion measured at different times of the day. A significant positive correlation was also found between video conferences and meeting duration, meeting size, and supervisor presence. This suggests that compared with meetings held through other media, supervisors take more part in video conferences and that video conference meetings are larger and longer. The positive within-person correlation between video conferences and exhaustion is the first indicator of “Zoom fatigue.”

Variance decomposition

To verify that a two-level approach is most appropriate to analyze our data, we tested whether our study variables (i.e. exhaustion, meeting duration, and meeting size) fluctuate between interactions, within persons. The Intraclass correlation coefficients (ICCs) range was between 37.6 per cent (emotional exhaustion) and 89.8 per cent (meeting duration). Thus, we concluded that the focus of the study should be on the within-person level (i.e. meeting level), with between-person differences accounted for by the two-level analysis (Nezlek, 2003).

Hypotheses testing

The results of the two-level analysis are presented in Table 2. Hypothesis 1 proposed a positive relation between video conferences and subsequent exhaustion. Controlling for the day (i.e. 1–10), the order of the meeting as a proxy for the time of the day (i.e. first meeting or second meeting), morning exhaustion, and the dummy variable type of interaction (i.e. work or private), we found a significant, positive relation between video conferences and exhaustion (estimate = .18, $SE = .05$, $p < .01$), supporting Hypothesis 1.

Hypotheses 2–4 proposed that the relation between video conferences and exhaustion is moderated by the meeting duration, meeting size, and the presence of the supervisor in the meeting. In all three hypotheses, the interaction terms were not significant, providing no support for Hypotheses 2–4 (video conference meeting-meeting duration interaction: estimate = .00, $SE = .00$, $p = .93$; video conference meeting-meeting size interaction: estimate = .01, $SE = .02$, $p = .65$; video conference meeting-supervisor presence interaction: estimate = $-.16$, $SE = .20$, $p = .42$).

TABLE 1 Descriptive statistics and intercorrelations

Variable	M	SD	1	2	3	4	5	6	7	8	9	
1 Morning exhaustion	1.61	.81	-	.27**	-.03	.02	.00	.01	-.02	-.14*	.01*	
2 Exhaustion	1.70	.83	.93**	-	.13**	.02	-.01	.08	-.03	-.10*	.02	
3 Video conference ^a			-.26**	-.22	-	.22**	.31**	.23**	-.17**	.01	-.22**	
4 Meeting duration ^b	32.22	33.07	-.00	-.00	.50**	-	.23**	.06	.00	-.01	-.23**	
5 Meetings size	4.02	6.48	.05	.12	.64**	.63**	-	.24**	-.07	-.06*	-.24**	
6 Supervisor ^c			-.00	.11	.29	.15	.18	-	-.11**	-.04	-.15**	
7 Interaction type ^d			-.00	-.00	-.31**	.07	-.09	-.33**	-	-.04	.11**	
8 Day											.00	
9 Meeting ^e												-

Note: Means and standard deviations at the person level. Correlations were computed in Mplus to account for the multilevel nature of the data. Correlations above the diagonal are on the within-person level ($n = 969$). Correlations below the diagonal are on the between-person level ($N = 81$).

^aMedium of communication (dummy variable; video conference = 1, all other communication media = 0).

^bMeeting duration in minutes.

^cInteraction partner (dummy variable; supervisor = 1).

^dInteraction type (dummy variable; nonwork = 1).

^e“Meeting” represents the order of the meeting (i.e. first meeting or second meeting) as a proxy of the time of the day.

