



Zoom Fatigue: A Review

Zoom Yorgunluğu: Bir Gözden Geçirme

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ABSTRACT

A novel coronavirus disease (COVID-19) pandemic is not just about physical health; It disrupts daily life on a global scale by changing individual and social attitudes and behaviors. In these conditions, video conferencing applications are becoming mainstream worldwide for the continuation of work, social life and education. Video conferences have helped us to remotely connect study rooms, classrooms, but after attending one or 2 virtual meetings, listening to an online webinar or two, and perhaps speaking, people begin to express feeling exhausted and nervous. Thus, a new term emerged, also named after a popular application, resulting from the excessive use of video conferencing platforms: 'Zoom Fatigue'. Zoom fatigue is defined as feeling tired after a meeting over a video conferencing tool. Fatigue appears to be different and specific from normal work fatigue. Mechanisms specific to existing video conferencing applications that can cause Zoom Fatigue are suggested. The first mechanism mentions mirror anxiety, which can be triggered by self-gaze in video conferences. The second mechanism is the feeling of being trapped by the need to stay within the camera's field of view. The other mechanism has to do with the increased cognitive load of managing nonverbal behaviors in this new communication environment. COVID-19 is increasing the long-anticipated trend of remote work. Even as social distancing recommendations are eased and face-to-face meetings become safe again, video conferencing apps seem to have the potential to continue to increase productivity and save energy.

Keywords: Zoom, fatigue, nonverbal communication, hypergaze

ÖZ

Yeni bir koronavirüs hastalığı (COVID-19) pandemisi sadece fiziksel sağlığı değil; bireysel, toplumsal tutum ve davranışları değiştirerek küresel boyutta günlük hayatı kesintiye uğratmaktadır. Bu koşullarda iş, sosyal hayat ve eğitimin devamı için video konferans uygulamaları dünya genelinde ana akım haline gelmektedir. Video konferanslar ve sohbetler bize çalışma odalarını, sınıfları uzaktan bağlamak, uzun mesafeleri ilişkileri sürdürmek ve COVID-19 günlerinde birliktelik duygusunu teşvik etmek için yardımcı oldu ancak bir veya 2 sanal toplantıya katıldıktan, bir veya iki çevrimiçi web seminerini dinledikten ve belki de konuşmacı olduktan sonra kişiler bitkin ve gergin hissettiklerini ifade etmeye başlamaktadırlar. Böylece video konferans platformlarının aşırı kullanımından kaynaklanan, popüler bir uygulamanın da adını taşıyan yeni bir terim ortaya çıktı: 'Zoom Yorgunluğu'. Zoom yorgunluğu video konferans aracı üzerinden yapılan bir toplantı sonrası yorgun hissetme olarak tanımlanmaktadır. Yorgunluğun normal iş yorgunluğundan farklı ve spesifik olduğu görülmektedir. Zoom yorgunluğuna neden olabilecek mevcut video konferans uygulamalarına özgü, mekanizmalar öne sürülmektedir. İlk mekanizmada, video konferanslarda kendi kendine bakış tarafından tetiklenebilen ayna kaygısından bahsedilmektedir. İkinci mekanizma, kamera görüş alanı içinde kalma ihtiyacı nedeniyle kapana kısılmış olma duygusudur. Diğer mekanizma, bu yeni iletişim ortamında sözlü olmayan davranışları yönetmenin artan bilişsel yükü ile ilgilidir. Video konferanslarda sözlü olmayan iletişim dilini hem üretmek hem de yorumlamak için bilinçli çaba ve dikkat gerekmektedir. COVID-19 uzun zamandır olması tahmin edilen uzaktan çalışma eğilimini arttırmaktadır. Halen sosyal mesafeli tavsiyeler hafifletilse, yüz yüze toplantılar tekrar güvenli hale gelse bile video konferans uygulamaları üretkenliği artırmaya ve enerji tasarrufu sağlamaya devam etme potansiyeline sahip gibi görünmektedir.

Anahtar sözcükler: Zoom, yorgunluk, sözsüz iletişim, hiperbakış

Introduction

COVID-19 was first reported in the city of Wuhan in December 2019 (Li et al. 2020). Due to its rapid spread and high morbidity and mortality rates, it was declared a public

health emergency of international concern in January 2020 by the World Health Organization and a pandemic on March 11, 2020 (WHO 2020). All over the world, public health measures designed to prevent the spread of the disease, such as travel restrictions, quarantine practices, curfews, social distancing rules, have been implemented.

