

## Characterising Fatigue

It is verging on cliché nowadays to moan about the struggles of video calls. The pandemic has exposed just how imperfect our current methods of online communication are; as a result, this dissertation aimed to offer sound evidence as to why this might be. It will uncover the main flaws of current videoconferencing technologies in relation to their negative psychological effects on human activity, and then build upon this knowledge to suggest design directions that they should take. If we can understand which of Zoom's features are producing an overload which in turn causes fatigue, then this gives clear targets to technologists to improve, change and adapt upon. Consequently, research oriented towards answering:

- 1) What constitutes the overload that causes Zoom fatigue?
- 2) Which of Zoom's characteristics are responsible for this overload?
- 3) How do we nullify the harmful effects of Zoom?

Guided by the theory of transactional stress and coping (TTSC), the field of conversation analysis formed the basis of the research model. Zoom fatigue was split into the five dimensions described by Fauville et al. in 2021, and then each of these dimensions explored to uncover potential stressors (the causation of strain/fatigue). These stressors were then linked back to characteristics within Zoom, completing the pathways from fatigue to its (potential) antecedents. For example, one stressor-strain pathway was:



The next step was to test these qualitative hypotheses through a quantitative survey.

## Research Methods and Data Analysis

The research model was formatted into a survey, each latent variable (i.e., the items in the model, such as 'Increased Cognitive Load', which encapsulate an abstract/latent construct) being represented by three questions. Scales used and validated in previous studies were modified to fit Zoom's context, each being measured on a 7-point Likert scale. Here is a question as an example:

**During Zoom calls, I feel like I need to look at my camera to show that I'm paying attention.**  
Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree

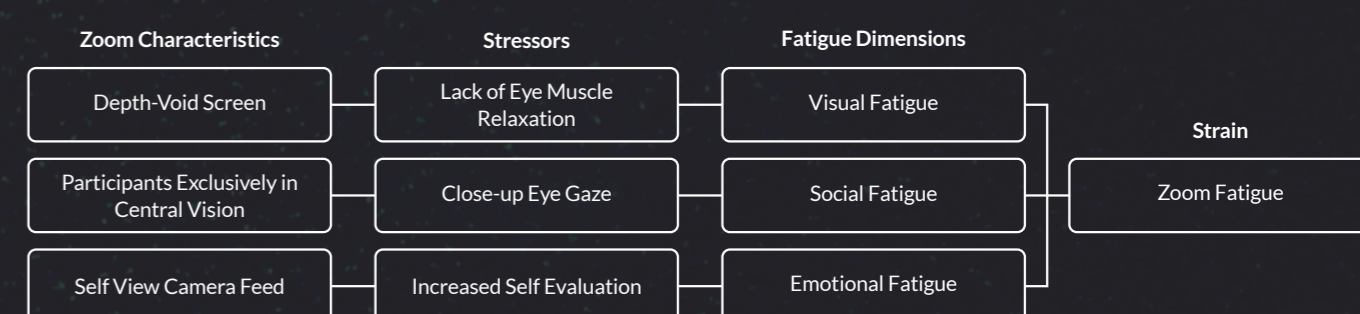
A total of 99 people fully completed the online survey. Many participants were from a UK university which had used Zoom extensively over the past couple of years; this resulted in 72.7% of respondents choosing Zoom as their most used videoconferencing software. This characteristic was beneficial towards the validity of the study, although data from less regular/other software users contributed towards a more well-rounded survey.

The validity of the survey results was confirmed using SmartPLS v. 3.3.9. After culling items with weak factor loadings, composite reliability values were all higher than 0.700, and all average variance extracted values greater than 0.500; this corroborates convergent validity. Discriminant validity was assessed using cross-loadings and the Fornell-Larcker criterion; both tests returned no problems, indicating discriminant validity. Multicollinearity was also not a concern in this study.

Future studies looking to validate this research should aim to have more items per latent variable to better represent each construct. Due to the already large number of items in this study (66), a better approach may be to run a set of smaller studies each with a larger number of items per construct.

## Minimising Fatigue

Pathway coefficients were assessed using the bootstrap resampling method with 5000 subsamples. Whilst many of the relationships were significant, of particular interest are the three pathways below:



The top-most path is the only highly significant path that runs through all three constructs. This implies that Zoom fatigue is largely caused by the lack of depth within an LED screen, and the resulting lack of eye muscle relaxation. The middle path was fairly significant, suggesting that the crowding of Zoom participants into our central vision can play a part in causing fatigue. This is because of the intimate interpersonal distance simulated between us and other participants. Lastly, the fairly significant bottom-most path indicates that viewing our webcam feed correlates to an increase in self-evaluation, and this leads to emotional fatigue (which is a dimension of Zoom fatigue).