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

TABLE 2 Results of the multilevel analysis predicting exhaustion

Variable	Model 1			Model 2			Model 3		
	Est.	SE	est./SE	Est.	SE	est./SE	Est.	SE	est./SE
<i>Within-person</i>									
Day	-.01	.00	-1.54	-.01	.00	-1.52	-.01	.00	-1.62
Meeting ^a	.04	.03	1.28	.04	.03	1.18	.03	.04	.81
Morning exhaustion	.33	.08	4.18**	.33	.08	4.03**	.32	.08	3.98**
Interaction type ^b	.00	.07	.03	.02	.07	.36	.01	.03	.81
Video ^c	.18	.05	3.23**	.20	.06	3.15**	.24	.06	3.74**
Meeting duration ^d				.00	.00	.36	.00	.00	.31
Meeting size				.08	.05	1.55	-.01	.01	-.91
Supervisor ^e				-.08	.00	-1.88	.10	.05	1.97*
Video × meeting duration							.00	.00	.08
Video × meeting size							.01	.02	.65
Video × supervisor							-.16	.20	-.80
<i>Between-person</i>									
Morning exhaustion	.87	.06	14.63**	.85	.05	14.59**	.85	.06	14.36**
Interaction type	.00	.22	.01	.13	.24	.53	.16	.25	.63
Video	.03	.19	.16	-.08	.18	.47	-.05	.17	-.32
Meeting duration				.00	.00	.16	-.00	.00	-.34
Meeting size				.01	.03	.42	.01	.03	.51
Supervisor				.43	.26	1.67	.42	.24	1.72

Note: est. = unstandardized estimate, resulting from one overall model testing all relationships simultaneously on both levels.

^a“Meeting” represents the order of the meeting (i.e. first meeting or second meeting) as a proxy of the time of the day.

^bInteraction type (dummy variable; nonwork = 1).

^cMedium of communication (dummy variable; video conference = 1, all other communication media = 0).

^dMeeting duration in minutes.

^eInteraction partner (dummy variable; supervisor = 1).

* $p < .05$.

** $p < .01$.

Additional analysis

We tested whether the basic results differ across the two countries (i.e. Germany and Israel) by adding a dummy-coded between-person variable, named “country.” A cross-level moderation analysis showed no significant moderation effect (estimate = .33, $SE = .19$, $p = .08$) suggesting that the main effect of video conferences on exhaustion does not differ between German and Israeli participants. Similarly, we tested if the results differ for people who engaged also in face-to-face meetings during the within-person investigation period (i.e. lockdown). A cross-level moderation analysis showed no significant moderation effect (estimate = -.20, $SE = .13$, $p = .12$) suggesting that the main effect of video conferences on exhaustion was present also when participants had occasionally face-to-face meetings.

In addition, to account for the possibility that the frequency of video conferences might have consequences for employee well-being (Luong & Rogelberg, 2005), we tested whether participants that took part in more video conferences were more exhausted by them. We created a between-person variable, named “proportion of video conferences” in which we calculated for every participant how many of the reported meetings were held through video conferences. A cross-level moderation analysis showed no significant moderation effect (estimate = .08, $SE = .33$, $p = .79$) suggesting that our participants were exhausted by video conferences regardless of the number of video conferences they reported on during the data collection period.

The results of Study 1 provide evidence for “Zoom fatigue.” Video conference meetings were more exhausting than meetings held through other communication media. These findings demonstrate that it is the video conference meeting, and not any meeting, that predicts exhaustion. Objective meeting characteristics (i.e. meeting duration, meeting size, and the presence of the supervisor), did neither play a role in increasing nor decreasing “Zoom fatigue.”

Although surprising, these results are in line with initial evidence from the pandemic literature. Bennett et al. (2021), for example, also found inconclusive results regarding objective video conference characteristics. One way to deal with such ambiguity is the examination of further meeting characteristics (e.g. camera usage; Shockley et al., 2021) potentially relevant for “Zoom fatigue.” An alternative is examining how media is entangled with symbolic meanings at work. Barley et al. (2011), for example, provide evidence that not only the technological media attributes (i.e. objective characteristics) but also their specific cultural-symbolic meaning (e.g. emails as a symbol of stress) matter for understanding media-usage related strain. Accordingly, we suggest that to reveal *what is* “Zoom fatigue” and *why* does it occur, a qualitative investigation focused on employees’ subjective experiences is needed. This is our goal in Study 2.

STUDY 2

To uncover the relevant experiences that may elicit “Zoom fatigue,” we used an explanatory design (Creswell et al., 2007; Molina-Azorin et al., 2017) and conducted a qualitative study focusing on employees’ experiences in video conferences. Theoretically, as previously noted, we draw on advances in media richness theory (Trevino et al., 1987) that suggest that media is not always evaluated according to objective cues (i.e. the richer the better; Daft et al., 1987) but subjectively, in a manner that reflects the specific context (Trevino et al., 1990; Webster & Trevino, 1995). In this regard, the medium of communication might have symbolic features (Barley et al., 2011) or a shared implicit meaning (Eisenberg & Riley, 1988; Sitkin et al., 1992). For example, when receiving a text message from a colleague, employees may feel intimacy, and when the meeting is set to be face-to-face, it might signal importance (Fulk, 1993; Ishii et al., 2019). The symbolic meaning of media, in turn, may affect people’s attitudes and reactions to media (Trevino et al., 2000). An employee receiving an invitation for a face-to-face meeting might potentially feel excited or worried depending on the specific connotation or meaning it carries within a context.

