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A labour perspective on videoconferencing fatigue: Critical review and reframing

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ABSTRACT

Videoconferencing fatigue or 'Zoom fatigue' has emerged as a prominent phenomenon due in part to the rapid adoption of videoconferencing during and after the COVID-19 pandemic. This critical literature review focuses on the nature of the labour involved in videoconferencing. Using a qualitative, grounded approach, insights from 147 papers on videoconferencing fatigue were coded according to five types of labour: interpretive labour, performative embodied labour, performative configuration labour, intensifying labour, and alienating labour. These insights can guide practitioners in making strategic decisions about the use of videoconferencing and provide a foundation for future research.

Introduction

Videoconferencing fatigue, referring to the feeling of exhaustion associated with participating in videoconferencing sessions (Kuhn, 2022), has emerged as a prominent Information Systems (IS) phenomenon following the rapid adoption of videoconferencing during and after the COVID-19 pandemic (Hacker et al., 2020; Waizenegger et al., 2020). Videoconferencing fatigue may also be known as *Zoom Fatigue* (B. J. Li et al., 2022b) or *CMC [Computer-Mediated Communication] Exhaustion* (Nadler, 2020). While videoconferencing fatigue bears some resemblance to related phenomena (e.g., visual fatigue, technostress, and overall problems with workplace meetings), it is a sufficiently distinct phenomenon such that the prior literature on those related phenomena does not provide adequate understanding of videoconferencing fatigue (see Table 1).

Despite being a relatively new phenomenon, there are already some previous literature reviews of videoconferencing fatigue. However, these have tended to deconstruct videoconferencing fatigue into its underlying problematic aspects (see Table 2). In doing so, they implicitly assume that these problematic aspects ought to be reduced or eliminated. Inspired by the concept of the 'problematizing review' (Alvesson and Sandberg, 2020) – which urges "researchers to imagine how to rethink existing literature in ways that generate new and 'better' ways of thinking about specific phenomena" (Alvesson and Sandberg, 2020, p. 1290) – we question the prevailing narrative of problematic aspects and their reduction/elimination. Likewise inspired by the critique of digital solutionism (Rowe et al., 2020), we engage in such problematizing by being particularly cautious of any overemphasis on technological solutions to those problematic aspects of videoconferencing, promising as they may be; in line with the sociotechnical axis of cohesion (Sarker et al., 2019), we recognise the need to attend to the social aspects of videoconferencing fatigue. Further inspired by previous work in IS research on labour and work exhaustion (Greenbaum, 1996; Greenhill and Fletcher, 2013; Rutner and Riemenschneider, 2015), we

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attend to the social aspects of videoconferencing fatigue by considering the possibility that videoconferencing fatigue occurs because there is a great deal of work and effort – i.e., labour – involved.

Taking this labour perspective thus opens up new ways of thinking about strategies to manage videoconferencing fatigue. Just as with other kinds of ‘costs’ incurred when doing business, the labour underlying videoconferencing fatigue is a cost that should not start with an assumption of reduction or elimination – just as a business does not focus exclusively on reducing costs at the expense of all else. In sum, the laboriousness of videoconferencing is fatiguing, but not inherently problematic – just as the laboriousness of other kinds of work is fatiguing, but also not inherently problematic. Potentially problematic, however, are the configuration of, constitution of, conditions of, and justification for such labour (Greenbaum, 1996; Greenhill and Fletcher, 2013; Rutner and Riemenschneider, 2015). As we elaborate in the “Background” section below, a labour perspective enables us to construct a more nuanced view of videoconferencing fatigue that—as with other ‘costs’ of doing business—should not be exclusively about elimination or reduction, but importantly also about sensible and productive handling of such costs with due consideration for benefits, meanings, and purposes.

The **research question** addressed by this paper is, therefore: *What are the characteristics of the labour involved in videoconferencing?*

We answer this research question with a critical literature review on videoconferencing fatigue. This literature review is critical in two ways: in the sense of the genre of “critical literature review,” problematising the absence of, and advocating in favour of, a perspective not yet prominent in the literature (Paré et al., 2015); and in the sense of the “critical research paradigm”—insight, critique, and transformative redefinition (Cecez-Kecmanovic, 2011)—in particular drawing attention to the perspective of those undertaking labour, a central concern in the intellectual tradition of critical theory (Bronner, 2011). We identify five types of labour undertaken involved in videoconferencing, which inform the development of a “three-dimensional conceptual framework of videoconferencing fatigue” that we present in this paper. This conceptual framework forms the basis for future research frontiers for scholars to investigate. We also suggest how the framework can inform practitioners’ strategic decision-making about the actual use of videoconferencing in their organisations.

Background

Videoconferencing fatigue and related phenomena

At first glance, videoconferencing fatigue may bear some resemblance to related phenomena such as visual fatigue, technostress,

Table 1

Phenomena related to videoconferencing fatigue.

Potentially Related Phenomenon	Apparent Relevance to Videoconferencing Fatigue	Limitations
<i>Visual fatigue</i> (Shen et al., 2019) and <i>technostress</i> (Ayyagari et al., 2011)	Visual fatigue refers to physiological tiredness of the eyes due to prolonged close-up visual tasks (Shen et al., 2019). Visual fatigue may therefore be relevant to videoconferencing fatigue since videoconferencing involves visually-strenuous use of computer technology (Fauville et al., 2021; Vidolov, 2022). Technostress refers to inability to deal with information and communication technologies in a healthy manner (Ayyagari et al., 2011). Technostress may therefore be relevant to videoconferencing fatigue since videoconferencing is an example of information and communication technologies and videoconferencing fatigue appears to imply an unhealthy impact.	These related phenomena provide a helpful starting point of reference, but do not adequately explain videoconferencing fatigue, which appears to be fatiguing in a different manner compared to other kinds of visually strenuous computer-mediated communication (CMC) activities such as participating in online games (Von Thienen et al., 2021) and social media (Nadler, 2020)
<i>Pandemic fatigue</i> (Reicher and Drury, 2021)	Pandemic fatigue refers to frustration with measures taken to protect public health during the COVID-19 pandemic, which includes the rapid adoption of videoconferencing (Chaparro et al., 2022; Döring et al., 2022).	This related phenomenon refers specifically to reduced vigilance towards public health restrictions, and thus does not entirely explain videoconferencing fatigue in settings where videoconferencing is used as a substitute for in-person activities even after public health restrictions have been lifted (Müller and Wittmer, 2023; Šmite et al., 2023)
<i>Counterproductive meeting behaviours</i> (Lehmann-Willenbrock et al., 2016) and overall problems with <i>workplace meetings</i> (Allen et al., 2012; Mroz et al., 2018)	These phenomena refer to the various frustrations with workplace meetings, and videoconferencing is often used for the purpose of hosting such workplace meetings (Karl et al., 2021).	Practitioner recommendations focus on reducing the total number of meetings (Allen et al., 2012) or enhancing the quality of already-scheduled meetings (Lehmann-Willenbrock et al., 2016; Mroz et al., 2018). There is no consideration of the unique characteristics of videoconferencing as the medium by which the meeting takes place. Also, not all videoconferencing sessions are workplace meetings, e.g., online learning sessions (Toney et al., 2021), telehealth sessions (Shklarski et al., 2021) and church services (Huygens, 2021).

and general problems with workplace meetings. We therefore first turn our attention to whether it is possible to explain videoconferencing fatigue simply as an instantiation of one of these related phenomena. These related phenomena are outlined in Table 1 and discussed thereafter.

As outlined in Table 1, these various related phenomena partially illuminate ‘videoconferencing fatigue,’ but the existing understanding of these related phenomena cannot fully explain it. Firstly, *visual fatigue* (Shen et al., 2019) and *technostress* (Ayyagari et al., 2011) provide a helpful starting point, given that videoconferencing involves visually-strenuous use of computer technology (Fauville et al., 2021; Vidolov, 2022). However, videoconferencing fatigue appears to be a very different kind of experience when compared with other physiologically intensive activities like participating in online games (Von Thienen et al., 2021) and using social media (Nadler, 2020). Meanwhile, *pandemic fatigue* (Reicher and Drury, 2021) appears to capture some of the essence of ‘videoconferencing fatigue,’ given the rapid adoption of videoconferencing during the COVID-19 pandemic (Chaparro et al., 2022; Döring et al., 2022), but it also cannot account for the continued experience of ‘videoconferencing fatigue’ after the easing of COVID-19 public health restrictions. Finally, *counterproductive meeting behaviours* (Lehmann-Willenbrock et al., 2016) and *overall problems with workplace meetings* (Allen et al., 2012; Mroz et al., 2018) appear to resonate somewhat with the experience of ‘videoconferencing fatigue’ as it manifests during videoconference calls taking place for the purpose of workplace meetings (Karl et al., 2021), but they do not account for the unique characteristics of videoconferencing as the medium by which the meeting takes place, and also do not account for ‘videoconferencing fatigue’ that occurs outside of the workplace.

Videoconferencing fatigue is, therefore, a distinct phenomenon that must be understood on its own terms. Other researchers who have come to similar conclusions have embarked on previous literature reviews of videoconferencing fatigue, which are outlined next.

Towards a labour perspective

Previous literature reviews of videoconferencing fatigue (Chaparro et al., 2022; Döring et al., 2022; Hove and Watson, 2022; Li and Yee, 2023; Riedl, 2021) have tended towards deconstructing videoconferencing fatigue into its underlying problematic aspects, as outlined in Table 2.

These previous literature reviews thus take an implied stance that the problematic aspects are undesirable and that future research could work towards their reduction or elimination. Riedl (2021), for example, writes: “it is clear that practitioners should actively prevent, or at least mitigate, the possible negative stress-related consequences” (Riedl, 2021, p. 168). The language used to describe the problematic aspects of videoconferencing fatigue is explicitly adversarial; Li and Yee (2023), for example, write of “tackling” them: “Employers, managers and healthcare professionals ought to take note of the different ways in which VF can manifest ... there are several strategies in which interested stakeholders can tackle VF [videoconferencing fatigue]” (Li and Yee, 2023, p. 814). Hove and Watson (2022) “survey emerging XR [mixed reality] solutions to video conferencing’s limitations” (Hove and Watson, 2022, p. 283). Döring et al. (2022) similarly write of “countermeasures” to “fight” videoconferencing fatigue: “countermeasures to fight increased

Table 2
Problematic aspects of videoconferencing.

Literature Review Paper on Videoconferencing Fatigue	Terminology	Papers Reviewed	Problematic Aspects of Videoconferencing
Riedl (2021)	‘Root Causes’	45	<ul style="list-style-type: none"> • Asynchronicity of Communication • Lack of Body Language • Lack of Eye Contact • Self-Awareness • Unnatural Interaction with Multiple Faces • Multitasking Opportunities
Li and Yee (2023)	‘Antecedents’	14	<ul style="list-style-type: none"> • Psychological antecedents • Social antecedents • Technical antecedents • Chronemic antecedents • Productivity antecedents
Döring et al. (2022)	‘Factors’	52	<ul style="list-style-type: none"> • Personal factors • Organisational factors • Technological factors • Environmental factors
Chaparro et al. (2022)	‘Feelings’	41	<ul style="list-style-type: none"> • Restlessness • Burnout • Stress • Boredom
Hove and Watson (2022)	‘Shortcomings’	65	<ul style="list-style-type: none"> • Delay • Gaze • Objects of discussion • Nonverbal cues
<i>This paper</i>	‘Labour’	147	<ul style="list-style-type: none"> • Interpretive Labour • Performative Embodied Labour • Performative Configuration Labour • Intensifying Labour • Alienating Labour

exhaustion related to VC are available” (Döring et al., 2022, p. 13). The overall view, we suggest, is an almost pathologising one, treating videoconferencing fatigue like an occupational health hazard: “in view of the gradual growth of scientific knowledge on Zoom fatigue, it is pertinent to evaluate the scientific activity on this topic in order to systematize the knowledge generated so far, and to make it useful for decision making in groups such as occupational health professionals, who have the responsibility to identify the causes and possible occupational risks” (Chaparro et al., 2022, p. 102).

This prevailing narrative of the problematic aspects underlying videoconferencing fatigue, implying problems to develop solutions for, is productive for some future developments while limiting for others. On the one hand, the prevailing narrative is constructive from a broader economic-technical rationalist perspective in society (Cecez-Kecmanovic et al., 2008), aligning with the trajectory of contemporary industry and commerce. For example, to address the problem of eccentric gaze (Kushner, 2021), new graphics processing technology offers to “deepfake your eyes to make you look at the camera” (Clark, 2023, p. 1) to reduce the fatiguing effort of actually maintaining eye contact during videoconferencing. Such innovations are intriguing and promising.

However, Döring et al. (2022) do prominently acknowledge at the end of their literature review:

“VC fatigue needs to be weighed against several advantages of VC, particularly in situations when VC sessions [relieve] us from daily stresses and strains (e.g., avoiding commute stress and rush-hour stress when working from home). Most likely, we are heading to a hybrid future with daily face-to-face and videoconference meetings that both should spare us from fatigue but save or even fuel our physical and mental energy.” (Döring et al., 2022, p. 15)

Table 3
Overview of the literature review method.

Iteration	Search scope	Screening criteria and total number of papers included	Focus of analysis	Product of synthesis
1	<ul style="list-style-type: none"> Database search Scope: 51 IS journals and 12 IS conferences Search terms: “zoom fatigue” 	<ul style="list-style-type: none"> Focus on Zoom fatigue (titles and abstracts) 18 papers included in total 	Exploratory reading	Initial understanding of the literature
2	<ul style="list-style-type: none"> Database search Scope: Scopus, Web of Science, ERIC, PsycInfo, PubMed, AISEL, DBLP Search terms: “zoom fatigue” 	<ul style="list-style-type: none"> Focus on Zoom fatigue (titles and abstracts) 110 papers included in total 	Deep reading of fulltexts	List of alternative terms describing the phenomenon
3	<ul style="list-style-type: none"> Database search Scope: Scopus, Web of Science, ERIC, PsycInfo, PubMed, AISEL, DBLP Search terms: (“zoom fatigue” OR “videoconferencing fatigue” OR “video conferencing fatigue” OR “videoconference fatigue” OR “video conference fatigue” OR “CMC exhaustion”) 	<ul style="list-style-type: none"> Focus on Zoom fatigue (titles and abstracts) English, peer-reviewed, accessible, conceptual and empirical, studied videoconferencing fatigue (fulltexts) 117 papers included in total 	Structured analysis of key themes	Preliminary analysis of literature, hinting at a labour perspective
4	<ul style="list-style-type: none"> Database search Scope: Scopus, Web of Science, ERIC, PsycInfo, PubMed, AISEL, DBLP Search terms: (“zoom fatigue” OR “videoconferencing fatigue” OR “video conferencing fatigue” OR “videoconference fatigue” OR “video conference fatigue” OR “CMC exhaustion”) Exhaustive backward search based on existing literature reviews Selective backward search based on most frequently cited articles 	<ul style="list-style-type: none"> Focus on Zoom fatigue (titles and abstracts) English, peer-reviewed, accessible, conceptual and empirical, studied videoconferencing fatigue (fulltexts) 130 papers included in total 	Critical analysis and qualitative coding of the literature drawing on techniques from grounded theory as a method for literature review	Qualitative data structure developing five characteristics of labour involved in videoconferencing: <ul style="list-style-type: none"> interpretative labour performative embodied labour performative configuration labour intensifying labour alienating labour
5	<ul style="list-style-type: none"> Database search Scope: Scopus, Web of Science, ERIC, PsycInfo, PubMed, AISEL, DBLP Search terms: (“zoom fatigue” OR “teams fatigue” OR “google meet fatigue” OR “skype fatigue” OR “webex fatigue” OR “videoconferencing fatigue” OR “video conferencing fatigue” OR “videoconference fatigue” OR “video conference fatigue” OR “CMC exhaustion”) Exhaustive backward search based on existing literature reviews Selective backward search based on most frequently cited articles 	<ul style="list-style-type: none"> Focus on Zoom fatigue (titles and abstracts) English, peer-reviewed, accessible, conceptual and empirical, studied videoconferencing fatigue (fulltexts) 147 papers included in total 	Critical analysis and qualitative coding of the literature drawing on techniques from grounded theory as a method for literature review	Three-dimensional conceptual framework of videoconferencing fatigue involving <i>types of labour</i> , hypothesised <i>use cases</i> of videoconferencing, and <i>contexts</i> of videoconferencing.

As explicated in Table 1, videoconferencing fatigue is not limited to—for instance—workplace meetings. Videoconferencing takes place in a variety of settings, ranging from virtual classrooms (Ebner and Greenberg, 2020; Toney et al., 2021) and psychological therapy sessions (Merchant, 2023; Shklariski et al., 2021) to entertainment experiences (Rot et al., 2022), research interviews (Heiselberg and Stepińska, 2022), arbitration hearings (Moreira and Zhang, 2023), and even religious gatherings (O'Lynn, 2022). These all represent different kinds of organisations, strategies, and intentions, all converged on the shared technological foundation of videoconferencing. This diversity undermines the viability of overly simplistic solutions such as merely reducing how many calls we have, a critique echoed in public discourse; we risk deleting both 'good' and 'bad' calls (Oczkowski, 2023) rather than taking a more strategic approach.

We therefore take a labour perspective to consider videoconferencing fatigue not as a problem to 'tackle' or 'fight' per se, but as a reasonably-anticipated outcome of doing work, of *labouring*. Our literature review, undertaken from this perspective, is anticipated to help us construct a more nuanced view of videoconferencing fatigue that—just as with other kinds of 'costs' incurred when doing business—is less about elimination or reduction but more about whether particular assemblages of costs, benefits, meanings, and purposes are sensible and productive.

Literature review method

The goal of our review of the literature on videoconferencing fatigue is to provide an understanding of a new phenomenon (Rowe, 2014). With our objective of critically assessing the emerging literature and developing insights for future research on videoconferencing fatigue, we chose a critical review approach (Paré et al., 2015). We followed guidelines from the methodological literature on critical reviews (Gough et al., 2012; Kirkevold, 1997) and took an interpretivist, hermeneutic approach to searching, screening, and analysing the literature (Böll and Cecez-Kecmanovic, 2014). In line with this hermeneutic approach to literature review (Böll and Cecez-Kecmanovic, 2014), we performed multiple iterations of literature search, screening, and analysis. An overview of these iterations is provided in Table 3.