These results were formatted into a structural-functional framework which concisely describes how each variable will effect the levels of Zoom fatigue. There are now clear steps that designers and technologists can take to improve our virtual interactions.

# interrogating Zoom fatigue

What exactly within videoconferencing software is making us feel fatigued?

By Jonah Ling, 25th January 2023

## Abstract

The boom of videoconferencing software during the pandemic left many loathing the technology due to its taxing nature. Guided by tested methodologies investigating stress and fatigue in information and communication technology (ICT), this study adopts the transactional theory of stress and coping (TTSC). This allows for the qualitative features within Zoom that cause fatigue to be tested through a quantitative online survey. It finds three characteristics (lack of depth in LED screens, crowding of participants into central vision, self-view camera feed) to be highly significant contributors to fatigue. A resulting structural-functional framework indicates the conditions under which Zoom fatigue occurs, listing clear propositions for controlling symptoms. The information presented here is intended to help inform designers and technologists, with the goal of achieving more natural and considered virtual interactions in the future.

## Highlights

- Zoom fatigue is examined using the transactional theory of stress and coping
- Three characteristics of Zoom are identified as significant influencers of fatigue
- A structural-functional framework for minimising Zoom fatigue is developed

## Keywords

Zoom fatigue, videoconference, computer-mediated communication, nonverbal behaviour, transactional theory of stress and coping, structural-functional analysis

## Critical Bibliography

### A Theory of Electronic Proximity

Korzenny, F. (1978) 'A Theory of Electronic Proximity', *Communication Research*, 5(1), pp. 3.

Korzenny employs structural functional analysis to produce an assessable framework for maximising electronic proximity. This dissertation aims to produce an equivalent framework for virtual communication, thus allowing us to define the optimum conditions for online conversation. Despite being written long before the internet became the giant it is today, the accuracy and continued relevancy of the paper validates the methodology, while Monge confirms the suitability of the approach for modelling communication in his 1972 thesis.

### Information and Communication Technology Overload and Social Networking Service Fatigue: A Stress Perspective

Lee, A. R., Son, S.-M. and Kim, K. K. (2016) 'Information and communication technology overload and social networking service fatigue: A stress perspective', *Computers in Human Behavior*, 55, pp. 51-61. Available at: <https://doi.org/10.1016/j.chb.2015.08.011>.

This paper analysed stress models and adopted the transactional theory of stress and coping (TTSC). It provides a validated framework for me to work from in order to offer an evidence-grounded argument for the causes of Zoom fatigue. The studies both deal with digital forms of communication, target similar users and are written within similar zeitgeists, encouraging the methodology to be appropriate for mirroring in this dissertation.

### Nonverbal Overload: A Theoretical Argument for the Causes of Zoom Fatigue

Bailenson, J. N. (2021) 'Nonverbal overload: A theoretical argument for the causes of Zoom fatigue', *Technology, Mind, and Behavior*, 2(1). Available at: <https://doi.org/10.1027/tmb0000036>.

Bailenson, in this seminal article, applies his knowledge on virtual human interactions to videoconferencing to give four main reasons as to why Zoom fatigue occurs. These theoretical hypotheses can be applied to the TTSC research model to test their validity and isolate the components of Zoom that are the main culprits of fatigue.

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A dissertation presented to the School of Architecture, Oxford Brookes University, in part fulfillment of the regulations for BA (Hons) in Architecture.

### Statement of Originality

The dissertation referenced in this poster is an original piece of work which is made available for copying with permission of the Head of the School of Architecture.

### Acknowledgements

I would like to thank my supervisor, Francesco Proto, for continually pushing me and my research towards greater rigour and maturity.

An additional acknowledgment to all 99 survey participants; thank you for your time and honesty in answering my questionnaire. And lastly, I am grateful to my parents for their eternal patience and support.



### Link to Dissertation

The dissertation, *Interrogating Zoom Fatigue*, can be viewed in its entirety by scanning the QR code to the left, or, alternatively, at the following link: <https://fb.ox/2kd7>

(N.B. The dissertation is graphically formatted to mimic the software Zoom in order to create an engaging user experience. Consequently, the file is best viewed on a computer rather than a phone screen)



### Contact Information, Portfolio and More

My contact information, portfolios, socials, LinkedIn and CV can all be found on my LinkTree. Access it by scanning the QR code to the left, or by navigating to the following web address: [linktr.ee/jonahling](https://linktr.ee/jonahling)

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