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In this respect, the pandemic is not only about physical health; It has disrupted daily life on a global scale by changing individual, social, attitudes, and behaviors. In these conditions for the continuation of work, social life, and education, video conferencing applications have become mainstream worldwide. The Zoom app has allowed the business to continue as usual during quarantine and restrictions, allowing people to make their lives online by following social distancing rules. While only 10 million people attended meetings on Zoom at the end of 2019 before the coronavirus spread, usage reached 300 million by 2020 (Morris 2020). Besides, while video conferencing has been shown to use less than 10% of the energy required for a face-to-face meeting, another recent review also shows that telecommunications save energy (Ona et al. 2014, O'Brien 2020).

In a study, 10,591 participants tested the relationship between videoconference fatigue and five theoretical nonverbal mechanisms (mirror, anxiety, being physically trapped, excessive gazing through a grid of facing faces, and the cognitive load from generating and interpreting nonverbal cues). It was found that it estimated the amount of fatigue, that women held longer meetings with short breaks than men, and that women reported more fatigue (Fauville et al. 2021). 26% of 4,600 participants stated that they did other things during online meetings in another survey study. In comparison, 27% stated they tried to focus their attention but could not do this most of the time, which contributed to fatigue (Dallon 2020).

A study examining the nature of videoconferencing fatigue, when it occurs, and what characteristics are associated with fatigue shows that meetings at certain times of the day are associated with a higher level of fatigue than expected in employee fatigue. Group belonging is the most consistent protective factor against video conferencing fatigue (Bennett et al. 2021).

Considering that the concept of zoom fatigue has recently emerged with the pandemic, empirical studies on its causes and consequences are still few. This review aims to review the literature information about zoom fatigue and determine the strategies to prevent fatigue.

Definition

Thanks to technology, the separate areas of our pre-COVID-19 life, such as work, school, social life, and family, occur in the same place. In this period, technological support is used to fulfill many roles in our lives, including professional, social relationships, leisure activities, and therefore the boundaries become blurred and complex. Video conferences and chats help us connect study rooms, classrooms remotely, maintain long-distance relationships, and promote a sense of togetherness in the days of COVID-19. However, after attending a few virtual meetings, listening to a few online webinars, and perhaps speaking, people feel exhausted and begin to express that they feel nervous (Epstein 2020). Thus, the term 'Zoom Fatigue'

has emerged, inspired by the name of a popular application resulting from the excessive use of video conferencing platforms (Wiederhold 2020, Sklar 2020).

Zoom fatigue is defined as feeling tired after a meeting via video conferencing (Nardi 2020, Bennet et al. 2021). While zoom fatigue is mainly seen in work and education, it can also be experienced due to non-work meetings, and the results of feeling exhausted due to video conference calls also cover other aspects of one's life. In addition, due to frequent and prolonged virtual interactions, the person experiences anxiety and distraction. People begin to feel indifferent to doing something, have a pessimistic attitude towards events, have difficulty focusing and remembering what they have learned, have negative thoughts about themselves and others, experience future anxiety, and have low life satisfaction (Bothra 2020).

Possible Causes

The causes of fatigue are different and specific from normal work fatigue, such as avoiding distractions from technology and paying more attention due to the absence of non-verbal cues. A recent article suggests four mechanisms specific to existing video conferencing applications that cause Zoom fatigue (Bailenson 2021). The first mechanism is mirror anxiety, which self-gaze can trigger in video conferences. Our camera acts as a ready-made mirror during social interactions. Studies in this direction show that exposure to digital and physical mirrors can increase self-focused attention, which may lead to adverse effects, including anxiety and depression (Ingram et al. 1988, Fejfar and Hoyle 2000, Gonzales and Hancock 2011). In addition, mirror anxiety seems to have the potential to indirectly contribute to the risk of eating disorder behaviors by increasing preoccupation with appearance. Posting self-images online has been shown to negatively affect body image and mood in predisposed individuals among young women (Mills et al. 2018).

The second mechanism is the feeling of being physically trapped by the need to stay within the camera's field of view. Studies are showing that reduced mobility weakens cognitive performance (Oppizzo and Schwartz 2014). In face-to-face meetings or training, people can move. They stand up to use the board, stretch, scribble on notebooks, walk to get a drink, but mobility is limited in a narrow space in virtual conversations.

The third mechanism refers to hyper gaze, the perceptual experience of constantly having people's eyes in our field of vision. During face-to-face meetings, the speaker tends to draw the gaze of others. However, during video conferences, all participants, no matter who they are, receive each other's direct gaze—looking at even digital faces while talking causes physiological arousal and anxiety (Takas 2019).