Literature search and screening

In the first iteration, we began with an exploratory database search (Gusenbauer and Haddaway, 2021) using the search term "zoom fatigue" against 51 IS journals and 12 IS conferences, through <https://www.litbaskets.io> (Boell and Wang, 2019) and the AIS eLibrary, to gain an initial understanding of the breadth of the literature. We read the records of articles' titles and abstracts, excluding those that were clearly not relevant to our search; we then briefly inspected the full texts of the remaining articles. Here, we noted the interdisciplinary nature of the zoom fatigue phenomenon.

In the second iteration, we expanded our search to other disciplines by searching the general-purpose databases Scopus and Web of Science, as well as the disciplinary databases ERIC, PsycINFO, PubMed, and DBLP, in order to develop a broader interdisciplinary perspective. We repeated the screening steps of the first iteration and, based on increasingly deeper reading of the literature, we identified a set of alternative terms used to describe the phenomenon.

In the third iteration, we broadened our keyword search to ("zoom fatigue" OR "videoconferencing fatigue" OR "video conferencing fatigue" OR "videoconference fatigue" OR "video conference fatigue" OR "CMC exhaustion"). After another iteration of pre-screening, we retrieved article fulltexts and excluded articles that were not in English, not peer-reviewed, or otherwise inaccessible. Our critical review followed a representative search strategy (Paré et al., 2015). Thus, we included all empirical and conceptual papers that studied the phenomenon of videoconferencing fatigue or described instances of it. During this iteration, we started a preliminary analysis of the literature, from which we began to identify the opportunity to, and potential benefits of, analysing the literature from a labour perspective.

In the fourth iteration, we compared our sample with those of prior literature review articles on videoconferencing fatigue and added any references to our sample that were not picked up in our keyword-based database search. A backward search for the most frequently cited articles based on the reference sections of all included papers yielded an additional 13 papers.

We conducted a fifth iteration based on reviewer feedback during the revision process. In this iteration, we updated the search to include all papers from 2023 and anything that was published up until 18 March 2024. We also included additional keywords to our set that cover other videoconferencing products such as "Skype", "Teams", "Webex", and "Google Meet." As our sample consists of references almost exclusively published between 2021–2024, we did not conduct a forward search, which would have required more time for citations to accumulate. After screening, we arrived at our final sample of 147 articles included in this review. Details of the sample are presented in the charts in Appendix A, and the full list of references is reported in Appendix B.

At this point, we may critically examine whether we have sufficiently managed concerns about the quality or rigour of the papers that will inform our analysis. Following our hermeneutic approach, we first acknowledge that "preunderstanding, preconceptions, tradition and biases involved in all dialogical encounters among readers and texts ... cannot be avoided – being inherent to all understanding – they can be reflected upon and thereby rendered more open for the unknown, unexpected and strange" (Böll and Cecez-Kecmanovic, 2014, p. 263). We also draw attention to the selectivity of our corpus, having excluded (since the third iteration, as outlined above) all papers that have not been peer-reviewed; and we further draw attention to the nature of our analysis (outlined below), which is not an exercise in assessing the robustness of evidence for specific hypothetico-deductive or causal claims, but instead endeavours towards critical scrutiny and insight generation (Alvesson and Sandberg, 2020).

Literature analysis and coding

Following our hermeneutic approach, we analysed the literature throughout the iterative searching and screening steps. In the interest of clarity, we explain the process of analysis sequentially and with a focus on our analysis in the fourth and fifth iterations. We have drawn on techniques from grounded theory as a method for literature review (Wolfswinkel et al., 2013). Specifically, we have structured our approach to grounded theory based on the methodology proposed by Gioia et al. (2013), organising our coding according to first-order concepts, second-order themes, and aggregate dimensions.

In order to ensure that our paper makes a novel contribution, we began by differentiating between literature reviews of videoconferencing ($n = 5$) and all other types of papers ($n = 142$). We analysed the 5 literature reviews of videoconferencing according to the overall perspective on videoconferencing as well as the characteristics of that perspective, as has already been outlined in Table 2 above. We then proceeded with first-order analysis of the remaining 142 papers, based on open coding, of all the other papers. Throughout this step, we coded portions of each paper, defining first-order concepts with descriptive labels closely related to the original meaning in the literature. In order to ensure coverage across a diverse range of research genres within our corpus, we coded any text within each paper that could be relevant to the research question, with no restrictions on whether or not the text pertained to a formally recognised research model construct, a direct quote from any qualitative empirical material, or scholarly commentary in the case of conceptual papers. We argue that this approach is suitable because of the open-ended nature of the research question and the overall critical orientation of this literature review, requiring us to recognise patterns within a diverse range of research genres and discourse and thus “reimagining our current ways of thinking about them” (Alvesson and Sandberg, 2020, p. 1297); this was not an exercise in assessing the robustness of evidence for specific hypothetico-deductive or causal claims. (Examples of quotes from this coding process are provided in the “Literature Review Findings”; additionally, a selection of illustrative quotes is also incorporated into the codebook in Table 4.) Each paper’s codes and corresponding quotes were organised in a notes file. We also coded the primary context of videoconferencing to which the paper and thus its coded quotes relate, for example, educational setting (teaching/learning/classroom), healthcare, or regular workplace meetings. By “primary,” we mean that we identify the predominant or most fundamentally relevant context, in other words, treating these as archetypal fuzzy sets rather than mutually exclusive, collectively exhaustive categories. Where there is no clear primary context of videoconferencing at all (for example, a study about videoconferencing fatigue in general or as generally perceived by individuals), we assigned “general-purpose” as the listed primary context of videoconferencing.

We then synthesised deeper patterns in the literature by grouping first-order concepts across papers into second-order themes (Gioia et al., 2013). For example, we grouped the first-order codes “Awkward asynchronous turn-taking due to latency”, “Inhibited spontaneity, for which breakout rooms are a poor substitute”, “Inherent ‘flatness’ of two-dimensional camera video”, and “Intensive use of flat light-emitting screen displays” under the second-order theme “Unnaturalness of the interpretive efforts”. Once this level of aggregation was completed, we then enumerated each of the first-order concepts according to the second-order theme into which it is grouped and according to its sequence in that theme (1A, 1B, 1C ... 14C, 14D), allowing us to refer precisely to each first-order concept. Throughout the remainder of this paper, we will refer to these identifiers when referring to first-order concepts.

Following the guidelines provided by Wolfswinkel et al. (2013), we constructed a concept matrix matching each paper to its primary context of videoconferencing and the specific first-order concepts that have been coded to each paper: this concept matrix is reproduced in Appendix B. Although our analysis is in essence qualitative, we nonetheless also computed descriptive statistics of the primary context of videoconferencing as reproduced in Appendix C. The largest to smallest categories are: *general-purpose* (52 papers); *educational (teaching/learning/classroom)* context (52 papers); *workplace meetings* (22 papers); *healthcare* (6 papers); *social gatherings, religious gatherings, conferences and events* (6 papers); *scientific and scholarly research* (4 papers); *virtual job interviews* (2 papers); *creative arts* (2 papers); and *legal/courtroom* (1 paper). For completeness, we individually noted our classification of each paper into ‘empirical’ or ‘conceptual’ and our records of each paper’s research design in our concept matrix in Appendix B. We specifically draw attention to the presence of empirical support for each and every first-order concept as demonstrated in Appendix E. Also, for completeness, we provide a tally of how many papers tagged against each primary context of videoconferencing contribute to each of the first-order concepts, in Appendix D.

We then grouped the second-order themes to form five aggregate dimensions that captured the key theoretical building blocks of our labour-oriented analysis of videoconferencing fatigue. In line with the position that grounded theory is not about a ‘blank slate’ form of analysis, we allowed for codes and especially the aggregate dimensions to refer to concepts from relevant existing theories in IS and beyond – such as those from the literature on technostress (Tarafdar et al., 2014, 2007), technology acceptance (Davis, 1989), panopticon (Foucault, 1977; Willcocks, 2004; Zuboff, 1988), heautopticon (Moya and Pallud, 2020), and of course work and labour (Bryman, 2004; Goffman, 1956; Graeber, 2015; Jarrahi and Nelson, 2018; Klein and Watson-Manheim, 2021; Michaelson et al., 2013; Richardson, 2018; Seeman, 1959). Based on the synthesis of our sample and increased engagement with the theoretical literature, we developed an alternative perspective that opens up a new perspective on videoconferencing fatigue based on five types of labour involved in videoconferencing. The data structure depicted in Fig. 1 traces the analytical progress from first-order concepts to ultimately the five types of labour. Here, we also drew on our coding of the *use cases of videoconferencing* to cross-tabulate them with the types of labour to identify the most common configurations. We later build on this labour-oriented analysis to identify opportunities for future research.

Literature review findings

To help readers navigate the findings from our literature review on videoconferencing fatigue, we begin with a summarization. In

Table 4
Codebook—definitions of second-order themes and aggregate dimensions.^a

Code	Level of coding	Supporting papers	Definition and Illustrative Quote	First-order concepts
Interpretive Labour	Aggregate dimension	11 conceptual, 34 empirical	The labour involved in attentively understanding and making sense of communication.	1A, 1B ... 3B, 3C
Interpretation based on inadequate information	Second-order theme	7 conceptual, 17 empirical	The interpretative labour of trying to develop an understanding when there is not enough information being received on the videoconferencing call in terms of verbal backchannels, eye contact, clarity (fidelity) of the signal; all of this has been observed to have real impacts. Illustrative quote: “These words always echoed in my ears, said a female participant: ‘I reminded colleagues to mute their mics, switch-off their cameras. I could not hear you, you are breaking up. What are you saying, just repeat what you are saying’. In most of the interview sessions, these sentiments were posted or expressed. Most participants posted their disappointment in ‘poor presentations, poor sound, and high noise levels were disturbing and break their concentration’. One of the participants made the following statement: ‘I hate to sit in meetings whereby poor quality presentations or background noise influence my concentration’.” (Amponsah et al., 2022, p. 8).	1A, 1B, 1C, 1D
Cognitive load of the interpretive efforts	Second-order theme	4 conceptual, 14 empirical	The interpretative labour of thinking through various kinds of information including non-verbal cues, signals to maintain situational awareness, and potentially even multitasking during the call. Illustrative quote: “Not being able to read their client’s full body language required therapists to compensate by paying especially close attention to what was in their view, such as observing eye contact or shifting in one’s seat” (Shklarski et al., 2021, p. 6).	2A, 2B, 2C
Unnaturalness of the interpretive efforts	Second-order theme	6 conceptual, 9 empirical	The interpretive labour of trying to make sense of communication even though it is being conveyed in a manner that is unnatural in terms of turn-taking, spontaneity, and intensive use of flat light-emitting screen displays. Illustrative quote: “In this study we presented the effect of network latency and jitter on visual task performance to assess the impact of network conditions on understanding non-verbal cues over video conferencing. These cues are important to collaboration in face-to-face communication and available in video but potentially disrupted by latency and jitter. Our observations suggest that prominent effects of network latency on participants arise from the mental workload and frustration during visual tasks as indicated by the NASA-TLX scores.” (Garg et al., 2022, p. 6).	3A, 3B, 3C
Performative Embodied Labour	Aggregate dimension	8 conceptual, 46 empirical	The labour involved in using one’s physical body to project a particular appearance for videoconferencing purposes	4A, 4B ... 6B, 6C
Performing an exaggerated stance	Second-order theme	2 conceptual, 11 empirical	The performative embodied labour of amplifying gestures and vocalisation, directing one’s gaze and conveying a particular personality. Illustrative quote: “Participants’ comments offered important details about each of these strategies for dealing with potential context collapse when using video. The following participant describes how they actively project cheeriness by “smiling more” and making an effort to “sound more enthusiastic.” They also note that this active strategy is needed to counteract challenges arising from others’ disengagement.” (Taber et al., 2022, p. 467).	4A, 4B, 4C
Performing in the presence of the Panopticon	Second-order theme	6 conceptual, 32 empirical	The performative embodied labour of conducting oneself under conditions where one is always being potentially observed by others, leading to a particular form of gaze, restricted mobility and motility, and impacts on one’s self-image. Illustrative quote: “This research also noted that among the five nonverbal factors, the sense of being physically trapped is the most significant predictor of Zoom fatigue.” (Moralista et al., 2022, p. 181).	5A, 5B, 5C
Performing in the presence of the Heautopticon	Second-order theme	6 conceptual, 14 empirical	The performative embodied labour of conducting oneself under conditions where one is always self-monitoring, as a distorted yet seemingly necessarily part of the overall performance, with a detrimental impact on being able to pay attention to other matters. Illustrative quote: “As this has been also sometimes sensed by others, participants engulfed in their own image would perform over-the-top reactions to create an impression of listening. For such reasons, some respondents also switched off their self-view features to later appreciate its role for self-presentation: It definitely bugged me and after reading about it I switched off my self-view window. Then after the meeting I	6A, 6B, 6C

(continued on next page)

Table 4 (continued)

Code	Level of coding	Supporting papers	Definition and Illustrative Quote	First-order concepts
Performative Configuration Labour	Aggregate dimension	10 conceptual, 20 empirical	<i>realized that I had a piece of spinach between my teeth which could've been avoided had I not switched my self-view window. (R11)" (Vidolov, 2022, p. 12).</i> The labour involved in setting up one's technologies (hardware and software) to project a particular appearance for videoconferencing purposes	7A, 7B ... 9A, 9B
Basic setup of the performance	Second-order theme	3 conceptual, 8 empirical	The performative configuration labour minimally necessary for participating in videoconferencing, requiring one to navigate complex technical matters and related non-technical issues like privacy complications. Illustrative quote: "Our analysis reveals that WCS lacked the features required to meet users' needs and that people lacked the skills to set up and configure WCS. Questions and advice for getting started with web-conferencing and regarding features like configuring security settings (T45) and recording sessions (41) show how users mitigated this constraint by seeking support" (Hacker et al., 2020, p. 571).	7A, 7B
Optimising the quality of the performance	Second-order theme	4 conceptual, 12 empirical	The performative configuration labour required to improve the audio and video quality, set the right balance of revealing or concealing parts of one's videoconferencing environment, and engaging with various related techniques including those arising from the emerging use of artificial intelligence. Illustrative quote: "Interestingly, increased appearance comparisons were associated with using the touch-up feature, adjusting camera angles and lighting, using gallery view, and spending more time looking at oneself while video chatting. We also found that more time spent video chatting for social purposes was linked to higher levels of appearance comparisons." (Harriger and Pfund, 2022, p. 930).	8A, 8B, 8C, 8D
Performing across concurrent streams	Second-order theme	3 conceptual, 7 empirical	The performative configuration labour involved in projecting one's presence not just in audio and video but also other concurrent streams involving supporting materials, activities, text chat, emojis, etc. Illustrative quote: "Most of the respondents also appreciated the chat function for typing questions or comments or using the "clapping" emoji as a form of support and appreciation in calls with multiple participants. These features, however, were used to fake certain attitudes: [...] sometimes I just can't force myself to say something when some of the crappy colleagues is being praised mostly due to self-promotional, lip service. I just then use an emoji." (Vidolov, 2022, p. 1795).	9A, 9B
Intensifying Labour	Aggregate dimension	11 conceptual, 36 empirical	The labour involved in dealing with various experiences of high intensity when engaging in videoconferencing.	10A, 10B, ... 12A, 12B
Videoconferencing workload within one's overall role	Second-order theme	8 conceptual, 21 empirical	The intensifying labour of larger and larger workloads videoconferencing in terms of total number of hours on videoconferencing calls, ever-smaller breaks between those hours, frequency and group size, and the extent to which all of these crowd out one's other responsibilities. Illustrative quote: "At the bivariate level, the four hypotheses concerning the relationships between energies resources and emotional exhaustion are supported: video meeting load and video meeting time beyond sufficiency for one's job are positively correlated with emotional exhaustion ($r = 0.14, p < 0.05$ and $r = 0.43, p < 0.01$, respectively)." (Johnson and Mabry, 2022, p. 392).	10A, 10B, 10C, 10D
Inflexibility of videoconferencing within work schedule	Second-order theme	2 conceptual, 13 empirical	The intensifying labour of workloads that cannot be easily adjusted to suit arising matters, personal commitments, and fluid approaches to managing one's time. Illustrative quote: "Whether for professional or personal reasons, participants frequently mentioned online meetings as a source of exhaustion. Participants noted how official meetings can easily extend beyond office hours and how merging work and home space can cause "zoom fatigue"." (Franco et al., 2022, p. 12).	11A, 11B, 11C
Situational cognitive dissonance	Second-order theme	3 conceptual, 8 empirical	The intensifying labour of participating in a video call that involves a situation that is disorienting or disturbing in some way emotionally or psychologically, for example due to the unintended likeness of intimacy created by videoconferencing or due to the high stakes of a given videoconferencing call. Illustrative quote: "This collapsing of professional and personal spaces presents several challenges, and faculty expressed how this issue complicates videoconferencing communication situations. One professor explained, "You're bring people into the spaces where you're not used to	12A, 12B

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Table 4 (continued)

Code	Level of coding	Supporting papers	Definition and Illustrative Quote	First-order concepts
Alienating Labour	Aggregate dimension	8 conceptual, 27 empirical	having what could be strangers or acquaintances..." Another admitted, "I still think I grapple with all the different intersections of my identity, and I know our students do that, too.... You don't want to make your sacred space a workspace." (Massner, 2022, p. 609). The labour involved in coping with questionable intentions and purposes imposed onto an individual with respect to videoconferencing.	13A, 13B ... 14C, 14D
Imposed unclear purposes/intentions	Second-order theme	2 conceptual, 19 empirical	The alienating labour of participating in a video call that has unclear purposes or intentions, or where such purposes or intentions clearly do not exist at all. Illustrative quote: "We found support for meeting relevance moderating the negative relationships between meeting satisfaction and effectiveness with meeting recovery from the moderation analyses. The nature of the moderation was consistent with the hypotheses for meeting satisfaction and recovery. More relevant meetings showed a stronger inverse relationship with recovery time than less relevant meetings. Employees seem to benefit more greatly in terms of recovery when the outcomes are more satisfying and effective." (Allen et al., 2022, p. 1057).	13A, 13B
Imposed undesirable purposes/intentions	Second-order theme	6 conceptual, 8 empirical	The alienating labour of participating in a video call that has purposes or intentions that are detrimental to the individual's wellbeing or are otherwise unpleasant. Illustrative quote: "Some tweets indicated increased demands on their time and a prevalence of unnecessary meetings, which were also perceived as a monitoring instrument" (Hacker et al., 2020, p. 571).	14A, 14B, 14C, 14D

^a Please note that the numbers in the "Supporting Papers" column do not add up when aggregating from second-order theme to aggregate dimension, because any given supporting paper could be supporting multiple second-order themes within a particular aggregate dimension. For full traceability of the underlying dataset, please refer to the Concept Matrix in Appendix B.