Extending these arguments to the current context, we suggest that video conferences might have become a symbol for working life during the pandemic. This symbolic, shared meaning (Sitkin et al., 1992), could have emerged during the pandemic. Accordingly, common experiences (e.g. frustration because of technical obstacles) might have changed how video conferences are experienced and thus led to the emergence of “Zoom fatigue.” Moreover, experiences in video conferences may also have led to other symbolic meanings to evolve (e.g. video conferences as a way to escape social isolation during the pandemic).

Participants and procedure

We collected data during the COVID-19 second pandemic wave (November 2020) in Germany and Israel. We informed participants that we are interested in how employees deal with the new work arrangements due to the pandemic (e.g. online meetings), emphasizing the extensive use of video conferences. Participants had to be at least 18 years old and continue working during the pandemic. The authors recruited participants in Germany and Israel using personal networks and social media (e.g. Facebook). The online survey consisted of mainly open questions regarding employees' work experiences during the pandemic and specifically their experiences in video conferences (see Appendix A for the full survey).

In total, 100 people registered for the study; of them, 53 (15 from Germany and 38 from Israel) provided answers to our questions (53% women). Mean age was 39.09 ($SD = 6.78$). Participants worked in diverse occupations (lawyer, academic positions, and software engineer), and 32.08 per cent had a leading position. On average, participants' job tenure was 2.70 years ($SD = 2.08$). Of the participants, 66 per cent reported that they live with a partner, and 62.26 per cent had to take care of other people living with them at home (e.g. young children).

Data analysis strategy

Guided by the research question 'What are the subjective experiences in video conferences that lead to "Zoom fatigue"?', we analyzed the data with a four-step thematic approach (Braun & Clarke, 2006). Because we had a specific interest that guided our coding, our approach can be considered deductive thematic analysis (Braun & Clarke, 2006). Nonetheless, no theoretical categorization was done before the beginning of the analysis. Moreover, to consider the potential variety and complexity of subjective experiences (Fulk, 1993), we were also open to inductively identify themes that do not fit the idea that video conferences are exhausting (e.g. positive sides of video conferences).

Based theoretically on a thematic approach as described by Braun and Clarke (2006) and following the empirical findings of Study 1, we (i.e. both authors) began with an independent careful coding of the answers (i.e. Step 1) to the open questions regarding video conferences. Two assistants helped us in case of doubts (e.g. regarding language). In the second step, we independently created categories and themes from the coded answers to the different questions. In the third step, we independently reviewed and organized the open-coded answers into the respected themes and checked for interrelations among the themes. In the fourth step, we worked together, further delved into the data, merged related themes, and created the final themes based on our research question. Moreover, in step four, we discussed and resolved minor disagreements. The final coding file consists of zero disagreements between the raters.

FINDINGS

From several descriptive questions, we learned about participants' experiences working during the pandemic. Of the participants, 86.63 per cent reported that they work in home office. Referring to meetings, 60.38 per cent of our participants reported that they have more than three video conferences a day. All participants, other than one, described that video conferences were necessary for their work. Some elaborated on this issue, mentioning that video conferences are

“the only way to communicate” and that video conference meetings are the “substitute” for meetings before the pandemic.

Below, we present the themes that we created from the answers to the questions regarding video conferences and themes that refer to factors that potentially can reduce video conference exhaustion. Tables 3 and 4 provide examples for participants' representative answers grouped into the identified themes.