The last mechanism relates to the increased cognitive load of managing nonverbal behaviors in this new communication

environment. Nonverbal cues contribute to interpersonal relationships, social judgment, and task performance (Burgoon et al. 2002). Nonverbal communication occurs unconsciously and spontaneously during interpersonal interactions, but conscious effort and attention are required to produce and interpret non-verbal communication language in video conferences (Kendon 1970, Hall et al. 2019). In video conferences, giving appropriate reactions at the appropriate time or making exaggerated movements to be seen on the screen and participating in the production of non-verbal behaviors that typically occur naturally increases the cognitive load (Hinds 1999).

Contributing Factors

Attention restoration theory recognizes that fatigue results from the mental effort required to maintain attention (Kaplan 1995). Recent studies also show that video conferences are more tiring than face-to-face meetings due to increased constant attention (Spataro 2020). The sense of distance instilled through video communication encourages distraction and multitasking (looking at phone messages, checking emails, watching tik-tok videos, shopping online) rather than just focusing on the meeting. Extra efforts such as multitasking also contribute to mental fatigue (Wiederhold 2020).

Additionally, many video conferencing programs have a chat function that can be useful for clarifying topics and sharing ideas. Nevertheless, the person is further distracted by typing questions in the chatbox, waiting for answers, and following the current conversation. Alternatively, while continuing to focus on the conversation with the need to ask questions and comments, turning up the volume and trying to be involved in the conversation without interrupting the flow of the program requires additional effort. In the survey conducted with 350 university students, it was reported that 80% of the participants had difficulty focusing their attention in zoom lessons and felt more isolation and anxiety compared to face-to-face lessons (Peper et al. 2021).

A timed series of vocalizations, gestures, and movements is used to communicate, and precise responses from the other party are used to determine whether we are understood (Wiederhold 2020). Under normal circumstances, both the speaker's facial expression and body language are noticed and responded to, which is perceived as feedback by the other person. Regular communication typically involves whole-body movements, which energize the speaker and listener and increase attention (Kendon 2004).

In a face-to-face conversation, people make great sense of turn-taking, agreement, and head and eye movements that help make sense of a range of emotional cues (Kleinke 1986). We receive verbal and nonverbal signals (tone of voice, hand movements, body language) from the whole body to understand what the other person is saying or whether what we are saying is understandable. During a face-to-face conversation, the focus is partly on spoken words. However,

at the same time, additional meanings are drawn from many non-verbal cues (whether the person is facing you or slightly back, fidgeting while you are speaking, or preparing to interrupt and breathe rapidly). These clues help draw a holistic picture of what is conveyed and what is expected from the listener (Sklar 2020). Watching a tablet screen or computer monitor, where only people's faces are framed, gestures are not visible, and attention must be focused only on the spoken word eliminates nonverbal communication clues. Currently, 'prolonged eye contact' in videoconferencing is becoming the most potent facial cue achievable.

Apart from losing synchronization, other factors make video conferencing difficult and tiring in personal communication. It is known that the lack of verbal and non-verbal feedback during social evaluations in adults creates stress (Birkett 2011, Gruenewald et al. 2004). Therefore, online communication is not a natural way to chat. The person is forced to focus intensely to understand the speech content. People prefer coordinated timing, synchronicity, hearing voice, seeing gestures, and tracking movements, but virtual communication is not synchronized. Video conferencing often causes a slight delay between the speaker's actions and the participants seeing the action. When the video is not clear and the spoken word does not match the speaker's lips, the eyes and the brain work harder to resynchronize these communication parts to understand what is said and what is meant, which contributes to increased fatigue (Epstein 2020). Usually, when a person's facial response shows an expression, it signals security and allows communication and intimacy to develop. It has been shown that if the person does not show a facial expression (your calm/flat face), we unconsciously interpret this as a danger sign (Porges 2017).

Even the way we voice over video conferencing requires effort. A study comparing face-to-face interaction with video conferencing showed that people spoke 15% louder when interacting in the video (Croes 2019). Similarly, the importance of sensory feedback was shown in a study in which mothers were instructed not to respond to their babies with facial and body cues, as babies became uncomfortable when the mother was unresponsive (Tronick et al. 1975).

In a study, in a test environment with two listeners and one speaker, instead of taking the natural head movements of the speaker who typically scans the room, looks at his notes, and makes eye contact when appropriate, both listeners perceived a direct and uninterrupted gaze from the speaker. The participants were asked to evaluate the augmented gaze situation. Listeners reported that they did not feel in harmony with the speakers and the interaction was not smooth (Bailenson 2005).