Fig. 1, we present the visualisation of our data structure, following the guidelines provided by Gioia et al. (2013). In Table 4, to assist readers' interpretation of this data structure, we provide our codebook defining the second-order themes and aggregate dimensions. "Then, we expand on Fig. 1 and Table 4 by discussing our findings in a detailed manner. We organize our discussion under the aggregate dimensions (i.e., the five types of labour). Under each aggregate dimension, we describe the associated second-order themes and each theme's associated first-order concepts. In the main text of this paper, then, second-order

themes are indicated in **bold text**, and first-order concepts are indicated in *italicised text*, written alongside the corresponding first-order concept identifier (1A, 1B, 1C ... 14C, 14D).

Interpretive labour

Interpretive labour—a concept adapted from Anthropology (Graeber, 2015)—is the labour involved in attentively understanding and *interpreting* communication. This type of labour is akin to "cognitive labour". However, while cognitive labour refers to the tasks of planning and decision-making (Daming, 2019), interpretive labour entails such efforts of imagination and sensemaking of human relations with all their histories and layers of meaning.

When videoconferencing, interpretive labour is required to undertake **interpretation based on inadequate information**. Videoconferencing users experience an *absence of verbal backchannels, leading to a 'newscast' effect* (concept 1A). These 'backchannels' are the "feedback that listeners provide to speakers indicating that they are paying attention" (Abdullah et al., 2021, p. 3). Such feedback encompasses not only facial expressions but also body gestures, body language, and body movement (McCoyd et al., 2022; Shklariski et al., 2021; Weiss et al., 2021; Wiederhold, 2020; Yeh and Tsai, 2022). The outcome of this deficiency in backchannels is that "what we're doing right now feels like a 1955 newscast" (Massner, 2022, p. 608), "it's like you're putting on a television show" (Massner, 2022, p. 610), "it's watching TV" (O'Lynn, 2022, p. 7): transmitting our ideas but without the instant feedback typical of in-person conversations.

This effect is exacerbated when interlocutors turn off their cameras and mute their microphones, removing not only body language but also facial expressions and auditory feedback, resulting in a sense of "talking to a brick wall" (Massner, 2022, p. 609), "the 'silent' crowd is hard to read" (Nesher Shoshan and Wehr, 2022). Even when facial expressions are present, though, videoconferencing users are *interpreting with abnormal eye contact (eccentric gaze)* (concept 1B). This 'eccentric gaze' has been defined by Kushner (2021)—"when engaged in a video chat, if one looks at the other person's face on their computer monitor, it will appear to the other person that they are looking eccentrically either up, down, or to the side, depending on which camera and computer setup is being used" (p. 175)—and has been reported across multiple papers as a hallmark of videoconferencing fatigue (Aagaard, 2022; Bailenson, 2021; Collins, 2020; Woods, 2021).

Further complicating matters is the fact that, when videoconferencing, users are *interpreting low-fidelity high-noise transmission* (concept 1C) often experienced due to unstable internet connections and/or environmental background noise. This can lead to

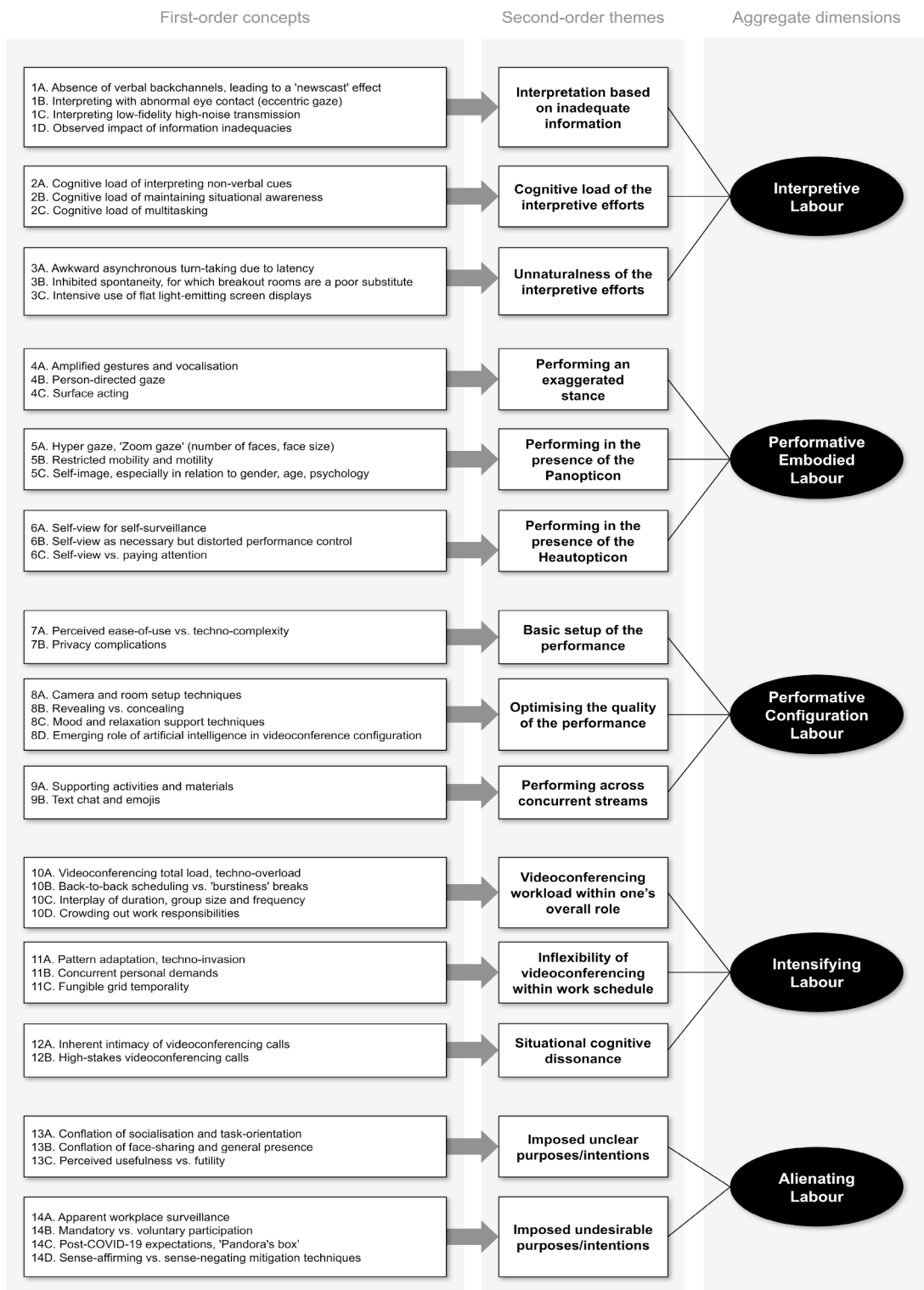


Fig. 1. Gioia-style Data Structure summarising the findings from the literature review.

experiences of not being able to hear one's interlocutors clearly, asking them to repeat themselves, software 'freezing', and interruption to the flow of the conversation (Amponsah et al., 2022; Bennett et al., 2021; Dacillo et al., 2022; Johns et al., 2021; B. J. Li et al., 2022a; Oducado et al., 2021; Shklariski et al., 2021).

The overall result of all the above is the *observed impact of information deficiencies* (concept 1D). Three papers, comparing learning and teaching over videoconferencing to traditional methods of instruction, have found the former to result in worse performance (Arellano et al., 2023; Darr et al., 2021; Vogt et al., 2022). Another paper, based on the analysis of electroencephalogram (EEG) scans, has found less brain-to-brain synchrony in videoconferencing compared to in-person interaction (Schwartz et al., 2022).

At the same time, though, videoconferencing ironically also involves interpretive labour in coping with the **cognitive load of the interpretive efforts**. To compensate for the diminished backchannels discussed above, videoconferencing users experience the *cognitive load of interpreting non-verbal cues* (concept 2A), requiring “especially close attention” (Shklarski et al., 2021, p. 6) to what detail is visible on camera, even if that detail is “perceptually realistic, but not socially realistic” (Bailenson, 2021, p. 3). Multiple papers attest to the laboriousness of such efforts (Fauville et al., 2023; Moralista et al., 2022; Oducado et al., 2022b, 2022c; Tufvesson, 2020; Webb, 2021; Woods, 2021), notably including one paper (Riedl et al., 2023) based again on the analysis of electroencephalography (EEG) scans and also electrocardiography (ECG) scans.

Additionally, videoconferencing users experience the *cognitive load of maintaining situational awareness* (concept 2B): constantly monitoring the conversation for the right moment to unmute and ‘chime in’ (Peper et al., 2021; Rot et al., 2022), then muting again to prevent background noise (Amponsah et al., 2022). They must also keep track of who is currently on the call to avoid discussing confidential information with the wrong people (Vidolov, 2022). Particularly high situational awareness is expected of the individual acting as the ‘host’ of a call, such as a presenter, facilitator, or instructor: “control of microphones by the host should be managed very well” (Amponsah et al., 2022, p. 9).

Situational awareness extends across multiple concurrent activities, including work tasks unrelated to the conversation, i.e., the *cognitive load of multitasking* (concept 2C). While some papers point to problematic individual behaviours, i.e., choosing to multitask (Bennett et al., 2021; Webb, 2021), other papers emphasise the role of poor meeting planning (e.g., frequency, duration, time of day, purpose of meeting) as the root cause of individuals feeling compelled to multitask in the first instance (Cao et al., 2021; Karl et al., 2021; Knox et al., 2023). In other words, although multitasking does of course take place in a variety of social settings and not exclusively on videoconferencing, such multitasking is nonetheless associated with the actual lived experience of videoconferencing and thus incorporated into our holistic understanding of the phenomenon of videoconferencing fatigue.

Finally, interpretive labour is also involved in coping with the **unnaturalness of the interpretive efforts** undertaken during videoconferencing. A prominent aspect is the *awkward asynchronous turn-taking due to latency* (concept 3A): in-person conversations normally involve conversational turn-taking that takes place between 0.1 and 0.3 s, which is within the same order of magnitude that videoconferencing platforms add latency—and thus disruption—to the normal flow of conversation (Aagaard, 2022; Garg et al., 2022; Wiederhold, 2020). As a result, speakers often “drop out” and forfeit their turn when overlaps occur (Aagaard, 2022), and interpreting others’ stances and intentions becomes harder (Tufvesson, 2020). One of the notable consequences of this awkwardness is that the conversation easily becomes dominated by “a single person [who] can be a loud voice in the room” (Singh Chawla, 2021, p. 172), discouraging the involvement of others who—under a more natural turn-taking situation—may have been able to speak up more readily.

A different but related aspect is the *inhibited spontaneity, for which breakout rooms are a poor substitute* (concept 3B). As Aagaard (2022) explains, “in everyday meetings and gatherings, the main conversation will often break off into several parallel conversations or ‘side-conversations’” (p. 1884), which can merge and split organically. This dynamic is lost in videoconferencing, where “you cannot address any one specific individual but are forced to address the entire assembly at once” (Aagaard, 2022, p. 1884), leading to the observation that “the virtual classroom was not the lively place where students cracked wise, challenged forcefully, and spoke freely” (Burton-Jones and Stein, 2021, p. vi). While breakout rooms with smaller groups can mitigate this issue (Connolly et al., 2022; Massner, 2022), the problem persists within these smaller groups, making conversations still somewhat unnatural and requiring an intentional, strategic approach (Ashour et al., 2021; Bess et al., 2022; Dacillo et al., 2022).

Finally, the physical act of videoconferencing involves *intensive use of flat light-emitting screen displays* (concept 3C) compared to other kinds of meetings (Amponsah et al., 2022; Salim et al., 2022a; Webb, 2021), which may be associated with physiological burdens such as blurred vision (Salim et al., 2022a). One paper (Belitskaja, 2023) draws attention to the inherent ‘flatness’ of two-dimensional camera video and argues that “although spending a lot of time with 2D screens has helped usher in the blurring of physical and digital space, we now see the negative impact of flattened spatial experience with the emergence of the likes of Zoom fatigue” (p. 114). This makes it even more challenging to perform all the above-detailed interpretive labour of videoconferencing.

Performative embodied labour

Performative labour—a concept adapted from the Sociology of Work (Bryman, 2004; Goffman, 1956)—is, in general, the labour involved in projecting a particular impression of oneself to others: a performance. Specifically, performative “embodied” labour—a concept adapted from the Sociology of Medicine—involves using one’s physical body to project a particular appearance for videoconferencing purposes (Menon and Sariego, 2022). While similar to “emotional labour,” which specifically refers to managing emotions (Hochschild, 1979), performative embodied labour encompasses not only managing emotions but all the labour of setting up the performance for the viewers.

When videoconferencing, there is performative embodied labour involved in **performing an exaggerated stance**. This stance often includes *amplified gestures and vocalisation* (concept 4A): “examples include centering oneself in the camera’s field of view, nodding in an exaggerated way for a few extra seconds to signal agreement ... even the way we vocalize on video takes effort ... consider the effects of raising one’s voice substantially for an entire workday” (Bailenson, 2021, p. 3). One paper even reports new kinds of hand gestures developed specifically for non-verbal communication on videoconferencing calls; for example, very visibly

placing one's hand on one's chest to signal empathy or crossing one's arms over one's face to signal objection (Hills et al., 2022). These are the non-verbal cues interpreted as part of interpretive labour (discussed previously). Both producing and interpreting these cues—as part of the performance that is videoconferencing—is laborious (Fauville et al., 2023; Moralista et al., 2022; Oducado et al., 2022b, 2022c; Webb, 2021).

A specific kind of such exaggerated stance is *person-directed gaze* (concept 4B), where one must look directly at the camera rather than at the faces of their interlocutors (Abdullah et al., 2021). As Peper et al. (2021) point out, this is very much a performance: “everyone working in media (newscasters, politicians, actors) have been trained to make their faces visible and expressive” (p. 51).

Moreover, the exaggeration of one's stance is not only physical but also emotional. This can take the form of *surface acting* (concept 4C): “showing a happy face ... provide a positive attitude to convey enthusiasm and positive energy” (Röbler et al., 2021, p. 12); “workers might feel compelled to fake emotions to appear happy or optimistic” (Johnson and Mabry, 2022, p. 385); “though she perceived herself to have a more ‘excitable’ personality, it was exhausting to maintain this in an online space” (Barbeau et al., 2022, p. 8); and “of course I present a positive and hard working version of myself with no flaws” (Taber et al., 2022, p. 467).

Additionally, there is performative embodied labour involved in **performing in the presence of the Panopticon** when videoconferencing. The panopticon is a prison design where inmates could be observed at any time without their knowledge, a metaphor deployed by Foucault (1977) and Zuboff (1988) as social commentary on surveillance and now a well-established concept in IS research (Willcocks, 2004). Even though we are not prisoners, we participate in panopticon-like systems in fear of missing out or being ostracised (Hafermalz, 2020).

Sumner (2022) alludes to a panopticon effect in the form of *hyper gaze*, ‘Zoom gaze’ (number of faces, face size) (concept 5A). When one performs on a videoconferencing call—camera on, voice vocalising, nodding and gesturing as discussed above—one is performing in front of, typically, a grid of interlocutors' faces fixated on one's performance (Anderson and Looi, 2020; Li et al., 2022c). Notably, depending on the size of one's screen and the number of faces present, the size of interlocutors' faces may be uncannily bigger or smaller than they would be in person (Bailenson, 2021; Fauville et al., 2023; Webb, 2021). Additionally, depending on the video resolution, faces may be uncannily clear such that “it's like you see every little flicker of the tiny muscles around their eyes in a way that you wouldn't necessarily [see in person]” (Shklarski et al., 2021, p. 6). Furthermore, unlike in an in-person setting, it is not clear which direction people are looking in. This creates a panopticon effect where any interlocutor could, at any time, be the focus of everyone else's gaze: “the awkwardness of having to watch somebody eat ... back when we all sat in conference rooms together, lunch meetings were common and nobody thought it was so awful to watch their colleagues chew—mostly because they didn't watch” (Karl et al., 2021, p. 354). This phenomenon, referred to as ‘hyper gaze’ (Fauville et al., 2023; Moralista et al., 2022; Oducado et al., 2022b, 2022c) or ‘Zoom gaze’ (Sumner, 2022), adds eeriness to the experience of performing in a way that can feel subconsciously threatening (Wiederhold, 2020). However, its effects are reduced as the size of faces decreases (e.g., when using a smartphone rather than a laptop) (Lestari and Fayasari, 2022) or when screen-sharing (Kushlev and Epstein-Shuman, 2022). The effect also diminishes as the number of people involved on the increases, since the face size is inversely proportional to the number of faces on a screen of fixed size (Kushlev and Epstein-Shuman, 2022).

Meanwhile, Aagaard (2022) alludes to a panopticon effect in the form of what we refer to as *restricted mobility and motility* (concept 5B). To ensure visibility on camera, videoconferencing users need to stay within the camera's field of view, “and most of the time this equates to sitting down and staring straight ahead” (Bailenson, 2021, p. 4). The camera's field of view is not a literal prison cell, but it has a similar effect to the cells of the panopticon, confining individuals to spaces where they can be readily observed (Aagaard, 2022). Even within the camera's field of view, one must be careful not to move or fidget excessively, as such movement may be distracting in a way that would not be in an in-person meeting or gathering (Webb, 2021); the exception being nodding to confirm understanding, “participants increased their range of nodding movements while restricting other movements” (Zubek et al., 2022, p. 10). The result of this phenomenon is that videoconferencing users are feeling physically trapped, as several papers report (Fauville et al., 2023; Moralista et al., 2022; Oducado et al., 2022a, 2022b, 2022c; Zaza et al., 2023; Zubek et al., 2022).