Subjective experiences in video conferences

Theme 1: Experiencing loss

During the pandemic, employees might experience a “potential loss of valued job features and a deterioration in working conditions” (Rudolph et al., 2020, p. 25). Such loss experiences were prevalent in participants' descriptions of video conference meetings. One participant mentioned explicitly that “... the positive parts of meetings are lost ...”. In line with the literature (Daft et al., 1987; Wang, Liu, & Parker, 2020), several participants addressed relational aspects, namely, the reduced richness of social cues in video conferences compared with face-to-face

TABLE 3 Experiences leading to video conference exhaustion: themes identified in Study 2

Theme	Frequency	Examples given in the German sample	Examples given in the Israeli sample
1 Experiencing loss	91.76 per cent	“The interpretation of reactions or opinions of people is very tiring in video conversations” “They last 1.5 h, at some point the attention is gone”	“It is an effort to read the facial expressions of the other participants” “The number of participants (sometimes over 30) is not allowing a proper talk”
2 Comparison with the “good old times”	30.76 per cent	“Moderating a video conference meeting is more time consuming than face-to-face meetings”	“The structure of the meeting demands occasional disruptions that were easy to avoid in a face-to-face conversation”
3 Experiencing technical problems	28.84 per cent	“If there are also technical problems, for example, the sound and picture quality is low, you lose patience which is also reflected in the tone of voice of some colleagues”	“First of all, the internet at my work is really bad, so there are many hang-ups and freezes of me and others”
4 “Zoom as an island”: Positive aspects of video conferences	43.39 per cent	“Relaxed talks with my colleagues”	“Meetings in which we laugh a lot, and share experiences from the lockdown”

Note: Fifty-two participants answered the question and mentioned one or more of the themes in their answers. The frequencies represent how many participants (of the 52) mentioned the respected theme. Participants reported one or more themes, such that the frequencies do not add to a total of 100 per cent, but several themes could be coded in one answer. Examples are translated quotes of representative answers.

TABLE 4 Factors potentially reducing video conference exhaustion: Themes identified in Study 2

Theme	Frequency	Examples given in the German sample	Examples given in the Israeli sample
1 Improving video conferences management	72.97 per cent	“The project manager could lead through the calls in a more moderating and coordinating manner”	“Guide the employees regarding what can be done to improve these meetings”
2 Technical improvements	43.24 per cent	“Standard technical equipment for the home office would have made sense from the start”	“Better cameras, better sound equipment”

Note: Thirty-seven participants answered the questions, and mentioned one or more of the themes in their answers. The frequencies represent how many participants (of the 37) mentioned the respected theme. Participants reported one or more themes, such that the frequencies do not add to a total of 100 per cent, but several themes could be coded in one answer. Examples are translated quotes of representative answers.

meetings as a source of exhaustion: “Even with the video, the mimics and gestures are not determined so well ...”. Further, participants suggested that not only the objective characteristics of the video but more symbolic features related to it (Barley et al., 2011) might shape the reactions to the video conference. For example, several participants mentioned the “*silent others*” (i.e. participants that mute themselves and do not open their cameras) as a source of exhaustion: “It can be very exhausting, as you cannot see the facial expressions of the others, nor their reaction... the ‘silent’ crowd is hard to read ...”, “... it is super frustrating to talk blindly to people, without knowing if they are even there”

Interestingly, there seems to be a tension, between what people expect of others (e.g. rich cues, open cameras, participation), as one participant mentioned: “open your cameras guys!” and how they experience the same social demands. Several participants mentioned that they feel “high awareness because my face is on the screen” as a source of exhaustion and “only listen” as a possible way to reduce exhaustion (see Shockley et al., 2021).

Other experiences of loss relate to perceiving a deterioration of work effectiveness in video conferences. Wang, Liu, and Parker (2020) suggest work effectiveness as one of the central outcomes relevant for media use. Our participants mention that not only the loss of social cues but also the overall experience of deteriorating effectiveness predicts “Zoom fatigue.” Video conference meetings were described as exhausting because they “prevent from doing other work/tasks,” or “block the work.” One participant put it as follows: “Time for other tasks is lost and, in the end, you discuss a lot of interpersonal, private matters.”