Another factor contributing to zoom calls fatigue is seeing our real-time camera feed, staring at ourselves throughout hours of meetings and training. Seeing ourselves talking and communicating is an entirely new experience, while until now, we have no idea what we look like when communicating.

For some, self-seeing can increase anxiety and negative self-judgment, which is more common in young people (Degges-White 2020). The effect of seeing oneself in a mirror has been explored for many years, starting with pioneering work that showed that people are more likely to evaluate themselves when they see a mirror image (Duval and Wicklund 1972). There are studies in which self-assessment can create stress and that mirror image viewing is associated with a negative effect. While mirrors are used in these studies, few studies have specifically examined the effect of seeing oneself through video (Fejfar and Hoyle 2000). In these studies, the duration is short, and the participants are shown a mirror image for less than 1 hour. To the best of our knowledge, data on the effects of self-monitoring for hours a day are not yet available. Looking at these studies, it seems likely that being in front of a mirror constantly on Zoom causes self-evaluation and adverse effects.

Due to the angle of view of the cameras, the transition to the Zoom environment means that we sit more and more. Although gestures can be used in a zoom call, we need to be in this area to be seen by others, which prevents us from moving. Studies show that mobility leads to better performance in meetings. It has been shown that walkers find more creative ideas than sitters and that children who need to move with their hands while learning mathematics make learning more permanent than the control group (Cook et al. 2008, Opezzo and Schwartz 2014). In another study, it was shown that when students performed some physical activities (for example, jumping in place) for only one minute to reduce the effect of sitting, they reported significantly increased emotional energy and attention levels (Peper et al. 2017).

Zoom Fatigue Scale

Fauville et al. (2021), the zoom fatigue scale consists of 15 items and five sub-dimensions (general, visual, social, fatigue, and emotional fatigue). In a recent Turkish adaptation and validity and reliability study, it has been shown that participants who enjoy and enjoy participating in video calls have low zoom fatigue. High fatigue level was detected in those who saw video calls as unnecessary or burdensome and made many daily video calls. The general, social, motivational fatigue sub-dimension scores and zoom fatigue scale scores of those who left less than 30 minutes between virtual interviews were significantly higher than the scores of the participants who took a break of more than 30 minutes between interviews. Participants working from home and on the hybrid model were compared with those working remotely, and it was shown that those working from home or on the hybrid model reported higher levels of zoom fatigue. It has also been reported that the social fatigue and emotional fatigue scores of the participants working in the hybrid model are significantly higher than the scores of the participants working from the workplace (Akduman 2021).

Recommended Methods to Reduce Zoom Fatigue

Some strategies are suggested to reduce fatigue in Zoom meeting participants. Human energy levels, including fatigue levels, can fluctuate throughout the day. Past research suggests that specific experiences can alter an individual's level of fatigue (Gartner 2020). Given that meetings are impactful events, they have been shown to affect fatigue levels throughout the day (Bothra 2020). In a study investigating the fatigue levels of people after video conference meetings, it was revealed that meetings held at different times of the day affected the fatigue of individuals beyond what was expected, and the fatigue was higher later in the day. For this reason, it is recommended that meetings be held earlier in the study period, at a time that is least tiring for as many participants as possible (Bennett 2021).

It is suggested that when individuals are allowed to interact socially with others, they are more likely to feel part of a group (Fauville 2021). Therefore, it is recommended to improve the perceptions of group belonging. In one study, a higher sense of belonging was associated with less post-meeting fatigue (Bennett 2021). It is expected to improve the sense of belonging to the group by making the participants more connected and reducing fatigue by making them more interested in participating in the meeting (Akduman 2021).

It is suggested that fatigue arises from the mental effort required to maintain attention. Individuals can reduce fatigue in various ways, such as "separating" from features that cause distraction or require constant attention (Kaplan 1995). Mute while speaking avoids distractions such as background noise, making it easier for everyone in the theme to pay attention with less effort. If not speaking, muting the microphone is also recommended to reduce fatigue. In addition, the use of mutes can reduce the time spent worrying about maintaining a quiet environment during meetings and reduce the levels of fatigue it causes. It has been shown that individuals who remain silent during meetings experience less fatigue. However, the interaction between group belonging and mute was found that at low levels of group belonging, using the mute more frequently was associated with increased fatigue, whereas using mute was not significantly associated with fatigue when perceptions of group belonging were high (Bennett 2021).