We observe that these panopticon effects have an alarming effect on *self-image*, especially in relation to gender, age, psychology (concept 5C). Several papers report on these panopticon effects particularly adversely impacting girls and women (Amboy et al., 2023; Fauville et al., 2023; Harriger and Pfund, 2022; Lee et al., 2023; Oducado et al., 2021; Phakey et al., 2023; Ratan et al., 2022; Shockley et al., 2021; Simbula et al., 2024; Standaert and Thunus, 2022). For instance, one study based on eye tracking reported that women check their appearance on camera significantly more than men do (George et al., 2022), and another study found that audio compression algorithms negatively impact female voices more than male voices (Siegert and Niebuhr, 2021). Women with minor children are a particularly severely impacted group (Bonanomi et al., 2021). Two papers reported findings in which gender was not found to be statistically significant but age was, indicating that older individuals are more impacted than younger ones (Johnson and Mabry, 2022; Stoeckl and Eckhardt, 2022). There is also evidence of correlation with ethnicity (Ratan et al., 2022), organisational tenure (Shockley et al., 2021), mental health (Deniz et al., 2022; Montag et al., 2022; Phakey et al., 2023; Salim et al., 2022b), resilience or ‘hardiness’ (Yosep et al., 2023), and neurodiversity (Zhang et al., 2023). Notably, Alencar et al. (2023) draw attention to the existing anxiety disorder known as scopophobia, the fear of being watched or stared at: a particularly relevant medical condition to consider in relation to these panopticon effects.

Related to the panopticon effects outlined above, there is also performative embodied labour involved in **performing in the presence of the Heautopticon** when videoconferencing. The term ‘heautopticon’ was introduced by Moya and Pallud (2020) as a self-directed equivalent of a panopticon effect, i.e., self-surveillance. The most prominent of these heautopticon effects occur in the form of *self-view for self-surveillance* (concept 6A): because one is being watched by others, one may wish to check what the others are seeing by using the ‘self-view’ functionality in the videoconferencing software, to the point where one is continuously monitoring this self-view during the call (Woods, 2021). Having this self-view activated during videoconferencing calls is frequently compared to having a

persistent mirror in one's view (Aagaard, 2022; Bailenson, 2021; Webb, 2021), leading to an empirically observed psychological burden termed 'mirror anxiety' (Fauville et al., 2023; Moralista et al., 2022; Oducado et al., 2022a, 2022b, 2022c), related to issues of self-consciousness, self-esteem, and social anxiety (Chen and Zhou, 2023; Kuhn, 2022; Ngien and Hogan, 2023; Peper et al., 2021). Examples of quotes from videoconferencing users describing the lived experience of this heautopticon effect include "seeing my makeup-less face on the screen was stressing me out" (Vidolov, 2022, p. 12), "what bad hair I have today!" (Merchant, 2023, p. 290).

Despite these concerns, however, there is also a prominent notion of *self-view as necessary but distorted performance control* (concept 6B): if we know we are being watched as per the panopticon effects, then the self-surveillance helps us maintain some control over what others see, even if prompting heautopticon effects. As Bailenson (2021) points out, dancers in dance studios are surrounded by mirrors for this exact reason. Thus, despite papers suggesting that self-view should be deactivated or minimised to reduce panopticon effects (Abramova et al., 2021; Tufvesson, 2020; Webb, 2021), the actual adoption of these techniques is limited (Aagaard, 2022). As one videoconferencing user describes: "[self-view] definitely bugged me and after reading about it I switched off my self-view window ... then after the meeting I realized that I had a piece of spinach between my teeth which could've been avoided had I not switched my self-view window" (Vidolov, 2022, p. 12). One ongoing study (Seitz et al., 2022) is investigating feelings of control in videoconferencing calls in relation to self-view: initial results have not yet isolated confounding variables but describe an upcoming study of "a more fine-grained analysis of the feeling of control" (p. 5). It has also been observed that participating in a videoconferencing call where self-view is deactivated, but one must still perform for the camera, is still cognitively detrimental compared to a participating in a videoconferencing call where the camera is just entirely off (Savage and Couture Bue, 2023), again indicating that the efficacy of deactivating self-view to reduce videoconferencing fatigue remains somewhat questionable. Self-view is, however, distorted as a form of performance control. Unlike a normal mirror, the self-view "reflections of our faces are displayed side-by-side to the other participants on the call, encouraging and emphasising comparison and self-judgement" (Sumner, 2022, p. 868).

Another related issue is the tension between *self-view vs. paying attention* (concept 6C): there may be a trade-off between the attention that one gives to monitoring self-view and the attention required for the interpretive labour of videoconferencing discussed previously. Self-view prompts "self-awareness that prevents us from becoming fully immersed in the ongoing conversation" (Aagaard, 2022). Abramova et al. (2021), for example, find that self-view has a negative effect on meeting outcomes when one is listening to others but not when one is speaking. This trade-off may result in particularly awkward situations as exemplified by an example reported in one paper: "she had a mirror face very recognizable, a kind of sucked-in cheeks [...] it was obvious for everyone who pays attention. I think someone told her and she felt very embarrassed" (Vidolov, 2022)—in other words, the performance control afforded by self-view may ironically and subconsciously deteriorate the authenticity of one's performance.

Performative configuration labour

Performative "configuration" labour—a concept adapted from Information Systems (Jarrahi and Nelson, 2018; Klein and Watson-Manheim, 2021)—is akin to performative "embodied" labour, extending the concept of performative labour. However, performative "configuration" labour refers to the operationalisation of performance through one's configuration of technologies rather than through one's physical body.

When videoconferencing, performative configuration labour is inherent in the **basic setup of the performance**. A key aspect involves balancing *perceived ease-of-use* vs. *techno-complexity* (concept 7A), to borrow concepts from the technology acceptance and technostress literature (Davis, 1989; Tarafdar et al., 2014, 2007). Videoconferencing users must learn to correctly configure their microphones, cameras, screens, software, wireless networks and cables (Bullock et al., 2022; Hacker et al., 2020; Harding, 2021). Being unable to hear others, or not being heard, are frequently reported configuration issues (Johns et al., 2021). The fatiguing impact of this kind of performative configuration labour has been observed empirically and reported in multiple papers (Stoeckl and Eckhardt, 2022; Tuan Anh et al., 2022). However, the fatiguing impact can be reduced as videoconferencing users increase their digital literacy (Amponsah et al., 2022) or when this performative configuration labour is outsourced to service providers (Jang and Choi, 2022). Nonetheless, even experienced videoconferencing users may encounter occasional technical difficulties: for example, in one case, an experienced user had a horizontal flip enabled—as in that which assists with the self-view 'mirror' for performance control (described previously)—but this 'mirroring' also reversed graphics and words, rendering them unreadable to the audience (O'Lynn, 2022). Experience with videoconferencing also becomes quickly outdated: as Pure and Stefanac (2023) point out, "many Zoom tools are added and/or updated regularly, thus a comprehensive list is outdated as soon as it is written" (p. 249).

Another specific task involved in performative configuration labour is dealing with *privacy complications* (concept 7B), which could arise from the difficulty of finding a private space for a videoconferencing call without others eavesdropping (Merchant, 2023), or from 'zoombombing' incidents where meeting links and codes are shared beyond the intended audience (Hacker et al., 2020). In other words, videoconferencing users not only need to set up their calls for functionality but also for information security, all of which entails performative configuration labour.

Additionally, performative configuration labour is involved in **optimising the quality of the performance** beyond the basic setup. Prominently, there are a variety of *camera and room setup techniques* (concept 8A). These techniques involve not only camera angles, framing, and lighting (Hacker et al., 2020; Harriger and Pfund, 2022; Pure and Stefanac, 2023) but also how one's attire and grooming appear on camera (Vidolov, 2022); in one case, a videoconferencing user states: "I hate to confess it but sometimes I'd put on my reading glasses just to make an impression" (Vidolov, 2022, p. 12). These techniques also require careful consideration of the room setup (Sumner, 2022), conceptualised by Nadler (2020) as a kind of 'third skin' beyond one's physical flesh (the 'first skin') and clothing (the 'second skin'): "one's home operates as a skin ... after all, does a mansion not convey immediate signifiers about its occupants the way a Rolex does?" (p. 13). Examples of such room setup styles include minimalism (e.g., "create more space around

you; remove items from your desk that you are not using”) (Webb, 2021, p. 2), task focus (e.g., “place a different background such as a poster ... when finished with the specific Zoom event, take down the poster”) (Peper et al., 2021, p. 54), and whimsical (e.g., “a male CFO taking a meeting in his daughters’ room with fairy wall motifs”) (Johns et al., 2021, p. 728).

However, all these techniques involve a delicate balance between *revealing* vs. *concealing* (concept 8B): one needs to reveal enough to appear authentic and honest, yet conceal anything that could undermine the performance. Virtual backgrounds, for example, can conceal confidential or sensitive aspects of one’s room (Kubi et al., 2021) or even family members “entering the stage” (Hacker et al., 2020, p. 573). Likewise, there are various practices to divert unwanted attention from one’s facial features, such as sitting further away from the camera or turning it off (Vidolov, 2022), adjusting one’s hair (Taber et al., 2022), or using experimental software features such as ‘tele-immersion’, where faces are displayed in a simulated virtual world setting rather than a grid (Branch et al., 2023). Looking into the future, optimising the quality of the performance may soon also entail *mood and relaxation support techniques* (concept 8C) such as using music and other therapeutic audio tracks to alleviate videoconferencing fatigue (Nurhadi et al., 2023; Walcott-Bedeau, 2022); and may likewise soon also entail *accommodating for the emerging role of artificial intelligence in videoconference configuration* (concept 8D) such as the use of augmented reality face filters (Li and Lee, 2023) and biosignal-based user-adaptive videoconferencing systems (Seitz et al., 2023) which, although offering various potential affordances and benefits, at the same time increase the complexity of the performative configuration labour involved.

During videoconferencing calls, performative configuration labour is also involved in **performing across concurrent streams** of signs, signals, data, information, and materials. Participation in videoconferencing is often not just about voices on microphones and faces on cameras, but also *supporting activities and materials* (concept 9A)—particularly in work and educational settings—such as screen-sharing, problem-solving, polls, surveys, quizzes, and collaborative work on documents (Böhm and Müller, 2022; Cheddad and Nordahl, 2022; Kushlev and Epstein-Shuman, 2022; Toney et al., 2021). Thus, activities occurring outside the videoconferencing software but within one’s computer become part of the performance, particularly in the context of a classroom or presentation.

Additionally, there are *text chat and emojis* (concept 9B) that are exchanged at the same time (Johns et al., 2021), further expanding the scope of the performance. While text chat can provide a backchannel, it may also facilitate side conversations that distract from the ongoing verbal communication (Pure and Stefanac, 2023; Wiederhold, 2020), requiring simultaneous performance across multiple conversations. Likewise, the use of emojis such as the “raising hand” emoji (Nesher Shoshan and Wehrt, 2022; Peper et al., 2021) facilitates turn-taking, but in a way that goes beyond interpretive labour; it involves deploying the outcome of interpretive labour (e.g., cognitive load of maintaining situational awareness) to respond appropriately in a timely manner. Emoji use in videoconferencing is performative not only in the sense of being a performance, but also in the sense of being disingenuous, e.g., “sometimes I just can’t force myself to say something when some of the crappy colleagues is being praised mostly due to self-promotional, lip service [so] I just then use an emoji” (Vidolov, 2022, p. 14). The performative configuration labour involved in videoconferencing is thus not only technically and socially complex, but multimodal.

Intensifying labour

Intensifying labour—a concept adapted from Human Geography (Richardson, 2018)—stands in contrast to the others described above. Intensifying labour refers less to the qualities of the labour that is changing with videoconferencing, but more to the intensity with which it is performed.

Firstly, **videoconferencing workload within one’s overall role** refers to various aspects of the quantity of hours involved in videoconferencing. The most fundamental aspect of volume is the *videoconferencing total load, techno-overload* (concept 10A), to again borrow a concept from the technostress literature (Tarafdar et al., 2014, 2007). Multiple papers draw attention to the number of hours (de Oliveira et al., 2022; Fauville et al., 2023, 2021; Johnson and Mabry, 2022; Lestari and Fayasari, 2022; B. J. Li et al., 2022a; Williams, 2021; Yeh and Tsai, 2022), and the concept of techno-overload in particular (Bullock et al., 2022; Stoeckl and Eckhardt, 2022), as one of the most obvious contributors to the fatigue associated with intensifying labour. The techno-overload caused by the number of hours is also related to other challenges that videoconferencing users must deal with outside of their professional capacities, e.g., work-family conflict (B. J. Li et al., 2022b). Conversely, videoconferencing is described by users as not being fatiguing or exhausting—and indeed even relaxing or therapeutic for mental health—when calls are rare (Nesher Shoshan and Wehrt, 2022; Sahi et al., 2021).

Another aspect of the volume of videoconferencing is the balance between *back-to-back scheduling* vs. ‘burstiness’ *breaks* (concept 10B), with multiple papers problematising ‘back-to-back’ scheduling (Allen et al., 2022; Bennett et al., 2021; Massner, 2022) and extolling the benefits of taking regular breaks (Amponsah et al., 2022; Asgari et al., 2021; Fauville et al., 2023; Hacker et al., 2020; Oducado et al., 2022a; Webb, 2021; Wiederhold, 2020; Williams et al., 2022), a characteristic of videoconferencing fatigue termed ‘burstiness’ (Fauville et al., 2021). Back-to-back scheduling is particularly prevalent in educational contexts, since a traditional school timetable consists of back-to-back classes, which thus translates poorly into a videoconferencing setting (Böhm and Müller, 2022; Dacillo et al., 2022; Gupta et al., 2022). This is also common in contexts where meetings often run overtime, e.g., for organisational leadership (Lucerna et al., 2023). Notably, one paper (Queiroz et al., 2023) suggests that a more problematic aspect of videoconferencing workload within one’s overall role may not necessarily be the total hours spent on videoconferencing, but rather, whether those hours are sufficiently arranged to account for the *interplay of duration, group size and frequency* (concept 10C); the paper found that meetings that are “shorter, more frequent, small in size, and high in interactivity” (Queiroz et al., 2023, p. 11) enable people to foster feelings of social connectedness. Comparably, another paper (Johnson and Mabry, 2022) likewise suggests that a more problematic aspect of videoconferencing workload within one’s overall role may again not necessarily be the total hours spent on videoconferencing, but rather, whether those hours are *crowding out work responsibilities* (concept 10D), “excess of video meeting load

... too much to accomplish their other job responsibilities” (Johnson and Mabry, 2022, p. 385). The same could be said of videoconferencing in a classroom context: “after working for hours due to online classes and meetings, or joining for events, the vigor and enthusiasm get drained” (Tarab, 2023, p. 878).

Next, the **inflexibility of videoconferencing within [one’s] work schedule** of intensifying videoconferencing labour refers to clashes between scheduled videoconferencing calls and other elements of one’s personal or professional schedule. People often adapt their schedules to accommodate videoconferencing calls, rather than the other way around, a phenomenon we refer to as *pattern adaptation*, *techno-invasion* (concept 11A). The term ‘pattern adaptation’ is used by Tuan Anh et al. (2022) to describe this phenomenon, which is related to the technostress concept of ‘techno-invasion’ (Bullock et al., 2022). Videoconferencing calls extending outside of office hours are a particularly prominent example of this pattern adaptation and techno-invasion (Franco et al., 2022). Whilst not everyone necessarily works 9-to-5 office hours, this concern about office hours reflects the underlying issue of having to manage *concurrent personal demands* (concept 11B) such as household responsibilities and financial hardship (Elbogen et al., 2022; Johnson and Mabry, 2022; Vidolov, 2022), particularly during the COVID-19 pandemic (Weiss et al., 2021). This is especially true when such personal demands involve other videoconferencing calls outside of work contexts, e.g., calls related to their children’s schooling (Buro et al., 2023) or social activities (Castiglione et al., 2022). Such concurrent personal demands still exist when meeting in-person, of course, but they are mitigated by the change in physical location, e.g., “an [in-person] classroom setting allows for no discrepancies or disturbances when all the students are in the same learning environment” (Chatha and Qayyum, 2023, p. 5).

Notably, many aspects of schedule inflexibility relate to the *fungible grid temporality* (concept 11C) described by sociologist Wajcman (2019) in relation to digital calendar systems: “the grid interface is divided into equal, interchangeable blocks of 30 or 60 min, as if shifting an activity from one slot to another is as easy as ‘dragging’ the activity across the calendar ... the architecture of rows and columns promotes a quantitative, fungible view of time” (Wajcman, 2019, pp. 1282–1283). Studies on videoconferencing fatigue explicitly problematise how “the default calendar systems suggest 30- and 60-minute meetings” (Allen et al., 2022, p. 1058) and how “What once used to be a “drop by your desk” chat has turned into “schedule a 30 min Zoom”” (Cranford, 2020, p. 587). Other studies highlight the folly of the fungible view of time that videoconferencing users often find themselves struggling with: “another participant mentioned that they “prefer to schedule [videoconferences] more toward the start of my workday as opposed to the end of the workday.”” (Bennett et al., 2021, p. 334); “perceiving a meeting as long may be the relevant factor instead of a meeting “objectively” being long” (Nesher Shoshan and Wehrt, 2022, p. 844); and “Zoom classes feel much longer online than in person” (Shahrivini et al., 2021, p. 7).