Theme 2: Comparison with ‘the good old times’

The pandemic breakout is characterized by quick changes in work life (Wang, Liu, Qian, et al., 2020). In line with recent findings about the negative consequences of longing for the past for daily well-being (Newman & Sachs, 2020), our participants' comparisons to “what was before” seemed to be a source of video conference exhaustion. In their descriptions of video conferences and the causes they gave to video conference exhaustion, participants often evaluated video conference meetings in contrast to “normal,” before the pandemic, face-to-face meetings. For instance, participants mentioned that “... I need to talk much more than in class ...,” and that “... it was easy to avoid these distractions in a room.” This theme relates to Theme 1 (“experiencing loss”) because

valued features from before the pandemic are deteriorating. However, we regard it as distinct because the focus is on “good old times” before the pandemic as the implicit comparison standard to which rapidly changing working conditions in the social and work domain are compared with. As one participant mentioned: “You *no longer* exchange information with someone sitting next to you, so ‘low threshold’ communication *no longer* takes place.”

Theme 3: Experiencing technical problems

In the literature, technical aspects have consequences for how non face-to-face communication is perceived (Wang, Liu, & Parker, 2020), and technical problems were described as an obstacle for remote work during the pandemic (Rigotti et al., 2020). Accordingly, several of our participants described video conference meetings as full of technical hassles. One participant mentioned that “...we have to go through these nonsense technical problems, for example: ‘Can you hear me? ‘My computer does not work’ ‘I cannot see the screen today’. Another participant expressed that “... there are many hang-ups and ‘freezing’ moments of me and others, it is very hard to keep concentrated as a participant, and even more as the leader of the meeting...” This theme relates to Theme 1 (“experiencing loss”) because the loss of concentration and time might be partly triggered by technical obstacles. Yet, it is distinct because the focus is on the objective technical features which independent of COVID-19 can be stressful (Wang, Liu, Qian, et al., 2020). Thus, this theme might not be specific to the pandemic context but was dominant since the pandemic elicited extensive video conference use.

Theme 4: “Zoom as an island”: Positive aspects of video conferences

As mentioned above, we took into consideration that also positive experiences might arise in video conference meetings during the pandemic (Rudolph et al., 2020). Indeed, when we asked if video conferences are exhausting, several participants mentioned that they are not, because “they are rare ...” or because “I don’t have a chance to speak to many people during the day, so it’s nice to speak with colleagues even if it is online.” We further asked participants to provide examples for relaxing video conferences if there were. Several participants answered this question and mentioned “coffee break” meetings and “nonformal meetings with colleagues” as relaxing. This is in line with the literature that suggests that online technology can act as compensation (Waytz & Gray, 2018). Accordingly, positive “island” interactions in video conferences can compensate for the broader experience of deteriorating social relationships at work (see Theme 1, “experiencing loss”). Interestingly, also regarding this theme tensions arise, because private nonwork talks were also mentioned as a source of exhaustion and “... not to allow small talk” was mentioned as a way to reduce exhaustion.

Factors potentially reducing video conference exhaustion

Theme 1: Improving video conferences management

Meeting management is an important feature of meetings in general (Allen & Rogelberg, 2013). The pandemic highlighted this need, as reflected strongly by our participants when offering

ways to mitigate video conference exhaustion. Several participants explicitly mentioned the need to “create organized and effective meetings.” Others suggested improving features of video conference meetings. For example, “use the raise hand feature,” “make sure that the time management is good and reduce the number of participants,” “allow more breaks,” and “prepare, structure, and take notes in advance” were suggested to manage video conference better. Some participants also suggested that a certain attitude could help to reduce “Zoom fatigue,” for example, to “approach the situation with understanding and patience.” Others, quite on the contrary, advised to “intervene if unnecessary discussions appear.” Thus, people may experience different approaches as appropriate to manage video conference meetings. Nonetheless, “... manage in a more moderating and coordinating manner” seems to be a general aspiration.

Theme 2: Technical improvements

In line with the theme “experiencing technical difficulties” participants suggested that solving such problems will aid in reducing “Zoom fatigue.” Participants suggested providing employees with adequate equipment or other technical improvements in the video platform. For example, they suggested to “buy Zoom licenses to everyone,” “buy good sound equipment,” and “fix the internet infrastructure” or to “... standardize the technical conditions for home office.” Although this theme is related to the theme “improving video conference management,” it is distinct in a way that it focuses merely on objective technical features and not so much on participants’ behavior and subjective experiences.