Turning off one's webcam is seen as another "disengagement" method that can reduce fatigue by reducing the number of distracting stimuli on the computer screen. It also reduces time spent worrying about how coworkers look, their facial expressions, how clean their house is, or what they will think of the video footage if it is turned off, which causes less fatigue. In one study, many participants cite that one reason they feel videoconferencing is tiring is that they feel pressured to be "open" and pay more attention to their "look and clothing." On the contrary, some meeting participants state that having their cameras on increases their sense of belonging to the

group. Considering that higher group belonging is associated with less fatigue, leaving a person's webcam on can reduce fatigue if it increases their sense of belonging to the group (Bennett 2021). One participant states that they use webcams more often because for people who have not yet returned to the office during the pandemic, turning them on helps them stay connected on a personal level.

Using the "Hide" view is another option that helps reduce fatigue. More images appearing on the screen means more stimuli and distractions. In a study on videoconferencing fatigue, one participant described the effect of seeing himself as "I find myself much more distracted when looking at my video." Not being able to see it while others are still watching the video footage reduces the time spent worrying about how the view or the background looks, increases belonging to the group, and makes the interview less tiring.

During video conferences, it is recommended to look away from the screen, stand up and walk around, and take breaks during long sessions. Breaks (during or between meetings) allow participants to 'break off', which is a critical way individuals can reduce fatigue, according to attention restoration theory (Bennett 2021). "Sometimes I turn off my webcam for a short time when I need to get up and get away from the computer or take a short break," said one participant in the study. Another participant experienced the video conferencing experience as "continuous back-to-back zoom meetings every hour throughout the day. No time to take a break, walk or chat with others as in real life/face-to-face." Evidence shows that even short breaks can help reduce fatigue levels (Bennett 2020).

There is evidence that group norms are associated with higher levels of cohesion and productivity (Gully et al. 1995, Chatman and Flynn 2001). There is a view that establishing group norms (e.g., use of silent and webcam, acceptability of multitasking, when/how to talk) can reduce fatigue in two ways. First, when strong norms exist, individuals experience less uncertainty about acceptable behavior and when such behavior should occur (Hackman 1992). When such norms exist, individuals do not have to worry about what they should do, which reduces fatigue. In one study, a participant states that part of his fatigue stems from not being sure of what the expectations are. When there are strong norms, individuals may feel more strongly connected to the group, which increases their level of interest and participation in the meeting and thus results in less fatigue (Kaplan 1995).

Conclusion

The cognitive load of being watched for hours on Zoom and interpreting non-verbal cues in communication is added to the physical fatigue experienced after speaking in front of a crowd. Direct eye contact is used sparingly. In a face-to-face meeting, it is rare for a listener to look at another listener for a long time and stare at the speaker without stopping. Even in one-on-one meetings where there is no third object to look at, such as a board or projection screen, participants have been

shown to spend significant parts of the interaction averting each other's gaze (Morris 2020, Nardi 2020). The only way to show we are paying attention in a Zoom meeting is to look at the camera. With the application, everyone gets the front view of the other without interruption. It is like looking down in a crowded subway car or being forced to look directly at someone standing too close instead of looking at the phone. Since faces are also more significant when we take the elevator, it has been shown that riders try to solve this by looking down and trying to reduce the amount of mutual gaze (Bailenson 2021).

In a preliminary study of personal space, anything less than 60 cm is classified as intimate, a type of interpersonal distance pattern reserved for families and loved ones (Argyle and Dean 1965). In Zoom grids, faces are more significant than face-to-face when calculating how groups are naturally located in physical conference rooms. Having a person's face enlarged in our field can be perceived as threatening and causes the secretion of stress hormones in our body, which explains why we feel restless and exhausted after a video call (Wiederhold 2020).

As a result, video conferencing applications make our lives easier during the pandemic process and become a tool that ensures business and school life. With COVID-19, many people integrate zoom and other video conferencing applications into their work and social lives in a short time, and opportunities such as screen sharing become critical. Even if social distancing recommendations are eased, and face-to-face meetings become safe again, our prejudiced attitude towards virtual meetings changes. It is estimated that working from home will become permanent in some positions after the pandemic. In addition to many innovations, applications also bring challenges. Online fatigue causes various mental problems in real life. With the uncertainty of how long the pandemic will last, video conferencing applications seem to have the potential to continue to take place in our lives, increasing productivity and saving energy, being aware of the physical and mental disorders they cause.

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