Finally, the **situational cognitive dissonance** of intensifying videoconferencing labour refers to the cognitive dissonance experienced when videoconferencing is deployed in sensitive situations where it seems intuitively inappropriate. Several papers point out a cultural perception of the *inherent intimacy of videoconferencing calls* (concept 12A), due to the captured details of interlocutors’ faces (Abdullah et al., 2021; Merchant, 2023; Webb, 2021) and their often very private spaces such as homes and bedrooms (Massner, 2022; Nadler, 2020): “faculty members recognized that teaching from their homes to students who are also in their private spaces causes dissonance” (Massner, 2022, p. 609). Before the COVID-19 pandemic, videoconferencing was primarily seen as an activity to share with close friends and family, not as a ubiquitous alternative to in-person encounters (Taber et al., 2022). Such entrenched sentiments may linger in the collective consciousness even as work practices shift according to operational needs.

Additionally, there are many cases of *high-stakes videoconferencing calls* (concept 12B) – such as for legal proceedings (Moreira and Zhang, 2023), training medical professionals (Franco et al., 2022; Vandenberg and Magnuson, 2021), administering mental health care (Merchant, 2023; Shklariski et al., 2021), and undertaking job interviews (Vallejo et al., 2022). Although these may still be functionally efficient, users must put effort towards resolving the cognitive dissonance about how “the embodied holding is more fragile” (Merchant, 2023, p. 293) and about concerns as to whether “good, ethical, and sound judgments are [being] made” (Franco et al., 2022, p. 12). The intensifying labour of videoconferencing is thus not just a matter of scheduling and workload, but also a matter of emotional and psychological intensity.

Alienating labour

Alienating labour—although historically a very complex and multifaceted phenomenon (Marx, 1844)—for the purposes of this paper refers specifically to the labour involved in coping with questionable intentions and purposes imposed onto an individual. This definition draws on the definition of alienation as powerlessness and meaninglessness as defined in Sociology and Business Ethics (Michaelson et al., 2013; Seeman, 1959). In the context of videoconferencing, we find hints of alienating labour in the imposition of unclear or undesirable intentions and purposes.

On one hand, **imposed unclear purposes/intentions** refers to situations where people are required to participate in videoconferencing calls without a clear understanding of the call’s necessity. Here, meaninglessness is the most salient aspect of alienating labour, because there is no clear meaning to the effort exerted in participating in the call. This meaninglessness is particularly evident when different possible purposes are conflated. One prevalent conflation is the *conflation of socialisation and task orientation* (concept 13A), when a call appears to be about catching up or getting to know people, but is also supposed to focus on accomplishing a specific task. Some videoconferencing users express frustration about when “some people discuss items that were not on the agenda – this is time-wasting” (Amponsah et al., 2022, p. 8) and assert that “meeting etiquettes of moderators exhausting agendum and arriving at resolutions should be adhered to in order to achieve zoom meeting goals” (p. 9). In contrast, other users express a longing for more socialisation: “video conferencing is quite impersonal ... everyone just wants to get in and get out, log in and log off ... there’s very little chatter before and after the meeting like there would be in real life” (Bennett et al., 2021, p. 334). Emerging strategies to address this issue include changing modality during the course of the call from socialisation to task orientation and vice versa (Bergmann et al.,

2023), or developing different tools for each purpose (Gebbing et al., 2022). However, these strategies can lead to longer calls and potential objections about productivity (Amponsah et al., 2022), as well as inefficacies arising from the observed phenomenon that people who are already feeling videoconference-fatigued on a call are less likely to feel socially connected to others (Queiroz et al., 2023), thus undermining any efforts to facilitate socialisation.

Another prevalent phenomenon leading to unclear purposes/intentions during videoconferencing is *conflation of face-sharing and general presence* (concept 13B): when a videoconferencing call implies the need to see each other's faces, but in reality, it is more about a general sense of shared presence that may not require everyone's camera to be on at all times. Some literature highlights the importance of users being able to turn off their cameras (Bennett et al., 2021; Collins, 2020; Pennington et al., 2021), while others point out the disadvantages of doing so (Bedenlier et al., 2021). Notably, one paper (Karl et al., 2021) reports prominently on points from both perspectives: "are you merely disseminating information so you wouldn't need people to be turning on their videos" (p. 352); "it's a bit like going to a meeting and sitting there with a bag over your head ... if you can have [your camera] on, it makes for better communication" (p. 350). Emerging strategies to address this issue also include changing the modality during the call (Collins, 2020) or developing different tools for face-sharing and general presence, with the latter potentially making use of augmented reality and virtual reality (AR/VR) technologies (Eriksson, 2021; Harendza et al., 2023; Putra et al., 2024; Qiu et al., 2023; Sachan and Peiris, 2022), LiDAR videogrammetry (Pesce, 2020), and videogame-like online spaces such as Kumospace and Gather.town (Dailey-Hebert, 2022; Tang et al., 2022).

Sometimes, there is no conflation at all, but simply a sense that the call has no meaningful purpose at all; there is, in that case, a question of *perceived usefulness vs. futility* (concept 13C), to again borrow a term from the technology acceptance literature (Davis, 1989). Futility or a lack of perceived usefulness occurs when videoconferencing users feel that a particular call is not useful to them (Johnson and Mabry, 2022). This feeling is related to concepts like boredom, escapism and apathy (Ebardo et al., 2021), which can exacerbate the experience of videoconferencing fatigue (Allen et al., 2022; Johnson and Mabry, 2022). Indeed, Nurmi and Pakarinen (2023) have notably conducted a study to differentiate between active fatigue (overstimulation and exhaustion) and passive fatigue (understimulation and monotony) in videoconferencing, their findings "highlighting that the modality of virtual meetings, and not any meeting, predicts passive fatigue" (Nurmi and Pakarinen, 2023, p. 356); they therefore recommend further consideration of "the protective role of high general work engagement" (Nurmi and Pakarinen, 2023, p. 343).

On the other hand, **imposed undesirable purposes/intentions** refer to situations where people are required to participate in videoconferencing calls for reasons that are clear but perceived as undesirable or unpleasant. Here, powerlessness is the most salient aspect of the alienating labour, as the individual is unable to avoid the undesirable work. An example of this is when employees are required to attend calls that serve as *apparent workplace surveillance* (concept 14A), e.g., "to keep things under control" (Hacker et al., 2020, p. 571). The opposite scenario is when attendance is voluntary, for example when one chooses to attend a conference, where videoconferencing fatigue may still occur but may be dampened by a sense of self-motivation (Jang and Choi, 2022); we thus see the importance of consideration *mandatory vs. voluntary participation* (concept 14B).

Looking to the future, there is a sense of apprehension towards *post-COVID-19 expectations*, 'Pandora's box' (concept 14C), suggesting that the surge in videoconferencing adoption during the pandemic will lead to its continued use in the future, whether we like it or not. The mythological symbol of "Pandora's box" is directly evoked in two papers (Massner, 2022; Nadler, 2020), indicating not only the continued use of videoconferencing to meet expectations (e.g., the expectations students have of their instructors), but also the expected quality of videoconferencing calls, for example when "instructors feel that students expect each presentation to be as captivating as a TED Talk ... thus, teaching has shifted from education to edutainment" (Peper et al., 2021, p. 51).

There is also concern about how videoconferencing fatigue will be addressed, particularly the question of *sense-affirming vs. sense-negating mitigation techniques* (concept 14D). If we only address the symptoms of videoconferencing fatigue in a numbing or sense-negating way, such as encouraging people to become less self-aware and enhance their stamina through nutritional supplements, without addressing the underlying problems, then we would be doing what is "reminiscent of early 20th century attempts to control every detail of the factory environment to ensure the physical well-being of the worker ... being able to turn the living machine into one that no longer has a consciousness or awareness of itself, its exhaustion and the socio-political conditions behind its exploitation" (Abdelrahman, 2022, pp. 85–86). Indeed, there is empirical evidence that videoconferencing fatigue is related to underlying psychological issues such as burnout and depersonalisation (Charoenporn and Charernboon, 2023), not just cognitive stamina and ophthalmological endurance. Multiple papers draw attention to how people can spend several hours playing video games (Gray et al., 2021), connecting with people on social networking services (Nadler, 2020), and 'binge-watching' television shows without experiencing the kind of fatigue associated with videoconferencing fatigue (Ebner and Greenberg, 2020). However, there are also promising examples of sense-affirming rather than sense-negating mitigation techniques, such as promoting feelings of shared kindness (Weiss et al., 2021), playfulness (Fadhli et al., 2022; Gray et al., 2021), and grounding techniques like deep breathing (Hall, 2020). Particularly in educational settings, there are discussions on adopting innovative pedagogical practices (Poskitt et al., 2022; Toney et al., 2021) and designing 'binge-worthy' classes by leveraging the compelling storytelling power of 'binge-worthy' television shows (Ebner and Greenberg, 2020). These efforts exemplify that the alienating labour of videoconferencing does not necessarily have to be alienating, depending on our approach, now and in the future.

Discussion

Reflection on coding and data structure

Our coding, as represented in the data structure (Fig. 1) according to which the above findings have been structured, provides an

overview of the characteristics of the labour involved in videoconferencing.

One point of comparison is whether these characteristics are fundamentally different to those of the labour involved in traditional in-person meetings. At the level of the aggregate dimension, it is certainly plausible—as per the literature on workplace meetings (Allen et al., 2012; Lehmann-Willenbrock et al., 2016; Mroz et al., 2018)—that the same aggregate dimensions (interpretive labour, performative embodied labour, performative configuration labour, intensifying labour, alienating labour) could be applied to understand the fatigue that can come with traditional in-person meetings unrelated to videoconferencing. In contrast, at the level of second-order themes and first-order concepts, the data structure is relatively more tightly coupled with the specific phenomenon of videoconferencing and its sociotechnical (Sarker et al., 2019) characteristics. The imperfect interplay—between the technical constraints of the videoconferencing technology and the human practices established around that technology—gives rise to several things: to the cognitive load of interpretive efforts under conditions of inadequate information and unnaturalness (concepts 1A ... 3C); to the exaggerated stance performed in this specific case of both panopticon and heautopticon (concepts 4A ... 6C); and, most prominently, to the extensive configuration work required for even a basic videoconferencing performance, let alone one that is optimised for self-presentation across potentially multiple concurrent streams of communication (concepts 7A ... 9B).

However, when considering the second-order themes and first-order concepts associated with the final two aggregate dimensions (intensifying labour and alienating labour: concepts 10A ... 14D), we do note that these are not inherent to videoconferencing or even meetings *per se*, but speak to broader issues around working conditions, emancipatory ideals and business ethics. In other words, these latter portions of the data structure are relatively less tightly coupled with the phenomenon of videoconferencing *per se*, and could instead be understood as more like a phenomenon-level instantiation of timeless concerns in critical information systems research (Cecez-Kecmanovic, 2011) and critical management studies (Alvesson and Willmott, 1992).

Types of Labour, Contexts, and use cases of videoconferencing

Our findings above affirm that the fatiguing and laborious efforts involved in videoconferencing should not be too quickly dismissed as undesirable. Whilst such efforts do represent a cost to doing business, they—like all such costs—are inevitably entangled with associated benefits and meanings as materialised in social practices. Interpretive labour, for instance, though fatiguing, can be beneficial and meaningful to students making efforts to engage with their online studies and virtual classroom. Interpretive labour is the labour required for organisational sensemaking (Sandberg and Tsoukas, 2014; Weick, 2012), arguably why anyone would be engaging in workplace meetings at all. Likewise beneficial and meaningful could be the corresponding performative embodied labour and performative configuration labour undertaken by those students' teachers, hoping to deliver the learning materials in an engaging and indeed 'binge-worthy' manner (Ebner and Greenberg, 2020). Even labour that presents as intensifying and alienating in some ways could be perceived as beneficial and meaningful in other ways, depending on the social context (Michaelson, 2021; Michaelson et al., 2013). An example could be if one is working in a job with a frustratingly high videoconferencing workload and unclear or undesirable reasons for such high videoconferencing workload, but yet that job is empowering improvement in one's personal circumstances and making a positive difference to others.

These abstract examples above already hint that the types of labour revealed by our literature review—deconstructing the 'fatiguing' experience of videoconferencing based on different types of labour—form only the starting point to understanding videoconferencing fatigue strategically, in terms of what kind of videoconferencing is 'worth it' (i.e., worthwhile to engage in). The next step appears to be to consider which types of labour are undertaken and which types are not, in a given setting.

One such possibility for thinking through which types of labour are undertaken or not that we considered was the 'context' of videoconferencing: i.e., differentiating between videoconferencing in general and videoconferencing specifically – for a workplace meeting, for a classroom setting, to deliver healthcare, to engage in creative arts together, or indeed even for very occasional social practices like virtual job interviews, religious gatherings, and virtual courtroom legal proceedings. As previously outlined in our Method section, we coded for such 'context' of videoconferencing as part of our open coding of the literature (see Appendix B), but it does not appear to be the case that the various types of labour are bound by specific contexts of videoconferencing. In other words, unsurprisingly, it is the case that teachers and students, healthcare professionals and patients, worshippers and worship leaders, interviewees and interviewers alike all engage in interpretive labour, performative labour, etc. However, it intuitively makes sense that within each particular context, there would be particular activities in which certain types of labour are undertaken and others are not; the teacher is perhaps undertaking relatively more performative labour while the student is undertaking relatively more interpretive labour.

Given that a videoconferencing system is, fundamentally, an information system—in a classical sense entailing processes, participants, information and technology (Alter, 1995)—we may consider the *use cases* of videoconferencing, entailing a consideration of what is specifically done on videoconferencing and for what purpose (Irwin and Turk, 2005). For example, the *use case* of attending a webinar kind of video call (e.g., for an online class) is perhaps mostly interpretive, especially when one is not required to turn on the

camera or microphone (Massner, 2022), in contrast to the practice of being the presenter broadcasting into that same video call, in which case one’s labour is predominantly performative. These two example use cases of attending and broadcasting are instantiated in a classroom context of videoconferencing (played out by students and teachers), but are likewise played out in a workplace setting (presenter and audience), and yet again likewise played out in a healthcare setting (clinician and patient), etc. We thus not only deconstruct the labour involved in videoconferencing based on different types of labour, but we also deconstruct the phenomenon of videoconferencing itself into a family of related ‘videoconferencing’ use cases.

We explore these ideas further in our depiction, in Fig. 2 below. As shown in the figure, the very broad concept of “videoconferencing fatigue” (albeit also instantiated along the lines of synonyms like “Zoom fatigue”, “Teams fatigue”, “Skype fatigue”, etc.) can be deconstructed in two different ways. Firstly, we can deconstruct videoconferencing fatigue according to different types of labour involved in videoconferencing, as we have done so in our analysis of the literature, and each of these types of labour imply some abstracted entanglements of benefits, costs, and meanings. Secondly, we can deconstruct “videoconferencing fatigue” according to different use cases of videoconferencing, as we propose in the figure. The orthogonal concepts of “use cases of videoconferencing” (vertical ‘y’ axis) and “types of labour” (horizontal ‘x’ axis) are then instantiated across multiple “contexts of videoconferencing” such as workplace meetings, classroom settings, healthcare delivery, etc. We refer to this overall product of our theorising as our proposed “three-dimensional conceptual framework of videoconferencing fatigue”.

The contribution of this paper therefore aligns with these two forms of deconstruction.

Firstly, as per “Contribution 1” in Fig. 2, we have established actual categories representing different types of labour (namely interpretive, performative embodied, performative configuration, intensifying, alienating), grounded in the evidence presented by existing literature on videoconferencing fatigue. Whilst future research may reveal the existence of further categories, our existing categories already present an extensive and insightful framework with which the different aspects of videoconferencing fatigue can be discussed by researchers and practitioners: for example, when considering how to formulate a strategy for videoconferencing use within an organisation.

Secondly, informed by the above and as per “Contribution 2” in Fig. 2, we have hypothesised different use cases of videoconferencing, each involving some speculated combination of different types of labour. These involve not only the various instantiations of videoconferencing already visible in the literature, but also other phenomena which are not dissimilar to these instantiations of videoconferencing, for instance the performative labour involved in livestreaming work more broadly (Carter and Egliston, 2021; Johnson, 2021; Woodcock and Johnson, 2019). These are, at this stage, entirely hypothesised, since the existing literature considers videoconferencing fatigue to be its own phenomenon, and this kind of deconstruction is novel in this regard. As such, one area of future research—discussed in further detail below—would be to further investigate the constitution and consequences of these use cases of videoconferencing fatigue.

Towards an actionable framework for practitioners

Our findings above—revealing the various ways to conceptually deconstruct videoconferencing according to the type of labour

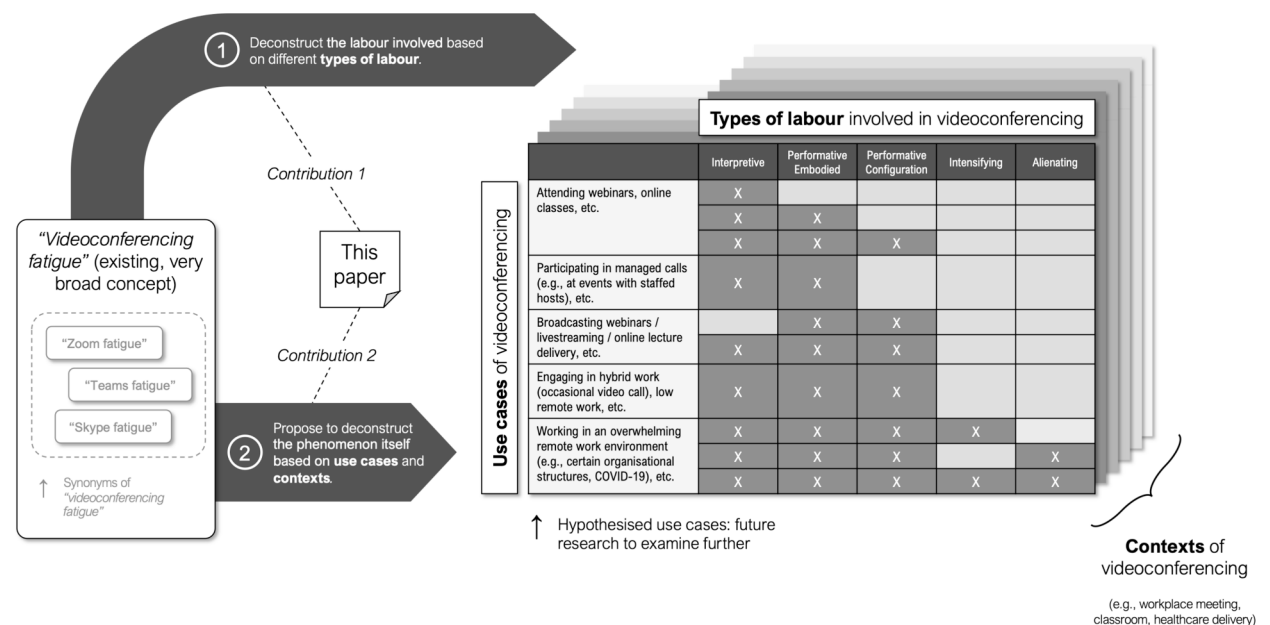


Fig. 2. Three-dimensional conceptual framework of videoconferencing fatigue: Types of labour, use cases of videoconferencing and contexts of videoconferencing.

undertaken, the use case of videoconferencing, and the context of videoconferencing—already offer a useful perspective on videoconferencing fatigue for practitioners to consider. We reassure practitioners that there is nothing ‘wrong’ with videoconferencing fatigue *per se*, and that they should avoid overly pathologising videoconferencing fatigue: videoconferencing requires a great amount of work—efforts to be exerted, labour to be undertaken—and doing a great amount of work is, unsurprisingly, fatiguing.