GENERAL DISCUSSION

Our within-person quantitative study (Study 1), conducted during the first COVID-19 breakout (March 2020), showed that meetings held through video conferences predict exhaustion (i.e. more than meetings held through other communication media). Thus, “Zoom fatigue” seems to objectively exist. However, meeting duration, meeting size, and the presence of the supervisor did not play a role in these straining consequences.

Our qualitative study (Study 2), conducted during the second COVID-19 wave (November 2020), indicated reasons for “Zoom fatigue” as experienced by employees. Specifically, participants expressed that through video conference meetings, they are reminded of what they lost (e.g. normal face-to-face communication, clearly structured work), compare their situation to working life before the pandemic, and experience technical obstacles. Moreover, participants described difficulties in reading social cues of others, while perceiving pressure to provide such cues themselves. Nonetheless, informal, friendly, and less task-related video conference meetings were described as promoting ease and relaxation.

Theoretical implications

Adding to the knowledge regarding employee well-being in the time of the COVID-19 pandemic (Zacher & Rudolph, 2020), our study has several implications for the literature in its aim to better understand the current work situation (Rigotti et al., 2020; Rudolph et al., 2020).

First, we provide further research-based evidence for “Zoom fatigue” (Bennett et al., 2021; Duong, 2020; Shockley et al., 2021). With our methodological design of Study 1, we were able to go behind the idea that meetings are exhausting per se (Luong & Rogelberg, 2005) and show that specifically video conference meetings are exhausting.

Theoretically, finding that video conferences are more exhausting than other media which are objectively less rich (e.g. phone calls, written communication) adds to current literature on subjective or humancentric views toward media (Ishii et al., 2019; see also Wang, Liu, & Parker, 2020) and points to the limitations of a more traditional “objective” media richness perspective (Daft et al., 1987; Maruping & Agarwal, 2004) that would suggest video conference meetings to be less exhausting than other media.

As in Barley et al.'s (2011) study on emails, we found evidence that a medium (i.e. video) gained symbolic meaning. More specifically, video conferences became a symbol of “what has been lost” and trigger “comparing to the good old times” but they can also represent “an island” when they enable social interactions putting people at ease (see Study 2), highlighting the need for sensitive media choices (Trevino et al., 1990).

Why is it specifically video conferences that gained this symbolic meaning is an open question. We speculate that the frequent use of video conferences and the feeling that video conferences are “the only way to communicate” during the pandemic (Study 2) might be the reasons.

Interestingly, the objective meeting characteristics that we tested in Study 1 did not shape the within-person relation between video conferences and exhaustion. Thus, our results suggest that the application of previous knowledge (e.g. virtual meetings in larger groups are undesirable; Baltes et al., 2002) to the unprecedented work situation of the pandemic requires careful consideration of the context (Wang, Liu, & Parker, 2020). Indeed, in our qualitative findings, participants indicated that “video conference conversations are exhausting because they take very long” This suggests that *perceiving* a meeting as long may be the relevant factor instead of a meeting “objectively” being long. Similarly, the presence of the supervisor did not play a significant role for “Zoom fatigue” in Study 1. However, the participants expressed a real desire for supervisors to take a more active part in video conference meetings in Study 2. This pattern of results does not necessarily entail that “objective duration,” for example, is not relevant for “Zoom fatigue.” It is more than reasonable to assume that the properties of the technology have consequences for the people using it (Wang, Liu, & Parker, 2020). In this regard, there might be other objective characteristics that affect video conference exhaustion other than the one we tested in Study 1. For example, technical problems related to video conferences (Study 2). However, our results suggest that people's reactions reflect context-sensitive interpretations of such objective circumstances. For instance, a meeting might be longer than what is perceived as necessary and thus exhausting, and technical problems might seem like a larger obstacle without managerial support.

To sum up, the novel pandemic context might have shaped how video conferences are experienced since video conferences might have gained a complex symbolic meaning (see Barley et al., 2011 for a similar approach). Video conferences, whether they are work-related or personal, might represent the unavoidable substitute of face-to-face communication during the pandemic resulting in “Zoom fatigue” and be a potential resource (see the theme ‘*Zoom as an island*’) at the same time. Methodologically, to uncover such complex interpretations, and understand the role of the context, a more open approach like the one we took in Study 2 (e.g. thematic analysis; Braun & Clarke, 2006) is fruitful.