These deconstructions of videoconferencing fatigue provide the conceptual basis for us to now provide practitioners with a starting point towards engaging with the existing but highly generalised advice about how to handle videoconferencing fatigue, such as “to not hold unnecessary virtual meetings” (Li and Yee, 2023, p. 814) and that “VC [videoconferencing] fatigue needs to be weighed against several advantages of VC” (Döring et al., 2022, p. 15). Based on our experience teaching in business schools and working with industry partners, we therefore propose an idea for a “canvas”-style framework (Osterwalder and Pigneur, 2010; Schoormann et al., 2021) for practitioners to structure their thinking and support their strategic decision-making about whether videoconferencing is or is not appropriate for a given situation. Drawing on the five types of labour that we have developed through our review of the existing literature on videoconferencing fatigue, we present Fig. 3, a possible starting point for such a “canvas”-style framework.

We envision this kind of canvas to be used as a collective brainstorming and decision-making aid: for example, to be displayed and collectively annotated in a departmental “strategy day”, quarterly team meeting, or externally-facilitated staff development event (e.g., facilitated by consultants). Such an exercise may be particularly helpful for teams that have experienced high levels of videoconferencing fatigue; so, instead of reactively ‘coping’ with videoconferencing fatigue at an individual level, they could proactively strategise about how to address videoconferencing at a collective level. This collective approach is especially important given the increasingly voluminous evidence that videoconferencing fatigue is particularly adversely impacting certain groups – for example, girls and women as per concept 5C (Amboy et al., 2023; Fauville et al., 2023; Harriger and Pfund, 2022; Lee et al., 2023; Oducado et al., 2021; Phakey et al., 2023; Ratan et al., 2022; Shockley et al., 2021; Simbula et al., 2024; Standaert and Thunus, 2022) – suggesting that shifting the burden of ‘coping’ onto the individual is not only strategically questionable but also ethically questionable.

The fields at the top of the ‘canvas’ situate the particular brainstorming/decision-making session organisationally, temporally, and according to two of the three dimensions of our depiction in Fig. 2. Below that, each column of the canvas prompts the discussants to reflect on their subjective experience of the five types of labour in their videoconferencing. Each column begins by prompting discussants to place their experience of videoconferencing fatigue on an adapted version of the pain scale (Karcioglu et al., 2018), proverbially casting videoconferencing fatigue in an occupational health and wellbeing metaphor as well as in a design thinking ‘pain points’ metaphor (Datar and Bowler, 2015). For columns where there is consensus that there is no such ‘pain point’, it could be the case

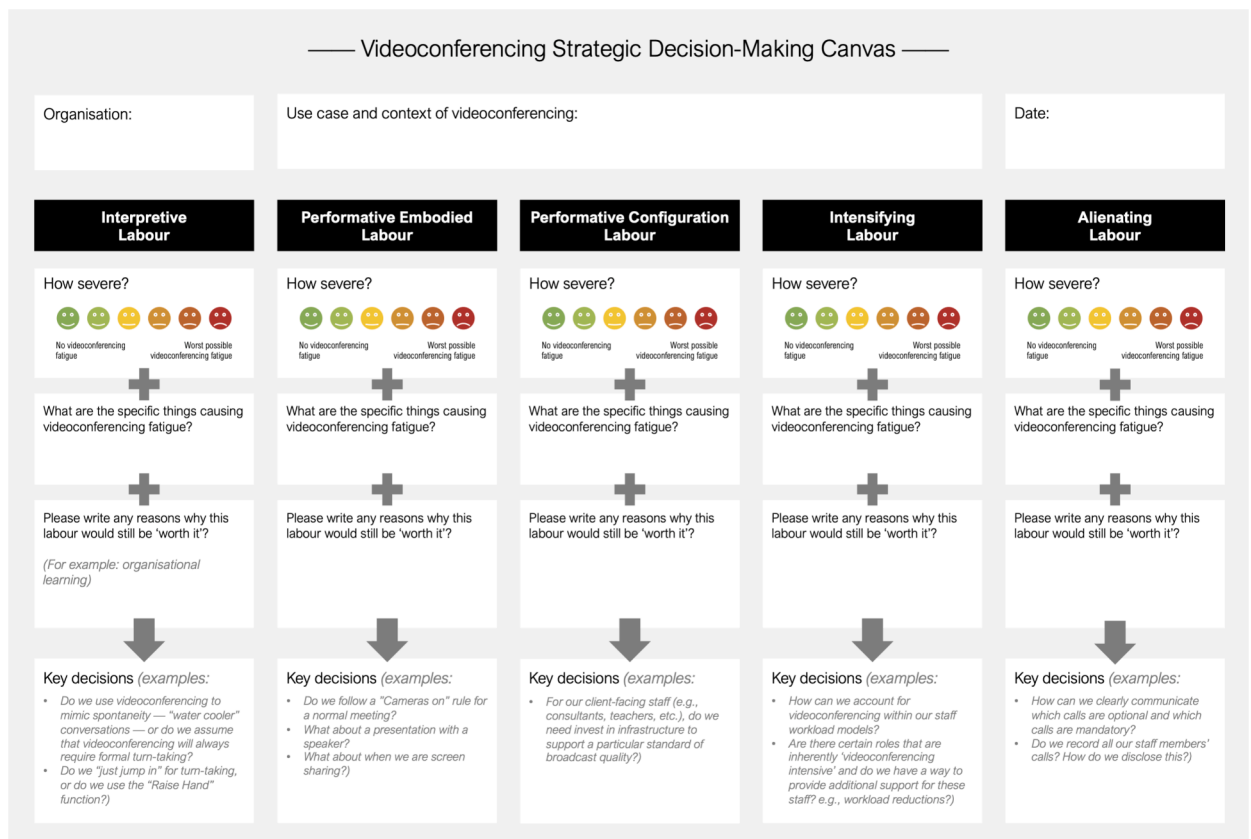


Fig. 3. Videoconferencing strategic decision-making canvas.

that this particular type of labour is not relevant in this particular use case and context of videoconferencing. For columns where there may be such a ‘pain point’ (i.e., the type of labour is indeed relevant and fatiguing), discussants are asked to reflect on not only what they feel may be causing the videoconferencing fatigue, but also contemplate if there may be reasons why that type of labour may still be ‘worth it’. Teaching an online class, for example, could be fatiguing but also rewarding and indeed central to an educational institution’s business model and value proposition. Likewise, taking time to attend knowledge-sharing ‘brown bag’ sessions, though fatiguing, could be potentially valuable for organisational learning. Finally, discussants are asked to consider—on the balance of the

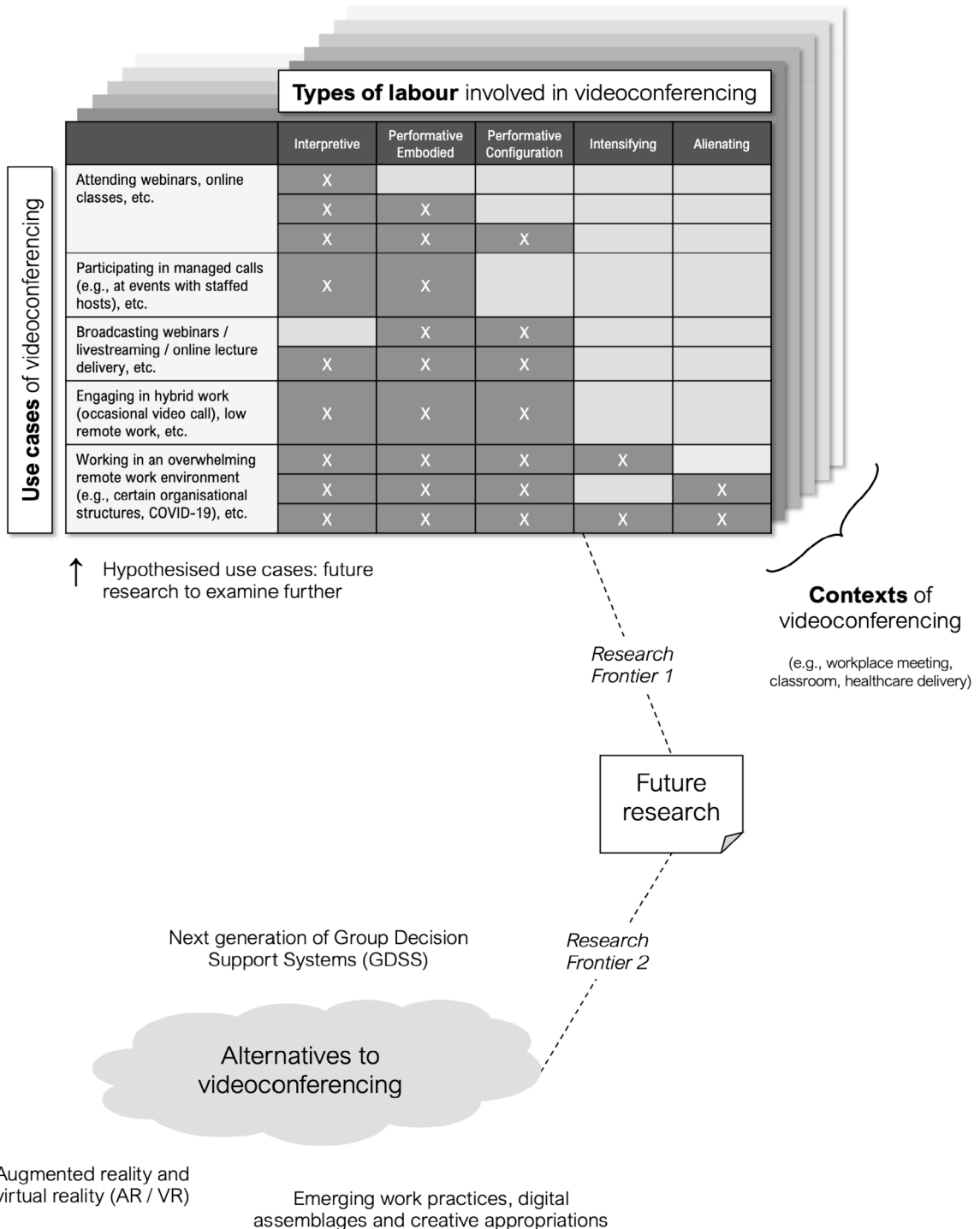


Fig. 4. Research frontiers.

above—whether there needs to be a collective decision about how to manage the fatiguing aspects of the labour whilst retaining the benefits as much as possible: for example, whether or not it is the social norm to have ‘cameras on’ for a particular kind of videoconferencing activity.

This canvas is by no means complete or final in any sense; it is simply an example of support for collective strategic decision-making about videoconferencing and videoconferencing fatigue that can be informed by our analysis of the literature. We suggest that this nuanced consideration of videoconferencing fatigue, broadly speaking, safeguards one’s thinking from sweeping generalisations and straw-man fallacies like “videoconferencing vs. in-person”, “videoconferencing vs. nothing at all”, or even “remote work is not feasible because of videoconferencing fatigue”. As practitioners informed by the different types of labour, asking ourselves questions like “Do we really need every single person in this call to have their camera on the whole time?” (thus reducing performative embodied labour for many audience members), and “Could we turn off cameras when we are screen-sharing?” (thus providing a brief respite to the interpretive and performative labour involved) enables innovations to our work practices that enable us to take advantage of the benefits of videoconferencing whilst addressing, even if not eradicating, videoconferencing fatigue.

Agenda for future scholarly research

Based on the understanding of videoconferencing fatigue constructed from our analysis of the literature and depicted in Fig. 2, we can understand videoconferencing fatigue in terms of different types of labour (grounded in existing literature) and use cases of videoconferencing (hypothesised/speculated). From this novel understanding, we can develop an agenda for future research, depicted in Fig. 4 below and discussed in further detail thereafter.

Research Frontier 1 challenges us to further develop the understanding of different types of labour and use cases of videoconferencing, with a particular emphasis on the latter, since the former is directly grounded in the existing literature as shown in the data structure (Fig. 1). A configurational approach (Henfridsson and Bygstad, 2013), such as Fuzzy Set Qualitative Configurational Analysis (fsQCA) (El Sawy et al., 2010), could be particularly promising in not only validating the different use cases but also their relationship both with the various types of labour as well as with the associated benefits, costs, and meanings. Ultimately, one of the objectives in this research frontier would be to provide a framework with which the benefits and costs of a proposed videoconferencing activity or practice (e.g., weekly “all-hands” team video call, a “dial-in” option for a conference event, etc.) could be quantified and assessed rationally. A cost estimating approach (Butt et al., 2021; Lederer et al., 1990) may be productive for this endeavour. Particular attention could be given to the paradoxical tensions (Smith and Lewis, 2011) that pull the balance of costs and benefits in a particular call towards opposing directions—such as that of *revealing* vs. *concealing*—and the possibility of dialectical synthesis between those oppositions (Ciriello and Mathiassen, 2022).

Research Frontier 2, on the other hand, challenges us to consider which business practices involving videoconferencing (and the ensuing videoconferencing fatigue) could be reimagined based on alternatives to videoconferencing. These designs include not only the platform design (and the technology underpinning them), but also, broadly, the work designs, i.e., designing configurations and

Table 5
Potential research questions for studying videoconferencing fatigue.

Research frontier 1	Research frontier 2
<ul style="list-style-type: none"> • RQ1: What are the distinct use cases of videoconferencing across different types of labour and work contexts? • RQ2: How do the costs and benefits of videoconferencing vary across different use cases and types of labour? • RQ3: What are the paradoxical tensions experienced by individuals during videoconferencing, and how do they navigate these tensions? • RQ4: How do organisational policies and practices shape the meanings and experiences of videoconferencing for employees? • RQ5: How do individual differences (e.g., personality, cognitive styles, communication preferences) influence the perception and management of videoconferencing demands? • RQ6: What coping strategies do individuals employ to manage the challenges of videoconferencing, and how effective are they? • RQ7: How does the interplay of videoconferencing practices and organisational culture influence employee well-being and productivity? • RQ8: How can videoconferencing platforms and tools be designed to better support different use cases and mitigate potential drawbacks? • RQ9: What are the ethical implications of extensive videoconferencing practices, particularly concerning privacy, surveillance, and digital inequalities? 	<ul style="list-style-type: none"> • RQ10: How can augmented and virtual reality technologies be effectively integrated into workplace communication to mitigate videoconferencing fatigue? • RQ11: What are the technical and user experience barriers to adopting augmented and virtual technologies for business communication, and how can they be overcome? • RQ12: What are the socio-cultural factors influencing the adoption and use of AR/VR technologies for videoconferencing in different contexts and cultures? • RQ13: How can group decision support systems be integrated with modern videoconferencing platforms to enhance collaboration, ideation, and decision-making processes? • RQ14: What are the potential benefits and risks of incorporating AI-driven features (e.g., automatic summarisation, task tracking) in next-generation group decision support systems to address videoconferencing fatigue? • RQ15: How can alternative work designs, such as new hand gestures or pedagogical innovations, be developed and implemented to mitigate videoconferencing fatigue in specific contexts (e.g., workplace meetings, online classrooms)? • RQ16: How can alternative work designs be informed by the principles of inclusive design and accessibility to ensure equitable experiences for diverse users? • RQ17: How do the affordances of alternative work designs compare to traditional videoconferencing platforms in terms of supporting different types of labour and use cases?

practices of humans and technology working together, in line with the sociotechnical (Sarker et al., 2019) positioning of this paper. We already draw attention to three clusters of such possible designs that we identify based on our literature review.

The first cluster involves augmented reality and virtual reality (AR/VR) technologies (Eriksson, 2021; Harendza et al., 2023; Sachan and Peiris, 2022), including related technologies such as LiDAR videogrammetry (Pesce, 2020). The reviewed literature indicates that these are promising but still in the early stages of maturity, with technical difficulties and limitations similar to virtual worlds and ‘metaverse’ concepts more broadly (Eriksson, 2021; Marabelli and Newell, 2023). However, the technologically simpler instantiations of augmented and virtual reality, such as in Kumospace and Gather.town (Dailey-Hebert, 2022; Tang et al., 2022), and hitherto largely overlooked comparable practices such as ‘vtuber’ livestreaming in East Asian digital cultures (Tang et al., 2021; Xu, 2021) could be adapted to reduce barriers to entry. In the future, the diffusion of recent technological innovations such as Apple’s virtual reality “personas” (Roth, 2023) could further increase the prevalence of AR/VR technologies and prompt studies of the same.