Limitations and future directions

Our study has several limitations. First, due to using self-report measures in Study 1, a threat of common method exists. However, in several constructs (e.g. duration of the meeting) participants could provide accurate answers, reducing potential bias (Podsakoff et al., 2012). To reduce the threat regarding exhaustion, we separated the measurement points and controlled for morning exhaustion. In Study 2, we used an online survey consisting of mainly open questions to collect the qualitative data. Although this method does not allow active researcher involvement (e.g. asking follow-up questions), it has advantages. For instance, allowing full anonymity and providing a voice to participants that usually do not take part in interviews (Neville et al., 2016). Future studies about “Zoom fatigue” may try to use synchronous qualitative methods to reduce these threats.

Second, while the heterogeneity of our participants (i.e. from two countries and various occupations) is a strength contributing to ecological validity (Xanthopoulou et al., 2018), there might be a threat of lack of measurement invariance across cultures (Milfont & Fischer, 2010). However, our main outcome, exhaustion, is well-established across cultures (Reis et al., 2015). Moreover, between-person differences between the countries (e.g. number of children) cannot explain the within-person findings of Study 1. Nevertheless, although cultural differences were not the focus of our study, the interpretation of our findings across cultures should be taken with caution.

Third, although we used a within-person quantitative design with three daily measurements in Study 1, we cannot completely rule out the threat of confounds. Nonetheless, our relatively “objective” predictor (i.e. video conferences), controlling for morning exhaustion and controlling for possible other explanations (Gabriel et al., 2019), minimizes the risk. Moreover, in several additional analyses, we demonstrated the robustness of “Zoom fatigue.” Specifically, video conference meetings were more exhausting than other meetings also when excluding nonwork and face-to-face meetings from our data. Moreover, by controlling for the order of the meetings (i.e. first meeting or second meeting reported), we show that video conference meetings conducted later during the day are not more exhausting and that exhaustion does not only result from an accumulating process throughout the day (Hülshager, 2016).

Future studies could rule out competing explanations by using experimental designs. For example, a within-person experiment may manipulate the medium of communication (e.g. video conference, phone, and face-to-face). However, one should consider that existing experimental evidence does not show that video conferences are exhausting (Wegge et al., 2007). Moreover, we argued that the context of the pandemic is critical to “Zoom fatigue.”

Future studies may investigate if experiences such as those we identified to trigger “Zoom fatigue” (e.g. “comparing to the good old times”) might occur also in other contexts (e.g. an unpredictable organizational change). Such experiences may lead to the evolvement of symbolic meanings, which can lead to the emergence of other novel psychological reactions, such as “Zoom fatigue.”

Moreover, an investigation of the “bright side” of video conferences is advisable. In Study 1, we investigated the effects of work and nonwork meetings on exhaustion. Although nonwork meetings did not affect our results (see Table 2), it is possible that nonwork meetings might actually affect employees positively, by providing them support and a feeling of being meaningfully connected to others during the pandemic. Our qualitative study hints at such effects (see Theme 4). Future studies may focus on the positive consequences of nonwork meetings.

Practical implications

Our study offers some practical implications for organizations. First, the straightforward and easy-to-implement implication is the need to rethink the extent to which using video conferences is desirable (Parker, 2020). Our data showed that although a large percentage of meetings were held through video conferences, there might be well-being costs related to them. We are aware that video conference platforms allow participants some features necessary to reach their goals (e.g. sharing screens); however, this does not mean that meetings' media should be chosen "almost at random" (Trevino et al., 1990, p. 79) nor that all meetings should be "100% held through video conferences" as described by one of our participants (Study 2). Our findings provide empirical support for the suggestion to "use your phone occasionally" (Parker, 2020, para. 2).

In addition, organizations should be aware not to adopt practices based on untested suggestions (Rudolph & Zacher, 2020) or to generalize knowledge from "before-the-pandemic" (e.g. Baltes et al., 2002) uncritically. For instance, according to our findings (Study 1), shortening video conference meetings might not benefit employee well-being.

However, managing the time (see Study 2), for instance, by defining shares of talking time for each participant, would most likely be appreciated by employees and might lead to reduced "Zoom fatigue." Thus, we advise organizations to put efforts into making managerial decisions regarding the practical use of communication media that take employees' context-specific needs into account (Wang, Liu, & Parker, 2020).