The second cluster involves renewed attention towards group decision support systems (GDSS). GDSS research reached a peak in the mid 1980 s to mid/late 1990 s (Hirschheim and Klein, 2012); but, as the work by Gebbing et al. (2022) (one of the papers in our sample) indicates, there is a promising avenue to combine features of modern videoconferencing systems with those of GDSS as conceived in the 1980 s and 1990 s. In addition to the various ideation and creativity supports that Gebbing et al. (2022) envision, historical GDSS research from decades ago draws attention to how GDSS may serve as “a group member that enables members to queue and filter information [which] may reduce information overload” (Nunamaker et al., 1991, p. 48), which may be of renewed interest in light of the recent attention towards videoconferencing fatigue. An approach combining GDSS and videoconferencing-like platforms may be further combined with recent advances in artificial intelligence—e.g., to automatically record and summarise meetings—entailing both benefits and risks to be considered in future research (Hefer et al., 2023). Fig. 4 therefore does not simply refer to ‘GDSS’, but to the ‘next generation of GDSS’, recontextualising GDSS for the current generation of technologies and work designs.

Finally, the third cluster constitutes those work designs (i.e., rather than platform designs). These include designs for workplace meetings taking place on videoconferencing, as exemplified by the new kinds of hand gestures proposed by Hills et al. (2022). In addition, they also include the designs for other use cases of videoconferencing, such as in education settings, exemplified by the pedagogical innovations seen in papers addressing videoconferencing fatigue in the online classroom (Ebner and Greenberg, 2020; Poskitt et al., 2022; Toney et al., 2021). Based on the broader literature on digital work and the futures of work, we recognise these as nascent examples of emerging work practices (Jarrahi et al., 2019; Morton et al., 2020), digital assemblages (Jarrahi et al., 2021), and creative appropriations (Feenberg, 2017). We envision future research to continue in the same spirit.

Table 5 distils the areas for future research from the frontiers discussed above into specific research questions.

Contributions to broader strategy literature

Although the discussion above has been so far focused on the contribution to knowledge on videoconferencing fatigue in particular, we now turn our attention to how understanding videoconferencing fatigue contributes to the broader literature on strategy in business and in information systems.

Firstly, we note that videoconferencing—whatever its complexities and problematics—is a tremendously promising technology in the broader context of globally-distributed work, digital work, and ‘work-from-anywhere’ remote work (Mickeler et al., 2023; Oshri et al., 2007) – and as such, it holds great potential for enhanced productivity (Choudhury et al., 2020). Although pre-COVID-19 literature from previous decades had then emphasised the importance of ‘face-to-face (F2F)’ meetings in such contexts (Oshri et al., 2007), we now live in an era where the meaning of ‘face’ could be perhaps not only ambiguous (physical face or virtual videoconferencing face?) but also uncertain (do we really need ‘face’ if the culture has shifted?).

Our literature review reveals that such questions should not be approached naively, given the inherent complexities across all the various types of labour, use cases and contexts involved in videoconferencing. Engaging with these complexities holds promise in being able to unlock the benefits of videoconferencing whilst carefully and strategically managing the prospect of videoconferencing fatigue. These complexities’ instantiation within the phenomenon of videoconferencing fatigue appears relatively novel, but in many cases they are closely linked with known issues in strategy literature, such as the gendered nature of sensitivity towards being seen or unseen (Mickeler et al., 2023).

As we have depicted in Fig. 3, we suggest that one immediately actionable insight for practitioners is to intentionally and explicitly define a collective strategy towards videoconferencing fatigue by setting norms together. Our proposed ‘canvas’, though only an indicative example, highlights the point made by Asatiani and Norström (2023) that “remote work arrangements complicate socialisation processes, and remote workers need to find new ways to understand norms and behaviors to develop identity and cohesion” (p. 12). We suggest that the understanding of videoconferencing fatigue developed in this paper – presented now in Fig. 2 and Fig. 4 in terms of the types of labour, use cases of videoconferencing and contexts of videoconferencing – facilitates ways of thinking about videoconferencing fatigue that helps all of us think about how to arrive at norms and behaviours that develop identity and cohesion in our videoconferencing calls.

Limitations

Despite the various contributions of this paper as outlined above, it is important that we acknowledge the limitations of this paper.

First, given that we follow an interpretivist, hermeneutic approach to literature review (Böll and Cecez-Kecmanovic, 2014), entailing grounded theory analysis (Wolfswinkel et al., 2013) following the coding methodology described by Gioia et al. (2013), our findings should be understood according to the constraints of this epistemological setting. The work we have presented in this paper seeks to be revelatory and insightful (e.g., in revealing the types of labour and their relevance to videoconferencing fatigue), rather than confirmatory or epidemiological. This is not a *meta*-analysis, and we do not seek to make claims about effect sizes, statistical significance or the physiological efficacy of potential interventions. As such, our work here is intended to be an indicative sample of knowledge on videoconferencing fatigue, and we do not claim to capture the totality of all knowledge on videoconferencing fatigue. As Alvesson and Sandberg (2020) put it, “our key point is to have a revealing but manageable sample – allowing for critical scrutiny and insight generation rather than aiming for vacuum cleaning” (Alvesson and Sandberg, 2020, p. 1298). Our work is, likewise, in keeping with the hermeneutic approach (Böll and Cecez-Kecmanovic, 2014), transparent but not deterministically replicable due to the central importance of interpretation within our epistemological approach. Of course, other kinds of future work are certainly not precluded for future research and could be valuable for both Research Frontier 1 and Research Frontier 2 as we have previously discussed.

Second, in line with the coding methodology that we have followed (Gioia et al., 2013), first-order concepts are aggregated as child nodes to only one parent node (i.e., only one second-order theme), which thus precludes more elaborate mapping of interrelationships between first-order concepts. We acknowledge that this methodology is critiqued for its rigidity and the problematisation of its underlying naturalist epistemological orientation (Mees-Buss et al., 2022), even as this critique is itself thoroughly debated (Gioia et al., 2022). However, at the same time, we appreciate the demonstrated insightfulness of applying this methodology, particularly to the context of literature review (e.g., Leemann and Kanbach, 2021). We suggest that the interrelationships between first-order concepts could be best explored through future research, empirically, perhaps with a configurational approach (Henfridsson and Bygstad, 2013) like Fuzzy Set Qualitative Configurational Analysis (fsQCA) (El Sawy et al., 2010), as we have outlined in our description of Research Frontier 1. (We thank the reviewer of this paper who pointed out the pair of first-order concepts “2C. Cognitive load of multitasking” and “6D. Self-view vs. paying attention” as an example of such a potential interrelationship.)

Overall, the limitations remind us that our work here is only a starting point, capturing a view of what extant literature on videoconferencing fatigue can reveal so far, while also providing a view of how future work could provide further insights.

Conclusion

This paper has presented a critical literature review of videoconferencing fatigue—critical both in the sense of problematising the absence of a perspective hitherto absent in the literature (Paré et al., 2015), and in the sense of the critical research paradigm (Cecez-Kecmanovic, 2011)—in particular with a concern for labour (Bronner, 2011).

Grounded in the existing literature on videoconferencing fatigue, we have presented detailed coding of the knowledge from the existing literature organised according to five types of the labour involved in videoconferencing: interpretive labour, performative embodied labour, performative configuration labour, intensifying labour, and alienating labour. This new perspective empowers collective decision-making about how to strategically address videoconferencing fatigue (rather than leave individuals to ‘cope’ with videoconferencing fatigue alone), exemplified by our proposed “videoconferencing strategic decision-making canvas”, “three-dimensional conceptual framework of videoconferencing fatigue”, and similar such products of theorising. Such ideas provide a basis for future research addressing two research frontiers: 1) further developing the understanding of different types of labour and use cases of videoconferencing; and 2) considering how business practices involving videoconferencing could be reimagined based on alternatives to videoconferencing and new platform designs and work designs. This paper thus contributes towards solving the very real problem of videoconferencing fatigue, and in doing so, supports broader efforts around digital work and the futures of work.

CRedit authorship contribution statement

Blair Wang: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Julian Prester:** Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix

Appendix A. Charts

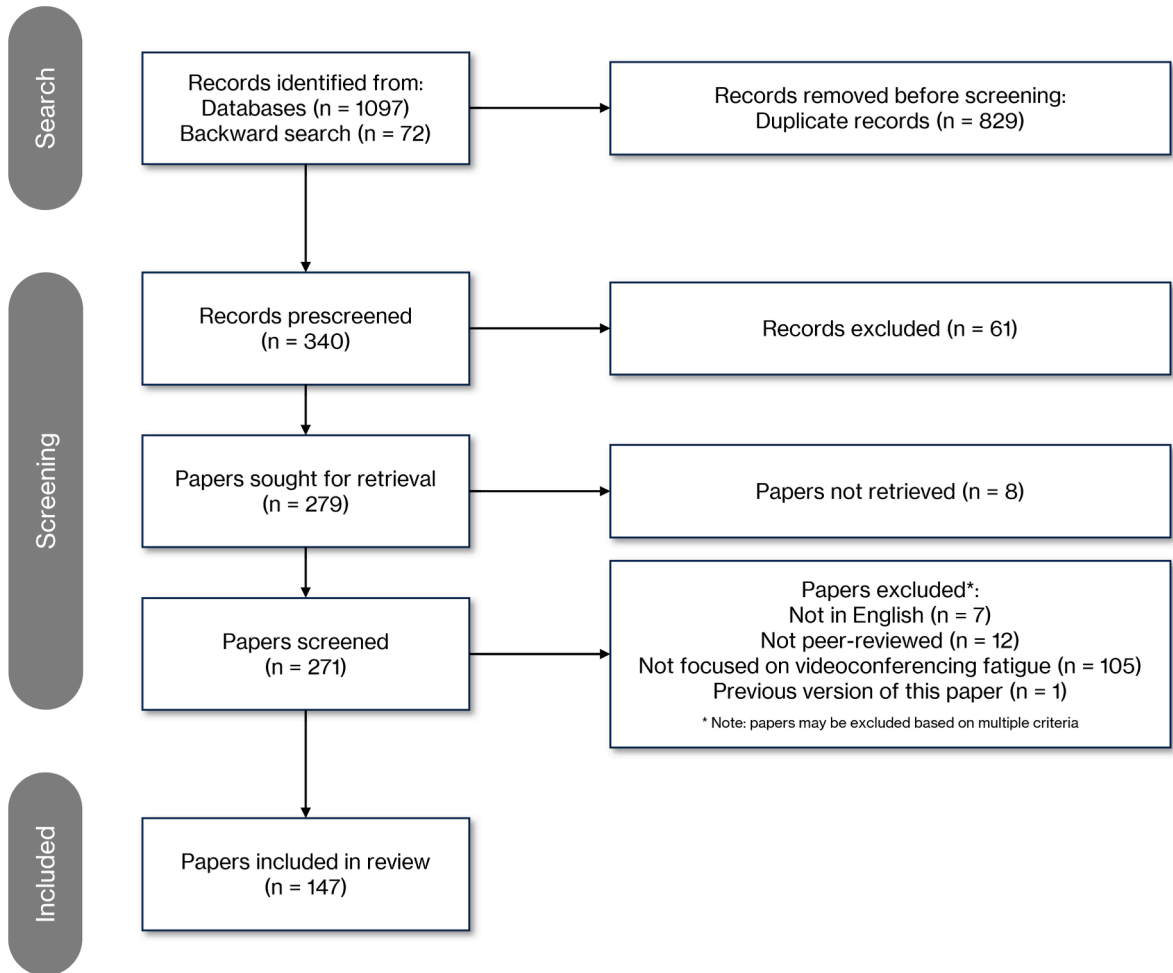


Fig. 5. PRISMA-style chart.

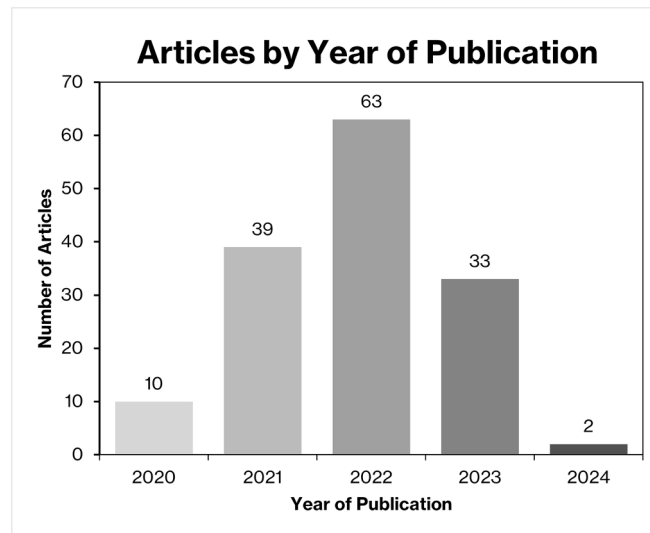


Fig. 6. Articles by year of publication.

Appendix B. Concept matrix

No.	Paper	Classification	Research design	Primary context of videoconferencing	Contributed to first-order concepts
1	Aagaard (2022)	Conceptual	Conceptual and Theoretical Development	General-purpose	1B, 3A, 3B, 5B, 6A, 6B, 6C
2	Abdelrahman (2022)	Conceptual	Conceptual and Theoretical Development	Workplace meetings	14D
3	Abdullah et al. (2021)	Empirical	Experiment	Workplace meetings	1A, 4B, 12A
4	Abramova et al. (2021)	Empirical	Survey	Workplace meetings	6B, 6C
5	Alencar et al. (2023)	Empirical	Survey	Educational setting (teaching/learning/classroom)	5C
6	Allen et al. (2022)	Empirical	Survey	Workplace meetings	10B, 11C, 13C
7	Amboy et al. (2023)	Empirical	Experiment	Educational setting (teaching/learning/classroom)	5C
8	Amponsah et al. (2022)	Empirical	Case Study	Educational setting (teaching/learning/classroom)	1C, 2B, 3C, 7A, 10B, 13A
9	Anderson and Looi (2020)	Conceptual	Conceptual and Theoretical Development	Educational setting (teaching/learning/classroom)	5A
10	Tuan Anh et al. (2022)	Empirical	Survey	General-purpose	7A, 11A
11	Arellano et al. (2023)	Empirical	Case Study	Educational setting (teaching/learning/classroom)	1D
12	Asgari et al. (2021)	Empirical	Survey	Educational setting (teaching/learning/classroom)	10B
13	Ashour et al. (2021)	Empirical	Survey	Educational setting (teaching/learning/classroom)	3B
14	Bailenson (2021)	Conceptual	Conceptual and Theoretical Development	General-purpose	1B, 2A, 4A, 5A, 5B, 6A, 6B
15	Barbeau et al. (2022)	Empirical	Interviews	Creative arts	4C
16	Bedenlier et al. (2021)	Empirical	Survey	Educational setting (teaching/learning/classroom)	13B
17	Belitskaja (2023)	Conceptual	Conceptual and Theoretical Development	General-purpose	3C
18	Bennett et al. (2021)	Empirical	Mixed Methods	Workplace meetings	1C, 2C, 10B, 11C, 13A, 13B
19	Bergmann et al. (2023)	Empirical	Mixed Methods	Workplace meetings	13A
20	Bess et al. (2022)	Empirical	Mixed Methods	Educational setting (teaching/learning/classroom)	3B
21	Böhm and Müller (2022)	Conceptual	Teaching Case	Social gatherings, religious gatherings, conferences and events	9A, 10B
22	Bonanomi et al. (2021)	Empirical	Survey	General-purpose	5C
23	Branch et al. (2023)	Empirical	Experiment	Workplace meetings	8B
24	Bullock et al. (2022)	Conceptual	Conceptual and Theoretical Development	Educational setting (teaching/learning/classroom)	7A, 10A, 11A
25	Buro et al. (2023)	Empirical	Experiment	Scientific and scholarly research	11B

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No.	Paper	Classification	Research design	Primary context of videoconferencing	Contributed to first-order concepts
26	Burton-Jones and Stein (2021)	Conceptual	Editorial	Educational setting (teaching/learning/classroom)	3B
27	Cao et al. (2021)	Empirical	Mixed Methods	Workplace meetings	2C
28	Castiglione et al. (2022)	Empirical	Mixed Methods	Social gatherings, religious gatherings, conferences and events	11B
29	Chaparro et al. (2022)	Conceptual	Literature Review of Videoconferencing Fatigue	General-purpose	
30	Charoenporn and Chareemboon (2023)	Empirical	Survey	General-purpose	14D
31	Chatha and Qayyum (2023)	Empirical	Experiment	Educational setting (teaching/learning/classroom)	11B
32	Cheddad and Nordahl (2022)	Empirical	Interviews	Educational setting (teaching/learning/classroom)	9A
33	Chen and Zhou (2023)	Empirical	Survey	General-purpose	6A
34	Collins (2020)	Conceptual	Conceptual and Theoretical Development	General-purpose	1B, 13B
35	Connolly et al. (2022)	Empirical	Case Study	Educational setting (teaching/learning/classroom)	3B
36	Cranford (2020)	Conceptual	Editorial	Workplace meetings	11C
37	Dacillo et al. (2022)	Empirical	Survey	Educational setting (teaching/learning/classroom)	1C, 3B, 10B
38	Dailey-Hebert (2022)	Empirical	Survey	Educational setting (teaching/learning/classroom)	13B
39	Darr et al. (2021)	Empirical	Analysis of Secondary Data	Educational setting (teaching/learning/classroom)	1D
40	Deniz et al. (2022)	Empirical	Survey	Educational setting (teaching/learning/classroom)	5C
41	Döring et al. (2022)	Conceptual	Literature Review of Videoconferencing Fatigue	General-purpose	
42	Ebardo et al. (2021)	Empirical	Survey	Educational setting (teaching/learning/classroom)	13C
43	Ebner and Greenberg (2020)	Conceptual	Conceptual and Theoretical Development	Educational setting (teaching/learning/classroom)	14D
44	Elbogen et al. (2022)	Empirical	Survey	Workplace meetings	11B
45	Eriksson (2021)	Empirical	Case Study	Educational setting (teaching/learning/classroom)	13B
46	Fadhli et al. (2022)	Empirical	Case Study	Educational setting (teaching/learning/classroom)	14D
47	Fauville et al. (2021)	Empirical	Survey	General-purpose	10A, 10B
48	Fauville et al. (2023)	Empirical	Survey	General-purpose	2A, 4A, 5A, 5B, 5C, 6A, 10A, 10B
49	Franco et al. (2022)	Empirical	Survey	Educational setting (teaching/learning/classroom)	11A, 12B
50	Garg et al. (2022)	Empirical	Experiment	General-purpose	3A
51	Gebbing et al. (2022)	Empirical	Design Science	Creative arts	13A
52	George et al. (2022)	Empirical	Experiment	General-purpose	5C
53	Gray et al. (2021)	Conceptual	Conceptual and Theoretical Development	General-purpose	14D
54	Gupta et al. (2022)	Conceptual	Conceptual and Theoretical Development	Educational setting (teaching/learning/classroom)	10B
55	Hacker et al. (2020)	Empirical	Analysis of Secondary Data	General-purpose	7A, 7B, 8A, 8B, 10B, 14A
56	Hall (2020)	Conceptual	Conceptual and Theoretical Development	Educational setting (teaching/learning/classroom)	14D
57	Harding (2021)	Conceptual	Conceptual and Theoretical Development	General-purpose	7A
58	Harendza et al. (2023)	Empirical	Mixed Methods	Educational setting (teaching/learning/classroom)	13B
59	Harriger and Pfund (2022)	Empirical	Survey	General-purpose	5C, 8A
60	Hills et al. (2022)	Empirical	Experiment	General-purpose	4A
61	Hove and Watson (2022)	Conceptual	Literature Review of Videoconferencing Fatigue	General-purpose	
62	Jang and Choi (2022)	Empirical	Survey	Social gatherings, religious gatherings, conferences and events	7A, 14B
63	Johns et al. (2021)	Empirical	Survey	General-purpose	1C, 7A, 8A, 9B
64	Johnson and Mabry (2022)	Empirical	Survey	Workplace meetings	4C, 5C, 10A, 10D, 11B, 13C
65	Karl et al. (2021)	Empirical	Analysis of Secondary Data	Workplace meetings	2C, 5A, 13B
66	Knox et al. (2023)	Empirical	Survey	General-purpose	2C