Finally, Study 2 demonstrates that employees desire better management and structure within video conference meetings. This finding is in line with the meeting literature (Allen & Rogelberg, 2013; Cohen et al., 2011; Leach et al., 2009) and initial findings regarding behaviors in video conference meetings (Bennett et al., 2020; Shockley et al., 2021). Thus, we suggest organizations to put efforts in the management of video conference meetings also in nonpandemic situations. Especially in times of crisis (e.g. undesired organizational change), leaders are responsible to show initiative. Based on our findings, leaders that moderate and structure video conference meetings may help their employees to prevent exhaustion. What is more, better meeting management could allow specific times for voluntary informal meetings (e.g. coffee breaks) that might contribute to employee well-being.

CONCLUSION

To advance the theoretical and practical understanding regarding "Zoom fatigue" our study provides a thorough investigation of this emerging phenomenon during the unique time of the COVID-19 pandemic. Our results empirically support "Zoom fatigue" and suggest that subjective experiences during the pandemic might have led to the emergence of this phenomenon, opening avenues for research and practice.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

ETHICS STATEMENT

The study was conducted in accordance with the ethical standards of the respective countries.

DATA AVAILABILITY STATEMENT

The participants did not provide their consent to make the data publicly available. Data are available from the corresponding author on request.

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ENDNOTES

- ¹ To account for the fact that face-to-face meetings are inherently different from meetings held through other communication media, we conducted the analysis also excluding the face-to-face meetings; results of the hypotheses tests remained unchanged in terms of significance.
- ² We deleted three outlier observations in which the meeting duration was 5 h or above.
- ³ We deleted two outlier observations, in which participants reported that 300 and 1000 people, respectively, took part in the meeting.
- ⁴ A reduced dataset with work meetings only, showed similar results in terms of the significance of the hypotheses test.
- ⁵ To account for skewed data patterns, we conducted the analysis with log-transformed (Hammouri et al., 2020) variables of “meeting duration” and “meeting size”; results of the hypotheses tests remained unchanged.

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APPENDIX

STUDY 2: SURVEY

Introduction text

We are interested to explore how employees deal with the new work arrangements due to the COVID-19 pandemic (e.g. home office and online meetings), focusing on video conferences. In the following, we will ask you to answer some open questions and fill in some demographic details. The survey is anonymous.

General questions regarding work during the pandemic

Do you usually work from home?

Due to the COVID-19 pandemic, many employees work from home (partially or fully). How many days a week do you work from home (generally during the pandemic)?

When did you start working in this arrangement?

How are your daily life/work life/physical activity/eating behaviors affected by the pandemic? (1—not at all to 5—very much):

General questions regarding video conference meetings

In the last month, how often did you take part in video conference meetings?

For many people, video conferences were uncommon before the pandemic. Do you have more video conferences during the pandemic than before?

Is it necessary and/or expected (e.g. by your employer) for you to use video calls to perform your job? Explain how.

During the pandemic, how frequently do you communicate with your colleagues/customers (including students, patients, or people outside of the organization) through video conference meetings?

Questions regarding experiences in video conference meetings

Please describe a typical video call situation at your work. For example, a team meeting or customer service (also for freelancers). Give the situations a short title (e.g. “weekly team meeting” and “meeting with customers”). Describe how long such a typical videoconference meeting lasts, who is present, what is the “psychological atmosphere” (e.g. pleasant, formal, and tensed) and what it is generally about. Address many aspects of the situation. The goal is that we can understand the situation well through your description.

Thinking of the situations that you just described, how exhausting are these meetings usually? (1—not at all to 5—very much).

If possible, give an example (or several examples) from your personal experiences to other work-related video conferences that are exhausting for you (e.g. meeting customers). Please give every situation a short title.

If possible, give an example (or several examples) from your personal experiences to other work-related video conferences that are relaxing for you (e.g. virtual break with colleagues). Please give every situation a short title.

Now think about the exhausting video conferences you mentioned and explain in as much detail as possible why these situations are exhausting for you.

If you generally experience video conferences as not exhausting (or even as pleasant, vitalizing); please describe instead why video conferences are not exhausting for you.

Now think again about the exhausting video conferences and explain what you/your supervisor/your colleagues/your organization could do that would make them less exhausting for you.