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No.	Paper	Classification	Research design	Primary context of videoconferencing	Contributed to first-order concepts
67	Kubi et al. (2021)	Empirical	Case Study	Virtual job interviews	8B
68	Kuhn (2022)	Empirical	Survey	General-purpose	6A
69	Kushlev and Epstein-Shuman (2022)	Empirical	Survey	Educational setting (teaching/learning/classroom)	5A, 9A
70	Kushner (2021)	Empirical	Experiment	General-purpose	1B
71	Lee et al. (2023)	Empirical	Survey	Educational setting (teaching/learning/classroom)	5C
72	Lestari and Fayasari (2022)	Empirical	Survey	General-purpose	5A, 10A
73	Li et al. (2022c)	Empirical	Experiment	General-purpose	5A
74	Li and Lee (2023)	Empirical	Experiment	General-purpose	8D
75	B. J. Li et al. (2022a)	Empirical	Survey	General-purpose	1C, 10A
76	B. J. Li et al. (2022b)	Empirical	Survey	Workplace meetings	10A
77	Li and Yee (2023)	Conceptual	Literature Review of Videoconferencing Fatigue	General-purpose	
78	Lucerna et al. (2023)	Conceptual	Conceptual and Theoretical Development	Healthcare	10B
79	Massner (2022)	Empirical	Mixed Methods	Educational setting (teaching/learning/classroom)	1A, 3B, 10B, 12A, 14C
80	McCoyd et al. (2022)	Empirical	Survey	Healthcare	1A
81	Merchant (2023)	Empirical	Survey	Healthcare	6A, 7B, 12A, 12B
82	Montag et al. (2022)	Empirical	Survey	General-purpose	5C
83	Moralista et al. (2022)	Empirical	Survey	Educational setting (teaching/learning/classroom)	2A, 4A, 5A, 5B, 6A
84	Moreira and Zhang (2023)	Conceptual	Conceptual and Theoretical Development	Legal (courtroom)	12B
85	Nadler (2020)	Conceptual	Conceptual and Theoretical Development	General-purpose	8A, 12A, 14C, 14D
86	Nesher Shoshan and Wehrt (2022)	Empirical	Mixed Methods	Workplace meetings	1A, 9B, 10A, 11C
87	Ngien and Hogan (2023)	Empirical	Survey	General-purpose	6A
88	Nurhadi et al. (2023)	Empirical	Mixed Methods	General-purpose	8C
89	Nurmi and Pakarinen (2023)	Empirical	Survey	General-purpose	13C
90	O'Lynn (2022)	Conceptual	Conceptual and Theoretical Development	Social gatherings, religious gatherings, conferences and events	1A, 7A
91	Oducado et al. (2022a)	Empirical	Survey	Workplace meetings	5B, 6A, 10B
92	Oducado et al. (2021)	Empirical	Survey	Educational setting (teaching/learning/classroom)	1C, 5C
93	Oducado et al. (2022b)	Empirical	Survey	Educational setting (teaching/learning/classroom)	2A, 4A, 5A, 5B, 6A
94	Oducado et al. (2022c)	Empirical	Survey	Workplace meetings	2A, 4A, 5A, 5B, 6A
95	Pennington et al. (2021)	Empirical	Survey	Workplace meetings	13B
96	Peper et al. (2021)	Empirical	Case Study	Educational setting (teaching/learning/classroom)	2B, 4B, 6A, 8A, 9B, 14C
97	Pesce (2020)	Conceptual	Conceptual and Theoretical Development	General-purpose	13B
98	Phakey et al. (2023)	Empirical	Survey	Educational setting (teaching/learning/classroom)	5C
99	Poskitt et al. (2022)	Empirical	Case Study	Educational setting (teaching/learning/classroom)	14D
100	Pure and Stefanac (2023)	Empirical	Case Study	Healthcare	7A, 8A, 9B
101	Putra et al. (2024)	Empirical	Experiment	Scientific and scholarly research	13B
102	Qiu et al. (2023)	Empirical	Experiment	General-purpose	13B
103	Queiroz et al. (2023)	Empirical	Survey	General-purpose	10C, 13A
104	Ratan et al. (2022)	Empirical	Survey	General-purpose	5C
105	Riedl (2021)	Conceptual	Literature Review of Videoconferencing Fatigue	General-purpose	
106	Riedl et al. (2023)	Empirical	Experiment	Educational setting (teaching/learning/classroom)	2A
107	Röbler et al. (2021)	Empirical	Experiment	General-purpose	4C
108	Rot et al. (2022)	Empirical	Mixed Methods	Social gatherings, religious gatherings, conferences and events	2B
109	Sachan and Peiris (2022)	Empirical	Mixed Methods	Educational setting (teaching/learning/classroom)	13B
110	Sahi et al. (2021)	Empirical	Survey	General-purpose	10A
111	Salim et al. (2022a)	Empirical	Survey	Educational setting (teaching/learning/classroom)	3C

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No.	Paper	Classification	Research design	Primary context of videoconferencing	Contributed to first-order concepts
112	Salim et al. (2022b)	Empirical	Survey	Educational setting (teaching/learning/classroom)	5C
113	Savage and Couture Bue (2023)	Empirical	Experiment	Educational setting (teaching/learning/classroom)	6B
114	Schwartz et al. (2022)	Empirical	Experiment	Social gatherings, religious gatherings, conferences and events	1D
115	Seitz et al. (2022)	Empirical	Experiment	Workplace meetings	6B
116	Seitz et al. (2023)	Conceptual	Conceptual and Theoretical Development	General-purpose	8D
117	Shahrivini et al. (2021)	Empirical	Survey	Educational setting (teaching/learning/classroom)	11C
118	Shklarski et al. (2021)	Empirical	Mixed Methods	Healthcare	1A, 1C, 2A, 5A, 12B
119	Shockley et al. (2021)	Empirical	Experiment	Workplace meetings	5C
120	Siegert and Niebuhr (2021)	Empirical	Experiment	General-purpose	5C
121	Simbula et al. (2024)	Empirical	Survey	General-purpose	5C
122	Singh Chawla (2021)	Empirical	Survey	Scientific and scholarly research	3A
123	Standaert and Thunus (2022)	Empirical	Survey	Workplace meetings	5C
124	Stoeckl and Eckhardt (2022)	Empirical	Survey	Educational setting (teaching/learning/classroom)	5C, 7A, 10A
125	Sumner (2022)	Conceptual	Conceptual and Theoretical Development	General-purpose	5A, 6B, 8A
126	Taber et al. (2022)	Empirical	Mixed Methods	General-purpose	4C, 8B, 12A
127	Tang et al. (2022)	Empirical	Case Study	Educational setting (teaching/learning/classroom)	13B
128	Tarab (2023)	Empirical	Survey	Scientific and scholarly research	10D
129	Toney et al. (2021)	Conceptual	Teaching Case	Educational setting (teaching/learning/classroom)	9A, 14D
130	Tufvesson (2020)	Conceptual	Conceptual and Theoretical Development	General-purpose	2A, 3A, 6B
131	Vallejo et al. (2022)	Empirical	Survey	Virtual job interviews	12B
132	Vandenberg and Magnuson (2021)	Empirical	Mixed Methods	Educational setting (teaching/learning/classroom)	12B
133	Vidolov (2022)	Empirical	Phenomenology	General-purpose	2B, 6A, 6B, 6C, 8A, 8B, 9B, 11B
134	Vogt et al. (2022)	Empirical	Experiment	Educational setting (teaching/learning/classroom)	1D
135	Walcott-Bedeau (2022)	Empirical	Experiment	Educational setting (teaching/learning/classroom)	8C
136	Webb (2021)	Conceptual	Conceptual and Theoretical Development	Educational setting (teaching/learning/classroom)	2A, 2C, 3C, 4A, 5A, 5B, 6A, 6B, 8A, 10B, 12A
137	Weiss et al. (2021)	Empirical	Case Study	Educational setting (teaching/learning/classroom)	1A, 11B, 14D
138	Wiederhold (2020)	Conceptual	Editorial	General-purpose	1A, 3A, 5A, 9B, 10B
139	Williams (2021)	Conceptual	Conceptual and Theoretical Development	General-purpose	10A
140	Williams et al. (2022)	Empirical	Experiment	Healthcare	10B
141	Woods (2021)	Conceptual	Conceptual and Theoretical Development	Workplace meetings	1B, 2A, 6A
142	Yeh and Tsai (2022)	Conceptual	Conceptual and Theoretical Development	Educational setting (teaching/learning/classroom)	1A, 10A
143	Yosep et al. (2023)	Empirical	Survey	Educational setting (teaching/learning/classroom)	5C
144	Zaza et al. (2023)	Empirical	Survey	Workplace meetings	5B
145	Zhang et al. (2023)	Empirical	Survey	General-purpose	5C
146	Zubek et al. (2022)	Empirical	Experiment	General-purpose	5B
147	de Oliveira et al. (2022)	Empirical	Survey	Educational setting (teaching/learning/classroom)	10A

Appendix C. Primary context of videoconferencing: Descriptive statistics

Primary context of videoconferencing	Number of papers
General-purpose	52
Educational setting (teaching/learning/classroom)	52
Workplace meetings	22
Social gatherings, religious gatherings, conferences and events	6
Healthcare	6
Scientific and scholarly research	4
Virtual job interviews	2
Creative arts	2
Legal (courtroom)	1
Grand Total	147

Appendix D. First-order concept × primary context of videoconferencing

The numbers listed in the cells represent the number of papers tagged against each primary context of videoconferencing (columns) are contributing to the listed first-order concept (rows). The sum across all cells exceeds the number of papers because each paper can contribute to multiple first-order concepts.

First-order concept	Creative arts	Education (classroom)	General-purpose	Healthcare	Legal (courtroom)	Scientific and scholarly research	Social gatherings, religious gatherings, conferences and events	Virtual job interviews	Workplace meetings
1A. Absence of verbal backchannels, leading to a 'newscast' effect	0	3	1	2	0	0	1	0	2
1B. Interpreting with abnormal eye contact (eccentric gaze)	0	0	4	0	0	0	0	0	1
1C. Interpreting low-fidelity high-noise transmission	0	3	2	1	0	0	0	0	1
1D. Observed impact of information inadequacies	0	3	0	0	0	0	1	0	0
2A. Cognitive load of interpreting non-verbal cues	0	4	3	1	0	0	0	0	2
2B. Cognitive load of maintaining situational awareness	0	2	1	0	0	0	1	0	0
2C. Cognitive load of multitasking	0	1	1	0	0	0	0	0	3
3A. Awkward asynchronous turn-taking due to latency	0	0	4	0	0	1	0	0	0
3B. Inhibited spontaneity, for which breakout rooms are a poor substitute	0	6	1	0	0	0	0	0	0
3C. Intensive use of flat light-emitting screen displays	0	3	1	0	0	0	0	0	0
4A. Amplified gestures and vocalisation	0	3	3	0	0	0	0	0	1
4B. Person-directed gaze	0	1	0	0	0	0	0	0	1
4C. Surface acting	1	0	2	0	0	0	0	0	1
5A. Hyper gaze, 'Zoom gaze' (number of faces, face size)	0	5	6	1	0	0	0	0	2
5B. Restricted mobility and motility	0	3	4	0	0	0	0	0	3
5C. Self-image, especially in relation to gender, age, psychology	0	9	9	0	0	0	0	0	3
6A. Self-view for self-surveillance	0	4	7	1	0	0	0	0	3
6B. Self-view as necessary but distorted performance control	0	2	5	0	0	0	0	0	2
6C. Self-view vs. paying attention	0	0	2	0	0	0	0	0	1
7A. Perceived ease-of-use vs. techno-complexity	0	3	4	1	0	0	2	0	0
7B. Privacy complications	0	0	1	1	0	0	0	0	0
8A. Camera and room setup techniques	0	2	6	1	0	0	0	0	0
8B. Revealing vs. concealing	0	0	3	0	0	0	0	1	1

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First-order concept	Creative arts	Education (classroom)	General-purpose	Healthcare	Legal (courtroom)	Scientific and scholarly research	Social gatherings, religious gatherings, conferences and events	Virtual job interviews	Workplace meetings
8C. Mood and relaxation support techniques	0	1	1	0	0	0	0	0	0
8D. Emerging role of artificial intelligence in videoconference configuration	0	0	2	0	0	0	0	0	0
9A. Supporting activities and materials	0	3	0	0	0	0	1	0	0
9B. Text chat and emojis	0	1	3	1	0	0	0	0	1
10A. Videoconferencing total load, techno-overload	0	4	6	0	0	0	0	0	3
10B. Back-to-back scheduling vs. 'burstiness' breaks	0	6	4	2	0	0	1	0	3
10C. Interplay of duration, group size and frequency	0	0	1	0	0	0	0	0	0
10D. Crowding out work responsibilities	0	0	0	0	0	1	0	0	1
11A. Pattern adaptation, techno-invasion	0	2	1	0	0	0	0	0	0
11B. Concurrent personal demands	0	2	1	0	0	1	1	0	2
11C. Fungible grid temporality	0	1	0	0	0	0	0	0	4
12A. Inherent intimacy of videoconferencing calls	0	2	2	1	0	0	0	0	1
12B. High-stakes videoconferencing calls	0	2	0	2	1	0	0	1	0
13A. Conflation of socialisation and task-orientation	1	1	1	0	0	0	0	0	2
13B. Conflation of face-sharing and general presence	0	6	3	0	0	1	0	0	3
13C. Perceived usefulness vs. futility	0	1	1	0	0	0	0	0	2
14A. Apparent workplace surveillance	0	0	1	0	0	0	0	0	0
14B. Mandatory vs. voluntary participation	0	0	0	0	0	0	1	0	0
14C. Post-COVID-19 expectations, 'Pandora's box'	0	2	1	0	0	0	0	0	0
14D. Sense-affirming vs. sense-negating mitigation techniques	0	6	3	0	0	0	0	0	1

Appendix E. Count of empirical vs. Conceptual papers for each first-order concept

As shown below, there is empirical support for each and every first-order concept.

First-order concept	Empirical papers	Conceptual papers
1A. Absence of verbal backchannels, leading to a 'newscast' effect	6	3
1B. Interpreting with abnormal eye contact (eccentric gaze)	1	4
1C. Interpreting low-fidelity high-noise transmission	7	0
1D. Observed impact of information inadequacies	4	0
2A. Cognitive load of interpreting non-verbal cues	6	4
2B. Cognitive load of maintaining situational awareness	4	0
2C. Cognitive load of multitasking	4	1
3A. Awkward asynchronous turn-taking due to latency	2	3
3B. Inhibited spontaneity, for which breakout rooms are a poor substitute	5	2
3C. Intensive use of flat light-emitting screen displays	2	2
4A. Amplified gestures and vocalisation	5	2
4B. Person-directed gaze	2	0
4C. Surface acting	4	0
5A. Hyper gaze, 'Zoom gaze' (number of faces, face size)	9	5
5B. Restricted mobility and motility	7	3

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First-order concept	Empirical papers	Conceptual papers
5C. Self-image, especially in relation to gender, age, psychology	21	0
6A. Self-view for self-surveillance	11	4
6B. Self-view as necessary but distorted performance control	4	5
6C. Self-view vs. paying attention	2	1
7A. Perceived ease-of-use vs. techno-complexity	7	3
7B. Privacy complications	2	0
8A. Camera and room setup techniques	6	3
8B. Revealing vs. concealing	5	0
8C. Mood and relaxation support techniques	2	0
8D. Emerging role of artificial intelligence in videoconference configuration	1	1
9A. Supporting activities and materials	2	2
9B. Text chat and emojis	5	1
10A. Videoconferencing total load, techno-overload	10	3
10B. Back-to-back scheduling vs. 'burstiness' breaks	11	5
10C. Interplay of duration, group size and frequency	1	0
10D. Crowding out work responsibilities	2	0
11A. Pattern adaptation, techno-invasion	2	1
11B. Concurrent personal demands	7	0
11C. Fungible grid temporality	4	1
12A. Inherent intimacy of videoconferencing calls	4	2
12B. High-stakes videoconferencing calls	5	1
13A. Conflation of socialisation and task-orientation	5	0
13B. Conflation of face-sharing and general presence	11	2
13C. Perceived usefulness vs. futility	4	0
14A. Apparent workplace surveillance	1	0
14B. Mandatory vs. voluntary participation	1	0
14C. Post-COVID-19 expectations, 'Pandora's box'	2	1
14D. Sense-affirming vs. sense-negating mitigation techniques	4	6

Data availability

Data will be made available on request.

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